

OCCURRENCE OF RED KITES *Milvus milvus* IN SERBIA BASED ON BIRDS TRACKED BY TELEMETRY DEVICES

Pojavljanje rjavih škarnikov *Milvus milvus*, spremljanih s telemetrijo, v Srbiji

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1. Introduction

Red Kite *Milvus milvus* is an opportunistic raptor of mixed habitats containing fragmented forests and open land for breeding and roosting. It is essentially a European species, and outside Europe it is found only scattered in North Africa. The total population of Western Palearctic (and of the world) is between 25,000 and 33,000 breeding pairs, with Germany, Switzerland, France, and Spain being the most important areas for its occurrence and accounting for about 90% of the world population (GÉNSBØL & THIEDE 2008, BIRDLIFE INTERNATIONAL 2015).

The Red Kite breeding population in Serbia became nearly extinct during the second half of the 20th century (RAŠAJSKI & MARINKOVIĆ 2000), as fewer than 10 breeding attempts were recorded since 1950 (ŠĆIBAN *et al.* 2015). During 1977–1996, Red Kites were observed in the breeding period at only three locations. In the second half of the 20th century, there were also few observations of Red Kites outside the breeding period, including wintering birds (RAŠAJSKI & MARINKOVIĆ 2000). At the end of the century, however, the species appeared more and more often even during the breeding period (PUZOVIĆ 2002). The estimated

population was 3–5 pairs at that time, and the trend was defined as increasing (with breeding pairs numbering 2–3 in Vojvodina, 0–1 in Central Serbia, and 1 in Kosovo and Metohija) (PUZOVIĆ *et al.* 2003). Breeding has not been confirmed since the beginning of the 21st century, although the birds were present during the breeding period at several sites in Vojvodina (ŠĆIBAN *et al.* 2015). Nevertheless, the breeding population in Serbia and Montenegro was estimated at 3–5 pairs (BIRDLIFE INTERNATIONAL 2004). More recently, the estimate of breeding pairs in Serbia was only 0–1 for the 2008–2012 period (BIRDLIFE INTERNATIONAL 2015). Similarly, PUZOVIĆ *et al.* (2015) classified the Red Kite population in Serbia as probably extinct, with possibly just one breeding pair. Outside the breeding period, there were few observations of Red Kites throughout the year (RAŠAJSKI & MARINKOVIĆ 2000, ŠĆIBAN *et al.* 2015). Although the species is still rare in Serbia, some additional observations have been published (RAKOVIĆ 2003, MÉRŐ & ŽULJEVIĆ 2011), with the species occurring especially during the breeding time (ŠĆIBAN 2003, TUCAKOV 2005, HULO 2016).

In 2014, we began using telemetry to study the biology of Red Kite populations in Austria, the Czech Republic, and Slovakia. These countries are located in the eastern part of an area where Red Kite occurs at a relatively low density, its population including only 28–35 breeding pairs (an estimate for 2011–2012), about 125 pairs (2015), and approximately 9 pairs (2014) in Austria, the Czech Republic, and Slovakia, respectively (BIRDLIFE INTERNATIONAL 2015, RAK 2016, MADERIČ & SVETLÍK 2015). Because some individuals tagged with loggers occurred in Serbia, we were able to characterize some spatiotemporal activities of Red Kites in this country. That is the aim of this paper. Information about Red Kite habitat demands in southeastern parts of Europe can be helpful from a pan-European point of view in protecting this threatened raptor species.

2. Methods

From 10 July 2014 until 31 March 2018, a total 95 Red Kites were fitted with telemetry devices in the Czech Republic (61 birds), Austria (26 birds), and Slovakia (8 birds). Some of these birds (5 from the Czech Republic, 3 from Austria, 5 from Slovakia)

were found to be using Serbian territory and could be characterized as being there during the post-breeding (autumn) migration and/or spring migration.

Saker H loggers (20 g; Ecotone, Sopot, Poland) were used to track the birds. The loggers were fitted onto the backs of birds using harnesses (backpack) with 6 mm Teflon ribbon encircling the body by two loops around the bases of the wings and joined in front of the breastbone. The loggers work in GPS (global position system)/GSM (global system for mobile communication) systems or in GPS/GSM/UHF (ultra-high frequency). GPS positions of the birds were collected according to individual setting (1 position fixed every 5 min to 6 h) and were sent by SMS (short message service) via local mobile telephone operators to the Ecotone Center in Poland, where they were saved and archived or data were uploaded by receivers locally and again saved and archived. Coordinates of bird positions providing the basis of information about their occurrence were transformed into curves on a map in order to visualize the spatiotemporal activities of the birds examined. Subsequent positions were connected by line on the figure using GIS (geographic information system) and ArcGIS and QGIS software, and ESRI Basemaps (ESRI Global Inc., USA, www.qgis.org) were used for GIS analysis and map visualization.

We analyzed data for the stay of each Red Kite tracked in Serbia, and we counted the number of days in individual months during which each bird stayed in Serbia. We also determined the locations used by each bird as points localized by GPS and connected them by lines as the shortest distance between the two points. Using combined temporal and spatial data, we determined areas in Serbia most attractive for migrant Red Kites.

3. Results and discussion

We found 13 Red Kites that occurred from 2014 until the end of March 2018 in Serbia (Table 1). These birds stayed in Serbia for a total of 138 days. The birds occurred mostly in the northwestern part of Serbia in Vojvodina within an area bordering Croatia (Figure 1). Crossings of the border were frequently observed in the western part of Serbia (at the borders with Bosnia and Herzegovina, Montenegro, Albania). We revealed

two main periods of Red Kite occurrences in Serbia (Figure 2). The first period was from March until June, with the most observations occurring in April. The second period was from August until November, with the most observations in October. One Red Kite (D 6162) died during its stay in Serbia. This occurred on 21 September 2017 near the village of Ritiševo in the northeastern part of Serbia. The body of this bird was found (Figure 3) and subsequent laboratory examination revealed

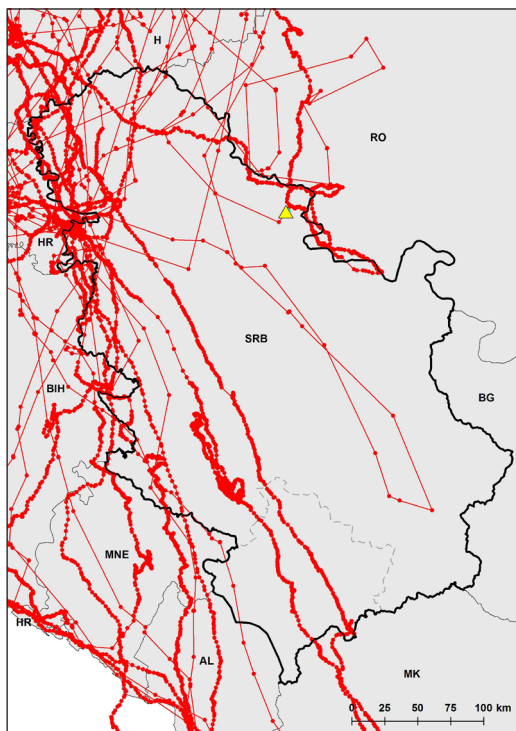


Figure 1: Occurrence of tagged Red Kites *Milvus milvus* during their stays in Serbia. Circles depict the positions of birds. Every line connects successive GPS positions of a bird. The yellow triangle shows the place where one poisoned bird was found. Country abbreviations: AL – Albania; BG – Bulgaria; BIH – Bosnia and Herzegovina; H – Hungary; HR – Croatia; MK – Macedonia; MNE – Montenegro; RO – Romania; SRB – Serbia.

Slika 1: Pojavljanje s telemetrijom spremljanih rjavih škarnikov *Milvus milvus* v Srbiji. Krožci označujejo položaj ptic, črte pa povezujejo njihove zaporedne lokacije. Trikotnik označuje kraj najdbe zastrupljenega osebk. Okrajšave držav: AL – Albanija; BG – Bolgarija; BIH – Bosna in Hercegovina; H – Mađarska; HR – Hrvatska; MK – Makedonija; MNE – Črna gora; RO – Romunija; SRB – Srbija.

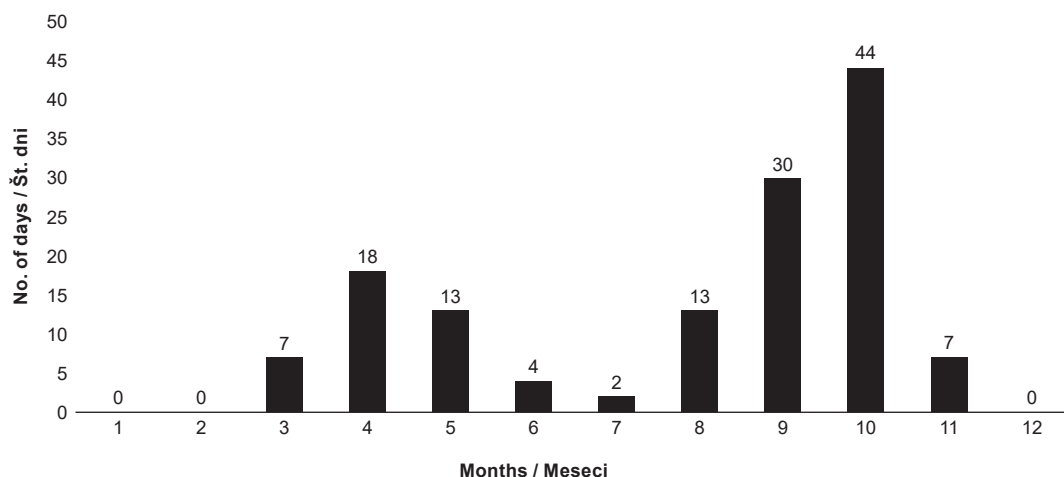


Figure 2: Dynamics of the annual occurrence of Red Kites *Milvus milvus* in Serbia. Numbers of days were counted as number of one bird/one day stays, 2014–2018, cumulative data.

Slika 2: Sezonska dinamika pojavljanja rjavih škarnikov *Milvus milvus* v Srbiji. Sešteti so dnevi, ki jih je v posameznem mesecu posamezna ptica preživela v državi, 2014–2018, kumulativni podatki.

poisoning of the bird by carbofuran (Naučni institut za veterinarstvo „Novi Sad”, Novi Sad, Serbia, Dr. Radomir Ratajac, 2 February 2018).

Whereas South European Red Kite populations are resident, most of the North European birds migrate to winter around the Mediterranean, with some flying on to North Africa and Turkey (GÉNSBØL & THIEDE 2008). Interestingly, in the past 25 years an increasing proportion of the population in Sweden, Germany, Switzerland, and France has spent the winter close to or within the breeding range, as has always been the case for the small population in central Wales. This tendency is possibly due to milder winters in recent decades and perhaps also to the greater availability of food. The young birds migrate separately, ahead of the adults, which are then probably influenced by the weather conditions (GÉNSBØL & THIEDE 2008).

As revealed in this study, Red Kites originating from central Europe appear in Serbia. In some parts of central Europe, the population density is now slowly growing. In the Czech Republic, for example, Red Kite recolonized the country after about 100 years of absence, and 1976 was the year of the first confirmed breeding (ŠTASTNÝ *et al.* 2006). Since that time, the population has expanded to 30–50 breeding pairs in 1985–1989, 70–100 breeding

pairs during 2001–2003, and to about 125 breeding pairs at present (BIRDLIFE INTERNATIONAL 2004, ŠTASTNÝ *et al.* 2006, RAK 2016). Further east within eastern Europe, Red Kites breed only sporadically in a limited number of pairs (3–10 pairs in Belarus, 1–10 pairs in Ukraine, 1–6 pairs in Russia, and probably no breeding pairs in Romania and Bulgaria) (BIRDLIFE INTERNATIONAL 2015).



Figure 3: Cadaver of a poisoned Red Kite *Milvus milvus* with a telemetry logger. The bird D 6162 (see Table 1) died near Ritiševo on 21 September 2017. Photo: I. Đorđević.

Slika 3: Truplo zastrupljenega rjavega škarnika *Milvus milvus*. Ptica D 6162 (glej tabelo 1) je poginila blizu Ritiševa dne 21. 9. 2017. Foto: I. Đorđević.

Table 1: Red Kites fitted with telemetry loggers and registered in Serbia (each bird was tagged as a pullus at a nest). Country abbreviations: A, Austria; CZ, Czech Republic; SK, Slovakia

Tabela 1: Rjavi škarniki, opremljeni z oddajniki, ki so bili registrirani v Srbiji (vsak osebek označen kot mladič v gnezdu). Krajšave držav: A, Avstrija; CZ, Češka; SK, Slovaška.

Red Kite number/ Številka rjavega škarnika	Origin of bird: country, coordinates of the nest, year/ Izvor ptice: država, koordinate gnezda, leto	Terms of occurrence in Serbia/ Obdobje pojavljanja v Srbiji	No. of days spent in Serbia/ Št. dni preživetih v Srbiji
CT 753	CZ, 48.78 N, 17.06 E, 2016	14 Oct. 2016	1
CT 754	CZ, 48.75 N, 17.03 E, 2016	4-5 Oct. 2016	2
CT 1457	CZ, 48.78 N, 17.07 E, 2017	28-29 Jul. 2017	2
CT 1682	CZ, 48.62 N, 16.95 E, 2016	27-29 Mar. 2017	3
CT 1913	CZ, 48.75 N, 16.78 E, 2017	14-18 Aug. 2017, 19-23 Sep. 2017	10
D 5603	SK, 48.93 N, 21.75 E, 2015	23-24 Aug. 2015, 26-31 Aug. 2015, 3-4 Sep. 2015, 12-13 Sep. 2015, 19-20 Sep. 2015, 22-30 Sep. 2015, 1-3 Oct. 2015, 5-13 Oct. 2015, 16-25 Oct. 2015, 28-31 Oct. 2015, 22-23 Apr. 2016, 11-12 Jun. 2016, 20-21 Sep. 2016, 16-17 Mar. 2017, 24 Mar. 2017	58
D 5605	SK, 48.93 N, 21.75 E, 2015	2-3 Sep. 2015	2
D 5607	SK, 48.93 N, 21.84 E, 2016	22-28 Oct. 2016	7
D 6161	SK, 48.93 N, 21.84 E, 2016	28 Mar. 2018	1
D 6162	SK, 48.90 N, 21.77 E, 2017	19-21 Sep. 2017	3
JC 57509	A, 48.42 N, 16.85 E, 2015	12-15 Nov. 2015	4
JC 57514	A, 48.55 N, 16.77 E, 2015	21-23 Sep. 2015, 21-22 Oct. 2015, 24-25 Oct. 2015, 28-31 Oct. 2015, 1-3 Nov. 2015, 17-30 Apr. 2016, 1-13 May 2016, 2-3 Apr. 2017	43
JC 75455	A, 48.60 N, 16.92 E, 2016	8-9 Jun. 2017	2

We found that Red Kites occurred mostly in the western part of Vojvodina. In Croatia, Red Kites nested rarely in the northeastern part of the country (Croatian Baranja) until the 1960s (BARIŠIĆ 2013). Recently, no breeding pairs have been known there (BIRDLIFE INTERNATIONAL 2015) and, according to the Croatian Bird Migration Atlas (KRALJ *et al.* 2013), it seems that Red Kite migration routes lie outside this country. Nevertheless, some vagrants and wintering birds are known. Wintering in Croatian Baranja was noted from 2002 (BARIŠIĆ 2013), but exact data were scarce. In 2002, at least two Red Kites wintered in Croatian Baranja (TOMIK in BARIŠIĆ 2013). Recently, seven Red Kites were observed in Jagodnjak in Croatian Baranja during 26–27 January 2015, together with one black

kite *Milvus migrans* (LITERÁK *et al.* 2017). Eight wintering Red Kites were observed at the same place in Jagodnjak on 22 January 2017 (I. LITERÁK & H. MATUŠÍK, *unpublished observation*). In Punitovce in Slavonia (bordering on Croatian Baranja), 11 and 2 wintering Red Kites were observed on 21 January 2016 and on 23 January 2017, respectively (I. LITERÁK, R. PETRO, H. MATUŠÍK, *unpublished observation*). In an adjacent area of Hungarian Baranya, some Red Kites have wintered as well (for example, one bird was observed in January 2016) and recently most of the breeding territories within Hungary have been located there (DUDÁS 2014, MÓROCZ *et al.* 2015, NAGY *et al.* 2016).

Baranja/Baranya is a historical geographical region between the Danube and Drava rivers.

Its territory is now divided between Croatia and Hungary. In Serbia (bordered by Croatia and Hungary including Baranja/Baranya), Red Kites stopped to nest in the second half of the 20th century (RAŠAJSKI & MARINKOVIĆ 2000). It now seems that Red Kites occur in the southern part of the Pannonian Basin (Baranja/Baranya/Vojvodina Province of Serbia) more frequently than in the second half of the 20th century, not only based on our results but also according to some direct observations (A. TOMIK *pers. comm.*). This lowland area has a character of agricultural landscape with small fields and meadows, small to medium-sized forest patches and small villages which probably meets the requirements of Red Kites. Other parts of Serbia were used by Red Kites to a substantially lesser extent.

The pattern and dynamics of Red Kites' occurrence in Serbia corresponded well to the notion that Red Kites presently occur in Serbia during spring and autumn migrations. The Red Kite population has been well monitored in Switzerland, and we can see some similarities (AEBISCHER 2009). In Switzerland, juvenile Red Kites started their migration between 27 September and 9 October. The birds arrived to their winter quarters between 3 October and 25 October. Juveniles then left their winter quarters between 10 March and 26 April (adults between 4 January and 14 March). Similarly as in Serbia, the spring migration of Red Kites in Switzerland peaks in April and the autumn migration during October.

We can speculate that as the density of Red Kites in central Europe continues to increase, the wintering of Red Kites in Vojvodina will occur more often than in the past. This area could become the next core area for Red Kite nesting in Serbia, thereby extending the area in Baranja/Baranya that is suitable for recovery of the wintering and nesting Red Kite population. Young Red Kites originating in Austria, the Czech Republic, and Slovakia and migrating through Serbia could provide a base for the next breeding population in this area, which has landscape characteristics appropriate for Red Kite breeding. Since the 1970 discovery of the first roosts of wintering Red Kites in Switzerland, the numbers of wintering and nesting birds have steadily increased (AEBISCHER 2009). Thus, the tendency to winter in central

Europe is real, even though many individuals continue, as in the past, to migrate to south Europe (AEBISCHER 2009).

At present, the most pertinent threat for Red Kites in Europe is illegal direct poisoning, indirect poisoning from pesticides, and secondary poisoning from consuming rodents poisoned by rodenticides spread on farmland (SMART *et al.* 2010, BIRDLIFE INTERNATIONAL 2015). We documented a case of illegal poisoning with carbofuran in a Red Kite in Serbia.

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4. Abstract

A total of 13 Red Kites *Milvus milvus* fitted with GPS/GSM telemetry loggers in central Europe were tracked in Serbia from 10 July 2014 until 31 March 2018. These birds remained in Serbia for 138 days (counted as number of one bird/one day stays). Red Kites occurred mostly in the Vojvodina Province (NW Serbia). They were registered most often in April and October, which corresponded to their spring and autumn migrations. It is possible that Red Kites occur in Serbia more often than formerly, and this could in future result in this threatened European raptor's more frequently wintering and breeding within the country.

Povzetek

S telemetrijskimi napravami smo označili 13 rjavih škarnikov *Milvus milvus* v srednji Evropi in med 10. 7. 2014 in 31. 3. 2018 spremljali njihovo pojavljanje v Srbiji. Ti osebki so se v Srbiji zadrževali 138 dni. Večina opazovanj je iz Vojvodine (SZ Srbija). Najpogostejše so se pojavljali med selitvijo – aprila in oktobra. Morda se vrsta v Srbiji pojavlja pogostejše, kot smo domnevali doslej, v prihodnje se zato lahko nadajamo njenega pogostejšega prezimovanja ali celo gnezdenja v državi.

Key words: *Milvus milvus*, raptor, vagrancy, migration, poisoning

Ključne besede: *Milvus milvus*, ujeta, selitev, zastrupitev

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GULL ATTACKS ON MIGRATING BIRDS AT ADA ISLAND (S MONTENEGRO)

Napadi galebov na ptice selivke na otoku Ada (J Črna gora)

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1. Introduction

Migration poses a high risk for birds as they can experience mortality rates 15 times higher compared to that in stationary periods (SILLET & HOLMES 2002). Abundant evidence points to heavy mortality of migrating landbirds during long sea-crossings (NEWTON 2008). One of the dangers faced by migrant passerines are specially adapted avian predators like Eleonora's Falcon *Falco eleonorae* and Sooty Falcon *F. concolor* (NEWTON 2008) in addition to opportunistic predatory species, like gulls (MACDONALD & MASON 1973). Yellow-legged gulls *Larus michahellis* are omnivorous. The species is well known as a scavenger, food-pirate and for its predatory habits by taking birds in aerial-pursuits (e.g. passerines at sea; MACDONALD & MASON 1973, WITT 1974). In some species predation by Yellow-legged gulls can account for a large percentage of total mortality (e.g. up to 33% in Storm Petrels *Hydrobates pelagicus* at Benidorm Island in Spain) (ORO *et al.* 2005). Other studies have shown that specialized individuals perform most of the kills (ORO *et al.* 2005, GUILLEMETTE & BROUSSEAU 2001, FINNEY *et al.* 2001). Similarly, the Black-headed gull *Chroicocephalus ridibundus* exploits a very wide range of potential food items, including occasional predation on songbirds (CRAMP 1985). Particularly at the northern shores of the Mediterranean Sea and

in the Atlantic, the populations of Yellow-legged gull have increased considerably in the second half of the 20th century (VIDAL *et al.* 1998). An example are the breeding numbers on Berlenga Island (120 ha), Portugal, where the population rose from c. 1000 breeding pairs (bp) in June 1939 to a peak of c. 22.500 bp in 1994 (MORAIS *et al.* 1998). Such a high breeding density in large nesting colonies can cause serious damage to other animal and plant species, especially if their populations are weak or have a very limited range (VIDAL *et al.* 1998). In contrast, the Black-headed gull experienced a moderate decline in Europe in the period between 1980 and 2015 (EBCC 2017).

In a study of bird migration by ground observations at the east coast of the Adriatic Sea in Montenegro (SACKL *et al.* 2014, 2016), Yellow-legged and Black-headed gulls were regularly present in numbers up to several 100 birds. While the study aimed to document the magnitude of visual bird migration at the coast off the Bojana-Buna Delta (Montenegro/Albania) we used the opportunity to evaluate the impact of gulls on migrating birds.

2. Methods and study area

Migrating birds were counted from the end of February till the beginning of April 2015 on a daily basis between sunrise till at least noon. Gull attacks were studied for 32 consecutive days between 17 Mar and 10 Apr 2015. Altogether we covered 205.2 observation hours. The observation point was located on the seafront of Ada Island at the mouth of Bojana-Buna River at the border between Montenegro and Albania. The study area and also the detailed method of bird-migration monitoring is described in more detail by SACKL *et al.* (2014). There are two main directions of migration at the site, along the coast to SE (i.e. ducks, gulls, loons, some waders) and from the sea to the coast in NE direction (i.e. some waders, birds of prey, herons) (SACKL *et al.* 2016). Our study was conducted within a study of waterbird migration at the south-east coast of the Adriatic Sea. While scanning the horizon for migrating waterbirds, birds from other taxonomic groups were also observed. They were identified to species if possible. While observing migrating birds gull behaviour was recorded. We

recorded the species of the attacker and the species and the number of birds being attacked. We also recorded whether or not the attack was successful, i.e. the attacked bird was caught and/or eaten.

3. Results

Between 24 and 334 gulls of two to eight species were present on any given day in the selected period, not including actively migrating birds (Table 1). Two of the most abundant species, Black-headed and Yellow-legged gulls, represented 37–100% of gulls present. During the same period, we observed 20 attacks involving 22 individuals of six species and on one unidentified passerine. In four instances gulls attacked birds of prey, in two Hoopoe *Upupa epops* and in 16 cases passerines. Except for two cases when groups of two individuals were attacked, gulls attacked individuals migrating singly. In all cases more than one gull was involved. Three species of gulls were observed to attack migrants: Black-headed *Chroicocephalus ridibundus*, Yellow-legged *Larus michabellis* and Mediterranean gull *Ichthyaetus melanocephalus*. Only Yellow-legged gulls were observed attacking birds of prey (i.e.: Marsh Harrier *Circus aeruginosus* and Short-eared Owl *Asio flammeus*), while all three species attacked other taxons of migrants. In two cases an attack

was successful: one Black-headed gull caught and ate a Robin *Erithacus rubecula* and a Yellow-legged gull caught and ate a Skylark *Alauda arvensis*. Thus, attacks were successful in 12.5% of observed cases ($n = 20$). Both passerines and Hoopoes reacted in the same way when attacked. In all cases attacked birds tried to stay above the attackers by continuously ascending to higher altitudes until they reached the shore where they plummeted into the forest behind the shoreline. This usually worked well and the gulls retreated after the attacked bird reached the shore. In case of a successful attack Yellow-legged gulls were taking turns in attacking the Robin and finally a Black-Headed gull joined in, caught it and ate it. In the case of Skylark, the bird seemed exhausted and was already flying very close to water. When it landed only a few meters from shore it was caught and eaten by one of the Yellow-legged gulls.

In the studied period 2,021 passerines (of 29 taxa), 20 Hoopoes and 128 birds of prey (of 11 taxa) were recorded. Gulls attacked 0.8% of all observed migrating passerines (Table 2). This percentage was higher (1.3%) when active fliers like swallows were excluded. On the other hand, when only birds migrating alone and birds migrating in pairs were included, the attack rate was 9.5%. The highest percentage of attacked individuals was registered with Robin (20.4%). The only observed

Table 1: Gulls *Laridae* present (not migrating) at the coast of Ada Island at the river mouth of the Bojana-Buna River, 17 Mar to 10 Apr 2015.

Tabela 1: Galebi *Laridae* prisotni na obali otoka Ada na ustju reke Bojane-Bune na meji med Črno goro in Albanijo, 17. 3.–10. 4. 2015.

	No. of individuals in period 17.3.–10.4.2015				
	Sum	Min	Average	Max	Days present (%)
<i>Chroicocephalus genei</i>	7	1	1	1	22.6
<i>Chroicocephalus ridibundus</i>	1123	3	36	88	100.0
<i>Hydrocoloeus minutus</i>	150	1	12	24	41.9
<i>Ichthyaetus melanocephalus</i>	213	1	12	105	58.1
<i>Larus canus</i>	47	1	2	6	71.0
<i>Larus cachinnans</i>	1	1	1	1	3.2
<i>Larus michabellis</i>	1066	4	34	281	100.0
<i>Larus fuscus</i>	3	1	2	2	6.5

Wren coming in from the open sea was attacked. Robins that mostly migrated singly (88.5%) were attacked in around one in five cases. On the other hand, Skylarks migrated mostly in groups with only around five percent of individuals migrating singly or in pairs and only 0.5% individuals were attacked. Those migrating singly or in pairs were attacked in almost 10% of cases. We recorded 20 migrating Hoopoes and observed two attacks on this species. Birds of prey were attacked in much lower percentages than passerines. Most of the recorded raptor species are fast flyers, like falcons (43 individuals) or large and heavier species, like Osprey *Pandion haliaetus* (4 individuals). Out of 65 harriers (*Circus* sp.) only one attack was recorded. On the other hand, 15 ind. of owls (Strigiformes) were recorded and they were attacked in three cases.

4. Discussion

Based on our data, around one percent of all passerines approaching the mainland from the

Adriatic Sea can expect an attack by gulls. Species with slower flight speeds, i.e. owls and Hoopoes, and species which mostly migrate singly, i.e. owls and Robins, appear to be more prone to attacks. Birds migrating across the sea lose weight and if conditions are unfavourable can be exhausted upon reaching the land (NEWTON 2008). We observed apparent exhaustion several times. One Robin landed twice on the surface of the sea before landing on the shore, where it rested exposed on the sand for at least five minutes. Also, especially exhausted birds and birds flying low are the main target of gulls (MACDONALD & MASON 1973). Our observations support this, since one of two killed birds was a Skylark with apparent signs of exhaustion. Unlike Ada where smaller species were attacked more often, MACDONALD & MASON (1973) report the most frequently attacked species to be thrush-size species like Starlings *Sturnus vulgaris* and Blackbirds *Turdus merula*.

In some areas larger numbers of predators accumulate in response to potential prey and can

Table 2: Migration volume and numbers of migrants attacked by gulls in front of the river mouth of the Bojana-Buna River, 17 Mar to 10 Apr 2015

Tabela 2: Število selivk in selivk, ki so jih napadli galebi na ustju reke Bojane-Bune, 17. 3.–10. 4. 2015.

	No. of migrating individuals between 17.3–10.4.2015		No. of attacks	% of attacked individuals		% of killed individuals	
	all individuals	birds migrating singly or in pairs		all individuals	birds migrating singly or in pairs	all individuals	birds migrating singly or in pairs
<i>Alauda arvensis</i>	588	31	3	0.5	9.7	0.2	3.2
<i>Erithacus rubecula</i>	61	54	11	18.0	20.4	1.6	1.9
<i>Troglodytes troglodytes</i>	1	1	1	100	100.0		
Unidentified Passeriformes	37	5	1	2.7	20.0		
All Passeriformes	2021	370	16	0.8	4.3		
Passeriformes without hirundines	1207	168	16	1.3	9.5		
<i>Upupa epops</i>	20	16	2	10	12.5		
<i>Asio flammeus</i>	13	11	3	23.1	27.3		
<i>Circus aeruginosus</i>	61	57	1	1.6	1.8		
All Birds of prey	128	108	4	3.1	3.7		

remove up to 10 % of migrants of a certain prey species (NEWTON 2008), which is similar to our study. Difference being, that in the present case the attackers were opportunistic and not obligatory predators. The lack of predator accumulation at Ada may be the result of a widely dispersed migration of passerines across the Mediterranean (NEWTON 2008) or simply of low passerine migration across the Adriatic. Gulls are widespread species along the coasts of Europe and MACDONALD & MASON (1973) believed that they may be one of the most important predators of many species of small migrating birds. Although there are at least five falcons adapted to take either spring or autumn migrants across the Mediterranean (NEWTON 2008), it would seem likely that in case of sparse or unpredictable migration where only opportunistic predation is feasible, gulls would have important impact on small migrants. Migration can account for up to 85 % of apparent annual mortality (SILLET & HOLMES 2002) and the relative importance of this mortality to overall annual mortality is unclear (NEWTON 2008). It is thus difficult to estimate the impact of gull attacks on migrants. Also, the mortality of migrants may be increased by other opportunistic predators, like Hooded Crow (ZDUNIAK *et al.* 2008), that were also present on Ada.

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5. Abstract

Migration poses a high risk to birds. Crossing of large bodies of water is especially demanding for land birds. One of the dangers faced by migrants are opportunistic predators like gulls. Most gulls Laridae are generalist predators with omnivorous diets. Attacking on migrating birds was investigated during ground observations of bird migration at Ada Island (S Montenegro) between 17 Mar and 10 Apr 2015. We recorded 20 attacks on 22 individuals of six species and on one unidentified passerine. In four instances gulls attacked birds of prey, in two

Hoopoe *Upupa epops* and in 16 passerines. Except for two cases when small flocks of two birds were attacked, gulls attacked individuals migrating singly. Considering our data around one percent of passerines migrating during the day across the southern Adriatic Sea can expect to be attacked by gulls. This percentage can be as high as 9.5% for passerines migrating singly.

Povzetek

Tekom življenja selitev pogosto pticam predstavlja obdobje z največjo smrtnostjo. Za kopenske vrste je še posebej zahtevno prečkanje večjih vodnih površin, kot so morja. Ena izmed nevarnosti za selivke so ob specializiranih plenilcih kot so sokoli *Falco*, so priložnostni plenilci kot so na primer galebi. Večina vrst galebov Laridae je vsejedi in oportunističnih plenilcev. Med 17.3. in 10.4.2015 sva avtorja na otoku Ada v izlivu reke Bojane na meji med Črno goro in Albanijo beležila napade galebov na ptice selivke. V napadih so bile zabeležene tri vrste galebov, rumenonogi *Larus michahellis*, rečni *Chroicocephalus ridibundus* in črnoglavi galeb *Ichthyetus melanocephalus*. Skupaj je bilo zabeleženih 20 napadov na 22 osebkov šestih vrst in na eno nedoločeno vrsto ptice pevke. V štirih primerih so galebi napadli ujedo oz. sovo, v dveh smrdokavro *Upupa epops* in v 16 ptico pevko. Z izjemo dveh primerov, ko je bil napad izveden na skupino dveh osebkov, so bile napadene posamezne ptice. Največ napadov je bilo zabeleženih na taščico *Erithacus rubecula* (11 napadenih osebkov, kar predstavlja 18% vse opazovanih taščic), po deležih pa na močvirsko uharico (3; 23,1%). Glede na zbrane podatke galebi napadejo približno 1 % ptic, ki se tekom dneva selijo čez južni Jadran. Za ptice pevke, ki se selijo posamič, je ta odstotek bistveno višji (9,5 %).

Key words: selitev, galebi

Ključne besede: migration, gulls

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