

Importance of the Adriatic Flyway for the Common Crane (*Grus grus*)

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Abstract:

The paper presents Common Crane (*Grus grus*) migration data and identifies key resting sites on the western Balkan peninsula and Eastern Adriatic. The Adriatic Flyway project undertook the first studies of Common Crane migration in the region between 2007 and 2010. Observations indicate two separate routes: (a) across the Slovenian karst and Istria to the Po basin in autumn, and (b) across the central Dinaric karst and the Adriatic via Bosnia-Herzegovina, Croatia and in some cases Montenegro in both autumn and spring. Counts indicated that the overwhelming majority of cranes resting in Hungary in autumn – by our estimates 80 % – use the latter route to reach North Africa. Cranes on the Baltic-Hungarian-Adriatic route outnumber those crossing Slovenia to northern Italy by a factor of ten. The lack of safe roosts and resting sites in the western Balkans, particularly along the Adriatic coast and on islands in Croatia, thus poses a significant threat to Common Crane.

Keywords: Common Crane, *Grus grus*, Balkan, Adriatic flyway, Karst, migration, resting, bird crime.

Introduction

Common Crane (*Grus grus*) migration between Europe and Africa has been little studied. Migration southward from Hungary in autumn is generally described as crossing the Balkan peninsula on two routes: one over the Adriatic Sea, and a second, more easterly route via Bulgaria, Greece and the Aegean (Prange 2010). Except for a study in Italy (Mingozzi *et al.* in Prange 2008), no current publications on Common Crane migration across the central Mediterranean were available, despite recent major changes to migration patterns including those that resulted from the establishment over the last decades of a large roosting site in Hortobagy National Park in Hungary (Prange 2010). Common Crane migration over the western Balkans and the Eastern Adriatic was studied for the first time in 2007-2010 in the framework of the Adriatic Flyway Project (cf. Denac *et al.* 2010).

The current paper presents information on migration and resting sites as well as dangers encountered on the western Balkan peninsula and eastern Adriatic by Common Crane using what we would like to call the **“Baltic-Hungarian-Adriatic route.”** It then opens a discussion about the origin of the cranes migrating across Slovenia and the northern Adriatic.

Method

For four years, from 2007 through 2010, water birds on the three priority wetlands on the Adriatic coast of the Balkans – Livanjsko Polje, the Neretva delta and Lake Scutari with the Bojana/Buna delta – were counted four times annually. Over the course of project implementation, the group of observers grew to include approximately 30 people and the collection of data on migrating and resting cranes was increasingly conducted on an ongoing basis. Data were tabulated for the areas south of the Sava and Danube rivers in Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Montenegro, Macedonia and Albania. The region, 800 km in length and on average 250 km wide, is dominated by largest continuous karst area in Europe (Stumberger 2010). The karst mountain range runs parallel to the Adriatic coast and includes the Dalmatian islands. The data set presented is based on formal monitoring of priority sites, the mid-winter waterbird census (IWC) that took in the most important wetlands both along Eastern Adriatic coast and **further inland, and chance sightings (“dispersed observations”).** Each of 275 collected observations with its own set of parameters was stored as a GIS project.

Results and Discussion

Migration

From 2007 to 2010, we tallied 156 observations that included 24,629 migrating cranes. Common Crane can cross the Adriatic Sea virtually anywhere, but concentrations in our observations of migrating cranes indicate two separate main routes: (a) across the Slovenian karst and Istria to the Po basin in northern Italy in autumn and (b) across the central Dinaric karst in Bosnia-Herzegovina, Croatia and in some cases Montenegro via the Dalmatian islands to southern Italy in both autumn and, in reverse, in spring. Those routes are well substantiated by observations of Common Crane (fig. 1). The springtime route across the central Dinaric Karst in Bosnia-Herzegovina mainly follows the Neretva-Bosna river corridor inland to the Pannonian plain, but weather conditions can cause it to shift as occurred in spring 2009 and 2010. Winds from the south-west led birds to arrive on the coast of Albania and Montenegro, including the Bojana/Buna Delta (cf. Schneider-Jacoby *et al.* 2006). They then flew NW to Bosnia before turning NE (Suorsa 2010, own data).

On the basis of flight directions on the two routes, the migrating cranes appear to have different origins.

The route via Slovenia to the Po basin follows the southeastern edge of the Alps. Birds following it in autumn likely do not originate in Hungary. The route across the central Dinaric karst, on the other hand, is clearly an extension of the Baltic-Hungarian route, and it is used in spring as well as autumn. Only a few observations suggest interaction between the two routes, and they involve very few birds. On November 5, 2009, birds flying westward across the Sava in Zagreb, Croatia, were seen to join the main corridor and continue down the Sava toward the SSE. Birds crossing Slovenia generally continue to northern Italy (Bordjan & Stumberger in prep.).

Our observations suggest that a majority of the birds resting in Hungary take off toward the SSW, heading for Slano Kopovo in Serbia/Vojvodina or Jelas Polje in Croatia (Setina, in litt.), and then use the Adriatic Flyway (Denac *et al.* 2010)* to reach their winter quarters in North Africa. During spring migration in 2010, we collected observations of 11,479 Common Crane returning on the same route. Since there is no regular monitoring scheme, that may be only a small fraction of the overall number of birds.

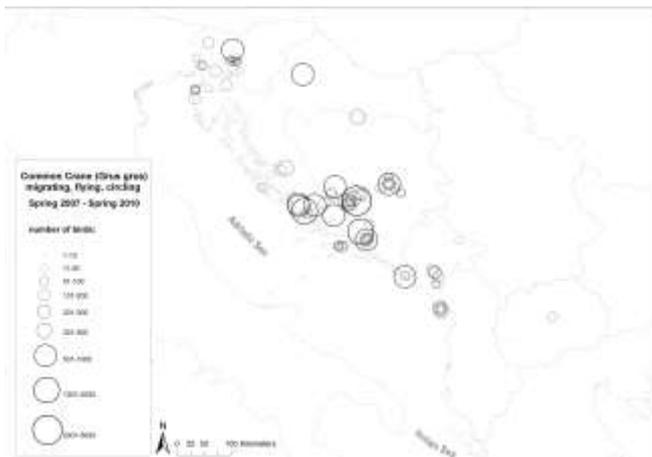


Fig. 1: Migrating Common Crane in the western Balkan peninsula and Eastern Adriatic 2007-2010 ($N_{ind}=24629$, $N_{obs}=156$)

Roosting and resting

There are no traditional Common Crane roosts on or near the eastern Adriatic coast. The closest are Slano Kopovo (45°37'N 20°12'E) in Serbia and Jelas Fishponds (45°08'N 17°45'E) in Croatia, located 210 km and 350 km from the sea, respectively. Both are on the southern edge of the Pannonian plain. Up to 20,000 cranes have been reported for Slano Kopovo and up to 7,000 for Jelas Fishponds in recent years, with maximum numbers reached in autumn (cf. Knežev *this publ.*, Lukač 2000, Šetina in litt).

Crane resting, feeding and roosting sites south of the Sava and Danube are sited almost exclusively in karst fields or poljes in the Dinarids (a.k.a. Dinaric Alps) at elevations of up to 1,300 m (Stumberger 2010, Stumberger & Schneider-Jacoby 2010). Periodic flooding in

the poljes plays an important role, especially in **spring, but the cranes' stopovers are brief and confined to small spaces.** Areas of open water in the flooded meadows are important as they permit ice-free feeding and nighttime roosting. Study was concentrated on the stopover sites in most frequent use by Common Crane, Duvanjsko polje and Livnansko polje. Mostarsko polje, as well, has gained importance in recent years as a resting site. All the sites are in Bosnia-Herzegovina.



Fig. 3: Observations of resting, feeding and roosting Common Crane in spring in the western Balkan peninsula and Eastern Adriatic, 2007-2010 ($N_{ind}=9032$, $N_{obs}=119$)

Winter observations

January seems to be the only month without important migration events. Common Crane in Slovenia in mid-winter are a rare and recent phenomenon (data collected by Dejan Bordjan):

- 12.1.2008, Marof (periodical karst lake Cerknica), 56 birds feeding
- 23. – 28.1.2008, Črna vas – Matena (peat fens in Ljubljansko Barje), 7 birds
- 24. – 31.1.2009, Črna vas – Matena - Notranje Gorice (peat fens in Ljubljansko Barje), many observations of same flock of 52-56 birds
- 3. – 22.1.2010, Zbure (NE Novo Mesto), 2 birds, adult and juvenile
- 16.1.2010, Postojna, 1 bird feeding (Karst field)

Bosnia-Herzegovina saw a remarkable increase in cranes in January 2009 due to an especially harsh winter on the Pannonian plain:

- 15.1.2008, Livno (Livanjsko polje), 3 birds feeding
- 19.1.2009, Zahum, Rama (artificial reservoir), 147 birds migrating toward S
- 23.1.2009, Duvanjsko polje, 150 birds migrating toward S

We made no observations of cranes in January anywhere on the eastern Adriatic coast nor on the islands

from 2007 to 2010. Intense bird hunting and poaching activity makes it impossible for cranes to use otherwise ideal wintering sites with a mild seaside climate.

Bird crime and Common Crane

Cranes arriving in the Bojana/Buna Delta in spring do not land (Schneider-Jacoby et al. 2006). The delta is divided between Montenegro and Albania, and the local people on the Albanian side consider Common Crane a desirable quarry (interview with inhabitant of Reci, March 17, 2010). The birds instead try to gain height to reach poljes in the mountains where **bird hunting is not so popular, for example near Nikšić in Montenegro** (compare Soursa 2010). Even Common Cranes flying against heavy bora winds, just 1-2 meters over the surface of the Adriatic in spring, will climb at an angle of 30 degrees to reach heights of 150-250 m before entering the Bojana/Buna delta. The birds bypass the coastal wetlands in favor of poljes located at elevations up to 1,300 m. A flock of 26 cranes arriving on the morning of March 21, 2007 too exhausted to continue made an attempt to land on Lake Scutari in Albania, which is a Ramsar Site. By noon, the flock had been reduced to 17 cranes flying back and forth along the northern lakeshore.

Killing of cranes has been reported from Montenegro as well – both on the Zeta Plain near Podgorica and **in Lovćen National Park (Saveljić et al. 2004). In Bosnia-Herzegovina**, at least 10 cranes were killed at their roost in the Rama reservoir during the morning after the majority of birds had left (**Šarčević in litt.**). Crippled birds with wings or legs damaged by gunfire have been documented in Mostarsko Blato (**Dervović in litt.**). **Casualties among large bird species** including Great Bustard, Little Bustard, Flamingo and herons are high, so that there is obvious danger to resting cranes (Schneider-Jacoby & Spangenberg 2010). Even hunting ban areas such as Lake Scutari National Park in Montenegro and Hutovo Blato Nature Park in Bosnia-Herzegovina are frequented by poachers, as are privately owned hunting ban areas including the Ulcinj salt works (Solana Ulcinj, Montenegro), as well as the core zones of the Ramsar Sites Neretva delta (Croatia) and Buna River (Velipoja Reserve, Albania). Many poachers build semi-permanent blinds and some even use decoys and calls designed to attract protected species such as Ferruginous Duck, Black-Tailed Godwit and curlews.

Conclusions

Baltic-Hungarian-Adriatic migration route

Observations of Common Cranes in the central Dinaric karst (fig. 1) suggest that a distinct migration route runs from the Pannonian plain to the Adriatic and continues across southern Italy to North Africa. The Baltic-Hungarian-Adriatic migration route – the

name we would like to propose for it – is substantiated by a range of recoveries (Nowald 2010). Records of cranes with transmitters indicate that birds flying as far south as Hungary continue to migrate to the SW and not the SE (cf. <http://www.satelliittikurjet.fi> and <http://birdmap.5dvision.ee>). The number of migrating cranes crossing Bulgaria toward the SE is very limited (Dimitar Popov, in litt.), and it appears that this route from Hungary to the SE has not been used by large flocks of Common Crane in recent years.

An alternative route for Common Crane apparently follows the south-eastern edge of Alps, with a bottleneck over the Slovenian karst, and connects to the Western European Flyway. Mingozzi *et al.* (2008) describe increasing numbers of migrating cranes in northern Italy. Data from Slovenia (Bordjan & Stumberger in prep.) fit well with that new development. However, available observations put the total number of cranes using the more northerly route in autumn at around one-tenth of those using the Baltic-Hungarian-Adriatic route.

Lack of roosts and resting sites

The lack of safe roosting and resting sites in the western Balkan peninsula, particularly along the Adriatic coast and on the Croatian islands, is a major problem for Common Crane.

Each year in spring, flocks of Common Crane use the poljes in the karst hinterlands as stopover sites on their return to nesting sites in central and northern Europe (Fig. 2). On average, the poljes are situated at 700 m above sea level, up to a maximum of 1,300 m. In contrast to the coastal plains and wetlands, they are often covered with snow and ice. Storms in the mountains force cranes to land for long periods, as they did in spring 2010. Due to the heavy hunting pressure and ubiquitous bird crime, none of the potential resting sites along the Adriatic coast is suitable for cranes. They clearly avoid landing in heavily hunted areas such as the Bojana/Buna delta or around Lake Scutari. Yet the birds urgently need rest between the Mediterranean and the Dinaric Alps, where ridges reach heights of 2,800 m.

Given the extensive wetlands and mild climate, cranes could easily spend the entire winter on the Adriatic coast. But hunting makes longer stays impossible. Despite their protected status, cranes are regarded as fair game in Albania and parts of Montenegro and Bosnia-Herzegovina. The most important step toward effective crane conservation would be to stop illegal killing and enforce large hunting ban areas. ADENEX described how Natura 2000 could be used to establish a network of reserves for cranes

(Fernandez & Ferrero 1990). A detailed zoning scheme for the most important wetlands was proposed by EuroNatur in the Adriatic Flyway report (Denac *et al.* 2010).

Numbers of Common Crane using the Adriatic Flyway*

Beside the analysis of such threats as hunting pressure (Schneider-Jacoby & Spangenberg 2010) and habitat loss (Stumberger & Sackl 2010) and the identification and protection of potential stopover sites on the western Balkan peninsula, the most interesting question is the overall number of cranes using the Adriatic Flyway to reach North Africa (Smart 2010). Based on our data and the numbers of cranes counted in Algeria – more than 15,000, according to presentations during the 7th ECC – and Tunisia (Smart 2010), we are convinced that the importance of the Adriatic Flyway for Common Crane is much higher than was previously suspected. Observations indicate that an estimated 80 % of cranes resting in Hungary cross the central Dinaric karst and proceed along the Adriatic Flyway to their wintering grounds in North Africa, and that they outnumber cranes heading WSW across the Slovenian Karst and Istrian Peninsula to the Po basin – whatever their origin – by a factor of ten. The central importance of the Adriatic Flyway is only now emerging, as is the magnitude of the damage caused by shooting.

*According to the biogeographic regionalisation scheme given by Wetlands International (2006), the sites described here belong to the Eastern Mediterranean Region. We defined the Adriatic Flyway as a core area inside the huge Black Sea/Mediterranean Flyway for waders

(<http://www.wingsoverwetlands.org/>) or European Siberia/Black Sea-Mediterranean Flyway for Anatidae (Boere and Stroud 2006). The East Atlantic Flyway and West Asian/East African Flyway follow the coastal zones of East and West Africa (Stroud *et al.* 2004), with waterbirds exploiting coastal wetlands and largely following shorelines. The Black Sea/Mediterranean Flyway is alone in crossing the Mediterranean basin from NE to SW. It is used by European and some Siberian waterbirds to reach wintering grounds in North Africa including Tunisia and the inner delta of the Niger. The Adriatic Flyway Project focuses on its stopover (staging) sites on or near the Adriatic coast of the Balkans.

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Zusammenfassung

Der Artikel stellt Zugdaten sowie Hauptrastgebiete des Graukranichs (*Grus grus*) an der westlichen Balkan-Halbinsel und östlichen Adria vor. Erste Forschungen des „Adriatic Flyway- Project“ innerhalb dieser Region wurden zwischen 2007 und 2010 durchgeführt. Die Untersuchungen ergaben zwei verschiedene Routen: (a) Über die slowenische Karstregion und Istria hin zur Po-Ebene im Herbst und (b) über den zentraldinarischen Karst und die Adria via Bosnien-Herzegovina, Kroatien und vereinzelt Montenegro in Herbst und Frühjahr.

Zählungen ergaben, dass die überwältigende Mehrheit der in Ungarn rastenden Kraniche im Herbst letztere Zugstrecke nutzen, um Nordafrika zu erreichen (nach unserer Einschätzung 80%). Kraniche der baltisch-ungarisch-adriatischen Zugstrecke übertreffen die über Slowenien nach Norditalien ziehenden Individuen zahlenmäßig um das zehnfache. Das Fehlen sicherer Schlaf- und Rastplätze in den westlichen Balkanstaaten, speziell an der Adriaküste und auf einigen Inseln in Kroatien, stellt somit eine signifikante Gefahr für den Graukranich dar.

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