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THE ORIGIN OF CASPIAN GULLS *Larus cachinnans* WINTERING IN CROATIA

Porijeklo pontskih galebova Larus cachinnans koji zimuju u Hrvatskoj

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ABSTRACT

The Caspian Gull is a breeding species of eastern Europe and central Asia, whose breeding range has over the last 100 years been expanding to western parts of Europe. It is regularly seen on migration and wintering in Croatia. Since the historical literature data for *Larus cachinnans* in Croatia mainly refer to the Yellow-legged Gull, the aim of this research was to determine the origin of Caspian Gulls wintering in Croatia. Recoveries from the Prudinec rubbish dump in Zagreb and the ones obtained from the ringing archive of the Institute of Ornithology, Croatian Academy of Sciences and Arts have been analysed. Ringed individuals seen in Croatia belong to the populations from central and eastern Europe, and the first ringed individual from the Black Sea population has been recorded. Compared to the available literature data, four new countries of origin of Caspian Gulls seen in Croatia have been recorded: Lithuania, the Czech Republic, Hungary, and Romania. The longest distance from the place of recovery (Croatia) to the place where the individual has been ringed (Ukraine) is 1507 kilometres. Ringed individuals were recorded in Croatia from October to March.

Keywords: *Larus cachinnans*, Caspian gull, gulls, origin, rubbish dump

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INTRODUCTION

The Caspian Gull *Larus cachinnans* is a large gull that inhabits eastern Europe and central Asia, but its populations have undergone a considerable range expansion over the last 100 years. Their breeding range has expanded from eastern Europe to Lithuania in the north, and the Netherlands in the west, with the species now breeding in several central and western European countries: Poland, Belarus, Slovakia, the Czech Republic, Lithuania, Germany, Hungary, and The Netherlands (Neubauer *et al.* 2007, Litwiniak *et al.* 2021). They mostly nest in colonies on rocky, grassy, and sandy islands, and on rooftops of buildings (Burger *et al*. 2020, Litwiniak *et al.* 2021). Their breeding season lasts from March to July after which they migrate to western, central, and northern Europe, where they can be seen amongst other large gulls, often feeding at rubbish dumps (Zagalska-Neubauer & Neubauer 2012, Burger *et al*. 2020).

Due to the fact that the Caspian Gull and the Yellow-legged Gull *Larus michahellis* were considered to be subspecies, and the difficulty with the identification of individuals, and distinction between the two species, most of the historical literature data referring to *Larus cachinnans* collected in Croatia refer to the Yellow-legged Gull. The first relevant data for the Caspian Gull were published after a gull research had been carried out at the Prudinec rubbish dump in Zagreb (Jurinović 2006). The Yellow-legged Gull is a regular breeding species in Croatia (Kralj 2013), while the Caspian Gull is regularly seen on migration and wintering (Jurinović 2013). Ringed individuals of Caspian Gulls were recorded in Croatia from December to March, and they originated from eastern and central European populations, with no reported recoveries of individuals from the Black Sea or the Caspian Sea populations (Jurinović 2013).

MATERIALS AND METHODS

The study took place at the Prudinec rubbish dump in Zagreb, Croatia (45°46′00.3″N 16°01′32.0″E) which is situated on the right bank of the Sava River. From 2001 to 2005, the research of gulls at the rubbish dump had been carried out once a week during the whole year (Jurinović 2006). Since 2006, the research has been carried out from November to March, with irregular visits to the rubbish dump in each season. Colour plastic rings with digit-letter code have been read by L. Jurinović, L. T. Taylor, A. Kota, B. Božić, B. Ječmenica, D. Dender, E. Fritze, K. Leskovar, D. Kralj, K. Rajaković, S. Kapelj, M. Gamser, M. Szymański, M. Zec and S. Peev. The reading was done using a spotting scope and from photos of colour plastic rings with digit-letter codes on the ringed individuals that were mainly taken by L. Jurinović.

Gulls have been caught and ringed at the Prudinec rubbish dump since 2006. Until the season 2009/2010, the birds had been caught with clap-nets, after which

the method was changed to canon-nets (Gosler 2004, Brajdić 2017). The used methods were not selective, and individuals of different gull species were caught. All the caught gulls were ringed with a metal ring on one leg and a colour plastic ring with digit-letter code on the other, the species and their age was determined, and they were safely released. For this research, only the data collected for the Caspian Gull have been analysed. Individuals that were ringed on mixed colonies and those whose species was not determined have not been included in the analysis.

We have made three analyses of the recoveries of Caspian Gulls in Croatia from 2001 to 2021:

1. Recoveries were selected following Arizaga *et al*. (2010) with selecting one recovery per month if individuals were seen more than once in the same month. This analysis included individuals recovered in Croatia that have been ringed either in Croatia or in other European countries. The recoveries were grouped by months in which the ringed individuals were seen.
2. Recoveries of individuals ringed in Croatia and seen as adults in May and June in other European countries have been analysed. The aim was to determine the breeding area of the individuals wintering in Croatia, since in that period, they are supposed to be at their nesting sites.
3. Recoveries of individuals seen in Croatia have been analysed by countries in which they have been ringed. Individuals that have been ringed as pulli in the nest and adult individuals ringed at nesting sites have been included in the analysis to determine the origin of individuals seen in Croatia.

RESULTS

The total number of recoveries by months from 2001 to 2021 is shown in Figure 1. The first recovery is from October, and the number of recoveries increases through November and December until January, when 94 recoveries have been reported in total. In February and March, the number of recoveries decreased, and in the rest of the months of the year, recoveries were not reported.

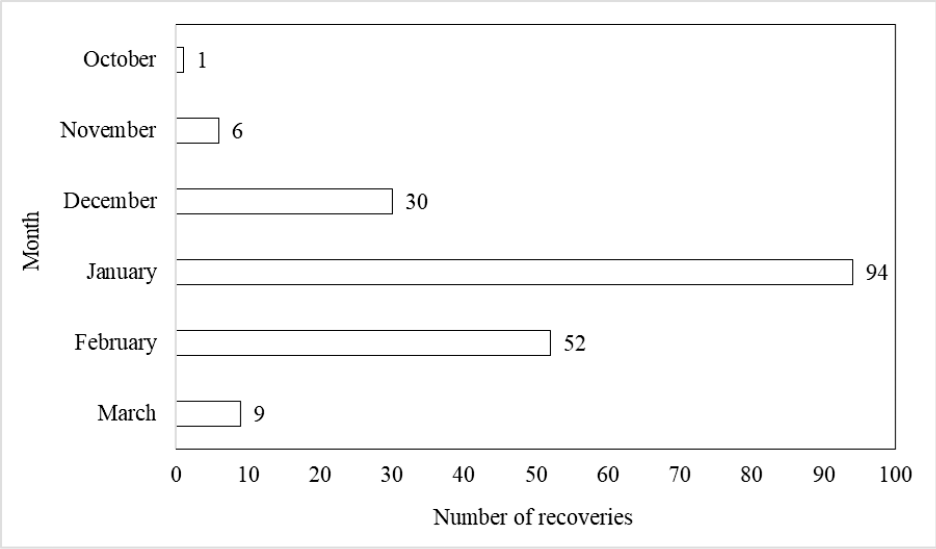

Figure 1. Number of ringed individuals of Caspian Gulls seen in Croatia from 2001 to 2021 by months; N (number of analysed recoveries) = 192.

Slika 1. *Ukupan broj zabilježenih prstenovanih jedinki pontskog galeba od 2001. do 2021. godine u Hrvatskoj po mjesecima; N (broj analiziranih nalaza) = 192*

From 2006 to 2021 a total of 167 individuals of Caspian Gulls had been ringed at the Prudinec rubbish dump. Out of 167 ringed individuals, 117 were seen in other European countries. In May and June, 11 individuals that had been ringed in Croatia were seen as adults in three European countries: 2 individuals in Poland, 6 individuals in Belarus, and 3 individuals in Ukraine. Out of those 11 ringed individuals, 9 were seen twice or more times in the country from which the recovery came from. They were seen in 7 different locations (Figure 2). The recovery sites and distances from the ringing site in Croatia are shown in Table 1. From the total number of 167 ringed individuals, 5 were seen again at the Prudinec rubbish dump: 2 after four years, 1 after three years, 1 after one year, and 1 that was ringed in January was seen again in November of the same year.

Table 1. Recovery sites of individuals of Caspian Gulls ringed in Croatia that where as adults seen in the breeding season, and distances from the ringing site in Croatia.

Tablica 1. *Lokacije nalaza jedinki prstenovanih u Hrvatskoj koje su kao odrasle viđene u sezoni gniježđenja i zračne udaljenosti od mjesta prstenovanja.*

Number on the map	Recovery site	Distance of the recovery site from the ringing site in Croatia / km
1	Świdnica rubbish dump, Poland	569
2	Mietowski Reservoir, Poland	578
3	Gatovo, Minsk, Belarus	1219
4	Trostenetskij rubbish dump, Belarus	1229
5	Severny rubbish dump, Belarus	1230
6	Kremenchuk Reservoir, Ukraine	1268
7	Cherkassy, Ukraine	1278

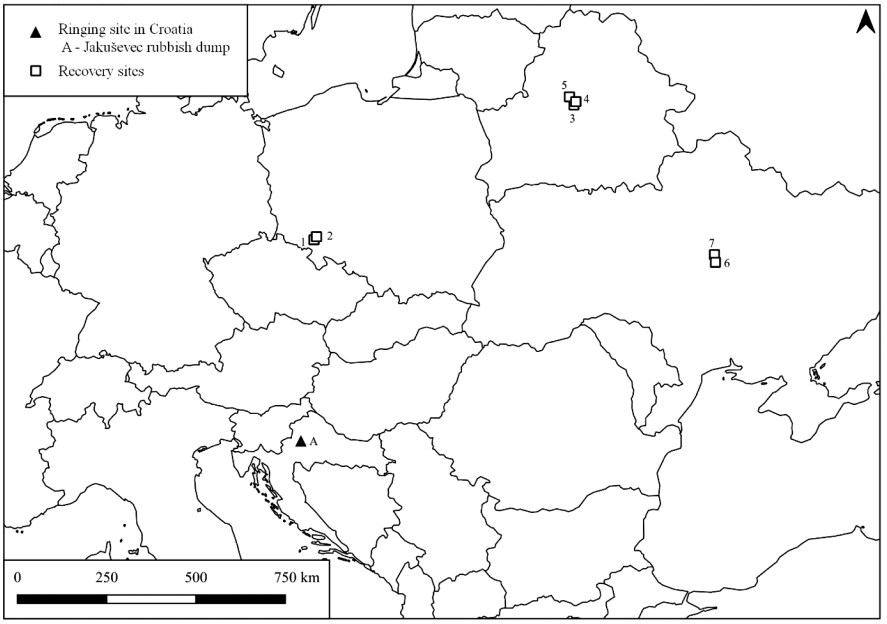

Figure 2. Recovery sites of individuals of Caspian Gulls ringed in Croatia that where as adults seen in the breeding season. The triangle on the map represents the ringing site in Croatia, and the squares represent the recovery sites outside Croatia (map: ©EuroGeographics for administrative boundaries). Numbers correspondent to these in Table 1.

Slika 2. *Lokacije nalaza jedinki prstenovanih u Hrvatskoj koje su kao odrasle viđene u sezoni gniježđenja. Trokut na karti označava mjesto prstenovanja u Hrvatskoj, a kvadrati mjesta nalaza jedinki izvan Hrvatske (karta: ©EuroGeographics za administrativne granice). Brojevi odgovaraju oznakama u Tablici 1.*

From 2001 to 2021, a total of 159 Caspian Gulls ringed in other European countries had been seen in Croatia. They were ringed at 24 different ringing sites (Figure 3, Table 2) in 9 European countries (Table 3). Out of 159 ringed individuals seen, 7 were seen more than once in different seasons. Ringed individuals were seen in Croatia at four locations: 1 in Umag, Istria; 1 on Lake Ormož near Varaždin; 3 on Lake Jarun in Zagreb; and 154 at the Prudinec rubbish dump.

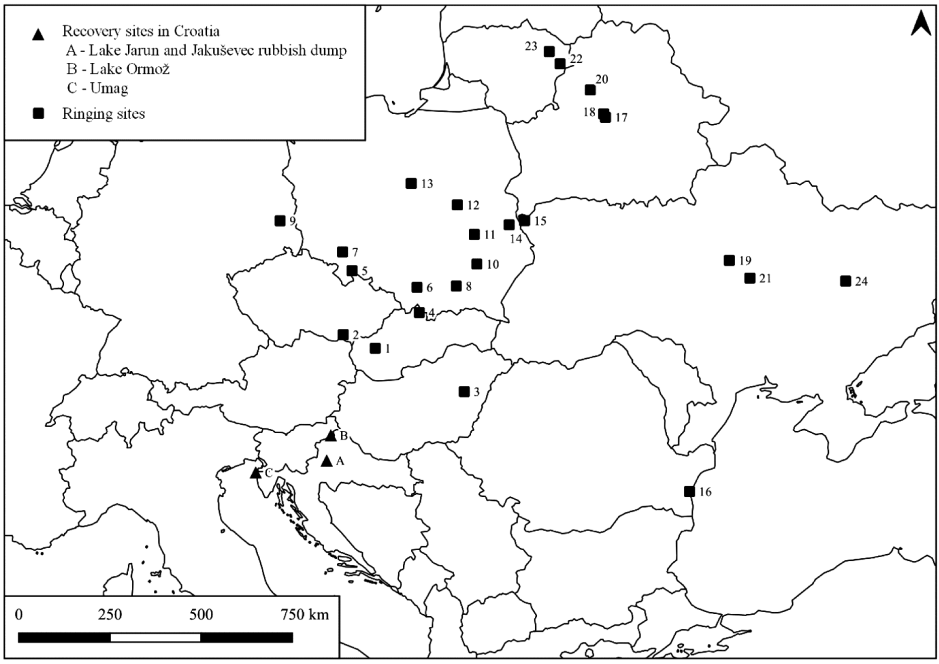

Figure 3. Ringing sites of Caspian Gulls ringed outside Croatia, and recovery sites in Croatia. Triangles on the map represent the recovery sites in Croatia, and the black squares represent the ringing sites of individuals seen in Croatia (map: ©EuroGeographics for administrative boundaries). Numbers correspondent to these in Table 2.

Slika 3. *Prikaz mjesta prstenovanja pontskih galebova izvan Hrvatske i mjesta nalaza u Hrvatskoj. Trokuti na karti označavaju mjesta nalaza u Hrvatskoj, a crni kvadrati mjesta prstenovanja jedinki viđenih u Hrvatskoj; karta: ©EuroGeographics za administrativne granice). Brojevi odgovaraju oznakama u Tablici 2.*

Table 2. Ringing sites of Caspian Gulls ringed outside Croatia, and distances from the recovery sites in Croatia.

Tablica 2. *Zračne udaljenosti mjesta prstenovanja pontskih galebova izvan Hrvatske od mjesta nalaza u Hrvatskoj*

Number on the map	Ringing site	Distance from the ringing site to the recovery sites in Croatia / km
1	Bassen Slnava, Slovakia	339
2	Nove Mlyny, Mušov, Jihomoravsky, Czech Republic	350
3	Hortobagy, Hungary	425
4	Slanica, Namestovo, Slovakia	428
5	Kozielno Reservoir, Poland	530
6	Jankowice gravel pit, Poland	541
7	Mietkowski Reservoir, Poland	580
8	Tarnów, Poland	602
9	Reddern, Germany	675
10	Jeziórko, post-mining pond, Poland	684
11	Zastów Karczmiski, Vistula river island, Poland	744
12	Kępa Nadbrzeska, Vistula river island, Poland	793
13	Włocławek Reservoir, Poland	800
14	Wytyckie Lake, Poland	823
15	Lake Svityaz, Ukraine	858
16	Lake Tasaul, Romania	1003
17	Gatovo, Minsk, Belarus	1219
18	Minsk, Belarus	1225
19	Kanivs'ke Reservoir, Ukraine	1239
20	Vileyskae, Belarus	1254
21	Kremenchuk Reservoir, Ukraine	1268
22	Kretuonas, Lithuania	1271
23	Alauso, Lithuania	1284
24	Solonyi Lyman Lake, Dnipropetrovsk Oblast, Ukraine	1507

Table 3. Countries of origin of ringed individuals of Caspian Gulls seen in Croatia from 2001 to 2021; N (seen ringed individuals) = 159

Tablica 3. *Države porijekla prstenovanih pontskih galebova zabilježenih u Hrvatskoj od 2001. do 2021. godine, N (broj različitih zabilježenih jedinki) = 159*

Country of origin	Number of ringed individuals seen
Poland	87
Belarus	18
Ukraine	16
Slovakia	14
Hungary	10
Lithuania	6
Czech Republic	4
Germany	3
Romania	1

Out of 159 ringed individuals seen, 16 were ringed as pulli during May and June, and were seen in Croatia in October, November, and December of the same year. The rest of the seen ringed individuals were in their second calendar year and older when they were seen with most recoveries (61 recovery) of individuals that were in their second calendar year. Out of the 159 ringed individuals seen, 29 were adults that were between their 5th to 17th calendar year when they were seen.

DISCUSSION

The research showed that almost all individuals recovered in Croatia and those ringed in Croatia that were as adults seen on breeding sites belong to the eastern and central European Caspian Gull populations with countries of origin being not only Poland, Belarus, Ukraine, Germany, and Slovakia (Jurinović 2013), but also the Czech Republic, Hungary, and Lithuania. Migration directions coincide with the ones stated by Jurinović (2013), with almost all individuals migrating from their ringing and breeding sites to the recovery sites in Croatia in southern and south-western direction, except one individual that was migrating in south-eastern direction. In January 2017, an individual that belongs to the Caspian Gull population of the Black Sea was recovered and according to Jurinović (2013), there had been no recoveries of individuals from this population before. The seen individual was ringed as pulli in June 2016 on an island on Lake Tasaul next to the Black Sea in Romania, where around 1000 pairs of Caspian Gulls breed (Marinov *et al*. 2017). The individual migrated around 1000 kilometres in western direction from its ringing site to the Prudinec rubbish dump, where

it was recovered. Recoveries of the Black Sea-ringed individuals have also been reported in Italy and Hungary (Burger *et al.* 2020). These recoveries suggest that individuals of the Black Sea population are wintering in Croatia and its neighbouring countries, but might only be scarce visitors, since according to Rudenko (2006) and Dubinina (2015), most of the Azov-Black Sea population winters in the Azov-Black Sea region, and only a small number of young and immature birds undertakes long-distance migrations. On the other hand, more individuals of this population that do migrate to western Europe might not have been recorded, since the research was done only at the Prudinec rubbish dump, while they might visit other possible wintering sites. Furthermore, the research at the Prudinec rubbish dump was done from November, and for example in Hungary, young birds from the north-western coast of the Azov Sea have been recovered in the post-nesting season (June-August) (Dubinina 2015).

Out of 159 ringed individuals recovered, 130 were young and immature birds, which can indicate that young birds are more dispersive in the winter (Jurinović 2013), although some of the recoveries of adult individuals show that they also covered distances greater than 1000 kilometres. The longest recorded distance for a young bird is 1507 km (from Solonyi Lyman Lake, Dnipropetrovsk Oblast, Ukraine to the Prudinec rubbish dump), while the longest distance recorded for an adult bird is 1278 kilometres (from the Prudinec rubbish dump to Cherkassy, Ukraine). Individuals ringed in other European countries and those ringed at the Prudinec rubbish dump that were recovered twice or more in different years show that Prudinec is a regular wintering site, to which individuals return. Other recoveries are from Lake Jarun that is 8 kilometres away, and Lake Ormož that is 70 kilometres away from the Prudinec rubbish dump. One ringed individual was seen on Lake Ormož on the 21st of January 2017, whilst a day later, on the 22nd of January, it was seen at the Prudinec rubbish dump. These recoveries suggest that Caspian Gulls are wintering in the wider area of the Prudinec rubbish dump, and that they visit Prudinec and possibly other rubbish dumps in Croatia, since they are commonly seen at rubbish dumps and various other habitats after the breeding season (Burger *et al*. 2020). More possible wintering sites might not have been recorded, because the research in each season has been done only at the Prudinec rubbish dump, and the other mentioned sites were only accidentally recorded, so they should be researched further to see if Caspian Gulls visit them regularly. Furthermore, Caspian Gulls have also been recorded wintering on the southern Adriatic coast (Burger *et al*. 2020). A recovery from Umag, Istria, which is in the north of the Adriatic Sea, suggests that there might be more possible wintering sites along the coast of the Adriatic Sea, but it remains necessary to determine them through further research.

Ringed individuals were seen in Croatia from October to March, which is earlier than Jurinović (2013) states. Most recoveries are from December, January,

and February. This shows that the Prudinec rubbish dump is an important food source in the winter, as Jurinović & Kralj (2012) state. The number of recoveries decreases in March; ringed individuals were not seen after March, since Caspian Gulls return to their nesting sites in mid-February and March (Burger *et al*. 2020).

Available literature data for the Caspian Gulls in Hungary, Italy, Slovenia, Serbia, Bosnia and Herzegovina, Albania, Greece, Montenegro, North Macedonia, and Bulgaria were also researched to determine the status of the Caspian Gull in these countries. In Hungary, the Caspian Gull has been described as a breeding species of eastern Hungary and a regular visitor during summer, autumn, and winter (Horvath & Szinai 2009). In Italy, the Caspian Gull is mentioned as *Larus argentatus cachinnans* (Pallas, 1811) taxon, but its status and recoveries have not been mentioned (Spina & Volponi 2009). In Slovenia, the Herring Gull *Larus argentatus* and the Caspian Gull were recorded as scarce species and the Yellow-legged Gull has been mentioned as a breeding species (Bloomqvist 2003, Hanžel 2014). During the International Waterbird Census in Slovenia, Božič (2015) mentions that the Herring Gull, the Caspian Gull, and the Yellow-Legged Gull were seen, but the *Larus michahellis/cachinnas* taxon is also mentioned. As well as in Italy, the status of the taxon has not been examined further. Caspian Gulls were in Bosnia and Herzegovina recorded for the first time in 2017 during the International Waterbird Census on the Una river in Bihać, in Kupreško polje by the Milač river, and by the landfill. Authors also stated that if the distribution of the Caspian Gull in the region is taken into account, it may be assumed that Caspian Gulls can be found in the wider area of Bosnia and Herzegovina and that individuals have not been recorded earlier due to the difficulty with the identification, distinction and taxonomy of the large white-headed gulls (Božić *et al.* 2017). In the breeding season of 2015, gulls were caught on the rooftops of the city hall in Ruse, Bulgaria, where it was recorded that amongst Yellow-legged Gulls, which were the only known breeding large gulls in Bulgaria, several Caspian Gulls were breeding too (Strahil Peev, unpublished data). According to the reported national wintering population sizes and trends of the Caspian Gull in Europe (Birdlife International 2015), wintering populations of Caspian Gulls have been recorded in Albania, Bosnia and Herzegovina, Bulgaria, Greece, North Macedonia, Montenegro, and Serbia; however, no further information was provided. Since the status of the Caspian Gull in abovementioned countries, except in Hungary, has not been studied in more detail, that is, no available literature data have been found, this research contributes to the knowledge of the phenology of Caspian Gulls in south-eastern Europe.

Finally, this paper provides an updated status of Caspian Gulls in Croatia. Since there was a recovery of an individual that belongs to the Caspian Gull population of the Black Sea, further research is necessary to determine whether more individuals of this population are wintering in Croatia. Further research should

also be conducted to determine if more Caspian Gull individuals are present in Croatia from October, or earlier. Moreover, further research is necessary to determine if there are other locations in continental Croatia and along the Croatian coast of the Adriatic Sea, where Caspian Gulls are wintering. Since most of the analysed recoveries of Caspian gulls are from areas where the hybridization of Caspian Gulls with Herring Gulls occurs, further DNA studies are necessary to determine if such hybrids are present in Croatia.

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SAŽETAK

Pontski galeb je gnjezdarica središnje i istočne Europe te središnje Azije čiji se areal recentno širi prema zapadu Europe. U Hrvatskoj je zabilježen kao preletnica i zimovalica. Budući da se literaturni podaci za pontskog galeba u Hrvatskoj najčešće odnose na galeba klaukavca, cilj ovog rada bio je utvrditi porijeklo pontskih galebova koji zimuju u Hrvatskoj, odnosno na kojem području se gnijezde te kojoj populaciji pripadaju. Analizirani su nalazi pontskih galebova u Hrvatskoj od 2001. do 2021. godine s odlagališta otpada Prudinec u Jakuševcu te nalazi dobiveni iz Arhive prstenovanja Zavoda za ornitologiju HAZU. Gotovo sve prstenovane jedinke pontskih galebova zabilježenih u Hrvatskoj pripadaju populacijama srednje i istočne Europe s Poljskom kao državom porijekla najvećeg broja jedinki te Njemačke s porijeklom najmanjeg broja jedinki. Također, zabilježena je i prva jedinka, prstenovana u Rumunjskoj, koja pripada populaciji pontskih galebova s Crnog mora. U odnosu na dostupnu literaturu, zabilježene su četiri nove države porijekla pontskih galebova viđenih u Hrvatskoj: Litva, Češka, Mađarska i Rumunjska. Najveća zračna udaljenost od mjesta nalaza jedinke do mjesta prstenovanja iznosi 1507 kilometara (odlagalište otpada Prudinec u Jakuševcu, Zagreb – Solonyi Lyman Lake, Dnipropetrovsk Oblast, Ukrajina). Prstenovane jedinke su viđene od listopada do ožujka, a najveći broj prstenovanih jedinki pontskih galebova zabilježen je tijekom prosinca, siječnja i veljače. Mlade jedinke su u Hrvatskoj bilježene od listopada dok su odrasle jedinke bilježene od

studenog. Ovaj rad doprinosi poznavanju fenologije pontskog galeba u jugoistočnoj Europi budući da status taksona u susjednim državama (Italija, Slovenija, Srbija, Bosna i Hercegovina, Crna Gora) i državama šire regije (Albanija, Sjeverna Makedonija, Grčka, Bugarska) nije detaljno proučavan.