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The seasonal placement of the Caspian Gull *Larus cachinnans* from the Northern-Western Coast of the Azov Sea based on Ringing Results

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Abstract – Connections between nesting areas of the Caspian Gull *Larus cachinnans* in the Northwest coast of the Azov Sea and the rest of Europe were examined by a long-term ringing program (1988–2012). The author analyzed the spatial distribution of individuals according to age (young, immature, adults) during different seasons. Directions and flight distances were determined and different types of dispersal (intra-continental, within the territory of Ukraine, within the nesting area) were specified. For perennial large nesting settlements of the Caspian gulls in the Northwest coast of the Azov Sea, the following features were determined: high degree of phylopatry in adults, the wide scope of migration after nesting and dispersion of young birds, formation of new temporary colonies by virtue of immature birds. The average movement of birds towards their colonies, during the spring was 1033 km (range 111-1900). During the post-nesting season, adult birds were found within a radius of 30 km around their colonies. In June the average displacement distance of birds of different age groups, from their colonies was 130.14 km (range 7.5-1900). In July and August, increased to 416.17 km (range 7.5-2025). In autumn, birds were found within an average distance of 284 km (range 7.5–2025) from their natal area, moving along the coast, mainly in a south-western and western direction. They were also present in large numbers in landfills and agricultural land. Some first year birds reached the territories of Denmark, Germany, Poland and Hungary. In winter, the average displacement distance was 850 km (range 7.5-2172). The birds usually moved along the Black Sea coast of Ukraine flying to the territories of Eastern European countries.

Key-words: dispersion, nesting area, Northwestern Azov, ringing, seasonal migrations.

INTRODUCTION

Throughout recent years the study of genetic differences between populations have become topical, which is important in addressing the systematics and taxonomy of species. Until recently, few studies have used ringing data to separate colonies and settlements. In the particular case of gulls, the status and independence of populations have been poorly studied. Therefore, it was necessary to collect data on regional connections within and between the neighboring nesting grounds. Seasonal nesting and territorial connections of Caspian gulls inhabiting different colonies within the nesting area in the territory of the Black Sea have been fragmentarily studied. Data obtained during the past decade, by ringing chicks in colonies and color marking of adult birds, show the birds' partial transition to the sedentary and a nomadic way of life and change in the traditional ways and areas of seasonal migrations, which are associated with global warming, anthropogenic transformation of the landscape, as well as sharp increase in the number of this species in the Azov-Black Sea region. The correlation of phylopatry and dispersion of adult breeding birds, immature and young gulls, their resettlement and development of inland water basins remains controversial and little studied.

During the last decade, the Caspian gull began nesting in Western Europe (Skorka & Wojcik 2008). The Azov-Black Sea region is inhabited by up to 80% of the world population of *L. cachinnans*. This species is concentrated on the Sivash marine islands, in bays and estuaries of the Azov Sea. For the first time the independence and degree of permanence of nesting colonies and species settlements in the region was proved. This study determined the wide range of the territorial connections of the Caspian Gull in the post-breeding season, active resettlement to continental basins due to the development of forages having anthropogenic origin.

Tagging and ringing are essential methods to study occurrence, movements and distribution of individuals in the wild. Ringing of Caspian Gulls in southern Ukraine and in the Black Sea Biosphere Reserve started in the late 1920s. In Ukraine, A.G. Rudenko carried out the first mass tag-

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ging of Caspian Gulls with colored rings in the Black Sea Biosphere Reserve (Rudenko 2006). During 1999-2002, 817 birds were marked, from which 20 long-distance returns (2.45%) were detected, and 16 recoveries were detected by remote reading of colored rings (Rudenko 2006). Gulls ringed in the Black Sea Biosphere Reserve were in their first month after ringing, recorded at a distance of 5 km from their nesting places, where they formed clusters around coastal areas, along the roads and in the fields. Young birds born on islands and Sivash leave their colonies and migrate along the coast of the Azov Sea. Upon reaching the northeast coast of the Azov Sea, these birds cover a distance of 300-500 km from their natal colonies. Gulls ringed in the Black Sea Biosphere Reserve carry out long-distance migrations to the north-west, as shown by the reports received from Belarus (Neman riverbed) and Sweden.

Ringing of Caspian gulls with colored rings has already been conducted in the continental part of Ukraine, at the Kremenchug reservoir and near Cherkassy (Grischtschenko 2003). A year after tagging information on 45 birds (22.6%) was retrieved Recoveries of birds ringed near Cherkassy came from Poland (25), Hungary (10), Germany (8), Austria (6), Sweden (4), Czech Republic (3), Denmark (2), Italy, Lithuania, Luxembourg, France, Croatia and Switzerland (1 each) (Grischtschenko 2003, Atamas 2005).

Migration processes are important in the life of large gulls. Observations made on *L. argentatus* (Isle of Man, Scotland) showed that up to 65% of individuals did not return to the natal colony (Chabrzyk & Coulson 1976). In the North Azov and the North-Western Black Sea region, the active exchange of individuals between the neighboring populations is observed (Dubinina-Pakhushcha 2012, Rudenko 2006). There is an increase in dispersion and intensive re-settlement of Caspian gulls both in inland waters of Ukraine and in the neighboring countries (Grischtschenko 2003, 2005, Skorka *et al.* 2005, Numerov & Vengerov 2012, Gryshchenko & Yablonovskaya-Gryshchenko 2013, Sarychev 2013).

METHODS

Two types of Caspian gulls populations were identified in the Black Sea: the coastal type – birds that breed, migrate and spend the winter along the Azov-Black Sea coast – and the continental type – birds with a life cycle connected to the Dnieper riverbed and water reservoirs of the continent. Local populations are formed mostly near water basins of the region; the largest are located at Sivash, in the Danube delta, in the north-western part of the Black Sea – the Black Sea Biosphere Reserve (BSBR), in the northern and eastern parts of the Azov Sea (Russia).

Ringing of Caspian gulls by standard steel rings in the southern Ukraine started on the territory of BSBR at the end of 1920s (Ardamatskaya 1977). The first colored tagging of these gulls in Ukraine was also conducted on the territory of BSBR at the beginning of 2000 (Skorka *et al.*2005, Rudenko 2006). In the continental part of Ukraine, the colored tagging of Caspian gulls was conducted at Kremenchug water reservoir (Gavrilyuk *et al.* 2001). During that year the following information on the recovery of 45 birds (22.6 %) from the territories of the Western European countries were obtained: Poland (23), Hungary (10), Germany (8), Austria (6), Sweden (4), Czech Republic (3), Denmark (2), Italy, Lithuania, Luxemburg, France, Croatia and Switzerland (1 each).

V.A. Kostiushyn conducted the previous generalization of the results of ringed Caspian gulls in Ukraine; this review included the recoveries from north Azov (Kostiushyn *et al.* 2011). In the northwestern coast of the Azov Sea, large breeding colonies were located in the natural wildlife reserve, on the isolated sand islands and spits of the Molochnyi Estuary and Obitochnaia Spit of the Azov Sea (Yudin & Firsova 2002, Dubinina-Pakhushcha 2012). Since the beginning of 2000, nesting colonies of Caspian gulls at this water basin disappeared due to the catastrophic over-drying of the Molochnyi Estuary.

During 1988-2012 a total of 28,688 gulls were ringed, of which 149 were recovered. These ringing returns were included in the regional database of the Azov-Black Sea ornithological observatory (Matsievskaya *et al.* 1998, 1999, 2001). The annual life cycle of the Caspian gull was provisionally divided into several seasons: spring migration, nesting, post-nesting period, autumn migration, wintering. The different age groups were provisionally specified: the birds aged up to 1 year (young); the birds aged from 1,1 to 3 years (immature); the birds older than 3 years (adults). The range and flight directions of the ringed birds were set according to Google maps (https://www.google.com.ua/maps/). On Google maps, locations of the nesting colonies were selected as starting points, afterwards in the map menu the “distance calculation” option was selected.

RESULTS

The majority of Caspian gulls (105 rings, 52.54%) can be considered of the “sedentary type” as they stay within the limits of the nesting area by moving along the Dnieper River and the southwestern part of Azov-Black Sea coast through-

out the year. However, some birds migrate for both short and long-distance, and the appearance of new migration directions is particularly typical during recent years (Tab. 1).

There were only 5 recoveries (3%) during the spring migration season (Fig. 1). Immature gulls migrated an average distance of 1,120 km (n = 4; range 111-1,900), and spend a considerable amount of time in the wetlands and domestic water basins of Germany and Poland. The adult gulls have stronger site tenacity to their nesting grounds during all seasons, covering a distance up to 300 km from their nesting grounds, and stay for long durations, mainly at domestic water basins, wetlands and close to coastal areas of the Azov and Black seas. (Figs 1, 2, Tab. 2).

The post-nesting season (June-August) is characterized by an increase of recoveries by young and immature individuals, as well as by an increase in their flying range. The usual flight directions in the post-nesting period are the northern and northern-western ones. The highest quantity of seasonal ringing returns was received from young gulls, which more frequently perish in their nesting areas. The average flight distance registered by young birds was 409.6 km (range 7.5-2,025; n = 37), and they are already known in Poland, Hungary, Germany, Denmark, Lithuania (Fig. 3).

Denmark and Lithuania are west European countries where one could meet the Caspian Gulls ringed along the coast in the north-western Azov. They have not been reported before in these territories (Matsievskaya *et al.* 1998, 1999). When regional weather conditions worsen, immature gulls expand the limits of their post-nesting movements in a north-west direction, thus covering an average distance of 529 km (range 16-1,340; n = 3). The most distant recoveries of rings were from Hungary and Denmark (Fig. 4).

Autumn migration, starting from around September, is considerably extended and lasts until November. The highest numbers of recoveries (37%) were recorded in the autumn months (Fig. 1, Tab. 2), from which 28.85% were met within a range of 300 km, and 8.72% constituted long-distance recoveries. The average distance, covered by the birds of all age groups during the season is 283.62 km (range 7.5-2,025; n = 56). During sharp cold spells, significant part (up to 60%) of Caspian gulls migrates to rubbish dumps located near the coastal cities of Ukraine. Young birds cover an average distance of 275.5 km (range 7.5-2,025; n = 35). 7.69% of the young were found within a distance in excess of 2,000 km in a north-western direction (Denmark) (Fig. 5).

Young and immature Caspian gulls from different settlements along the North-West Coast of the Azov Sea were recorded on the territory of Poltava, Lugansk, Dnepropetrovsk, Zaporozhiye, and Odessa regions in autumn.

Table 1. The number of ringing returns from different regions and countries from Caspian gulls ringed in the North-western coast of the Azov Sea.

Country, region	**Number and percentages of ringing returns**	
	n	***%***
Ukraine, Zaporozhiye Region	78	52.4
Ukraine, Kherson region	4	2.72
Ukraine, Nikolayev region	5	3.4
Ukraine, Odessa region	6	4.08
Ukraine, Donetsk region	4	2.72
Ukraine, Lugansk region	1	0.68
Ukraine, Dnepropetrovsk region	12	8.16
Ukraine, Kirovograd region	1	0.68
Ukraine, Poltava region	3	2.04
Ukraine, AR of Crimea	8	5.44
Poland	7	4.76
Germany	8	5.44
Denmark	2	1.36
Holland	1	0.68
Hungary	1	0.68
Lithuania	1	0.68
Bulgaria	1	0.68
Turkey	1	0.68
Greece	1	0.68
Island of Cyprus	1	0.68
Russia	2	1.36
Total	**148**	

The long-distance returns by young birds ringed on the islands of Molochnyi Estuary, Germany consisted of 15.38 % (Figs 5, 6). Immature gulls covered an average distance of 244.8 km from their natal colonies (range 10-630; n = 11), as they migrated along the coastline within a distance of 300-500 km, and along rivers. During autumn, young and immature gulls dispersed in a north-western, north-

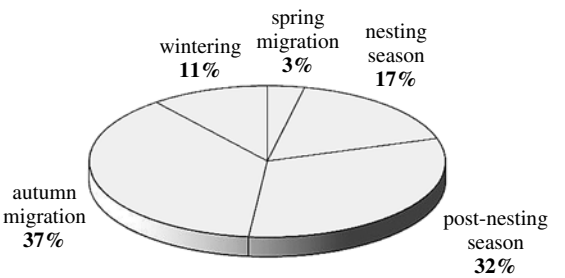

Figure 1. Ratio of the seasonal distribution of ringing returns from gulls ringed in the North-West Azov.

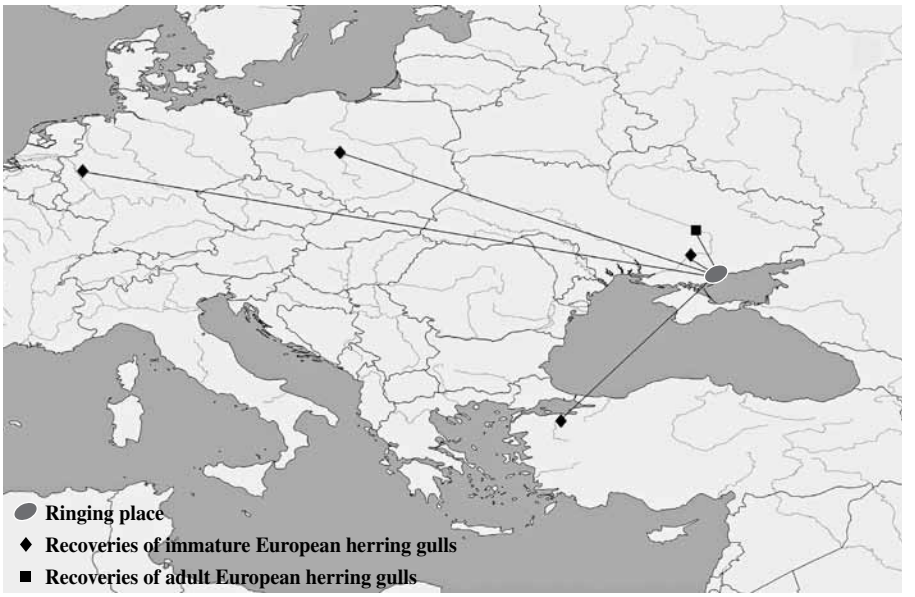

Figure 2. Ringing recoveries of gulls ringed in the North-western Azov colonies during the spring migration season.

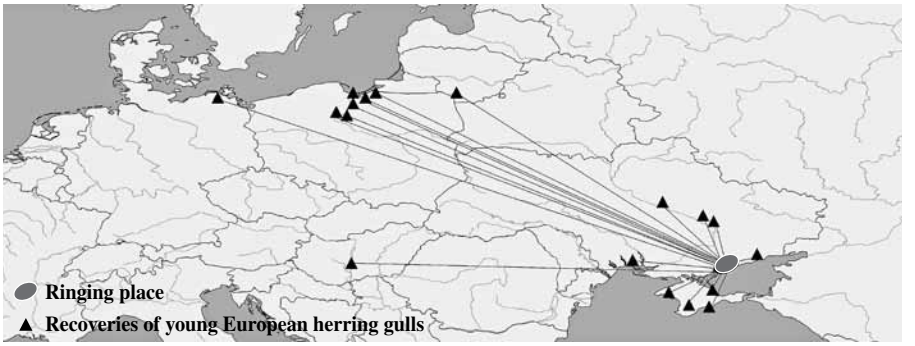

Figure 3. Young gulls ringed at colonies of the North-West Azov during the post-nesting season.

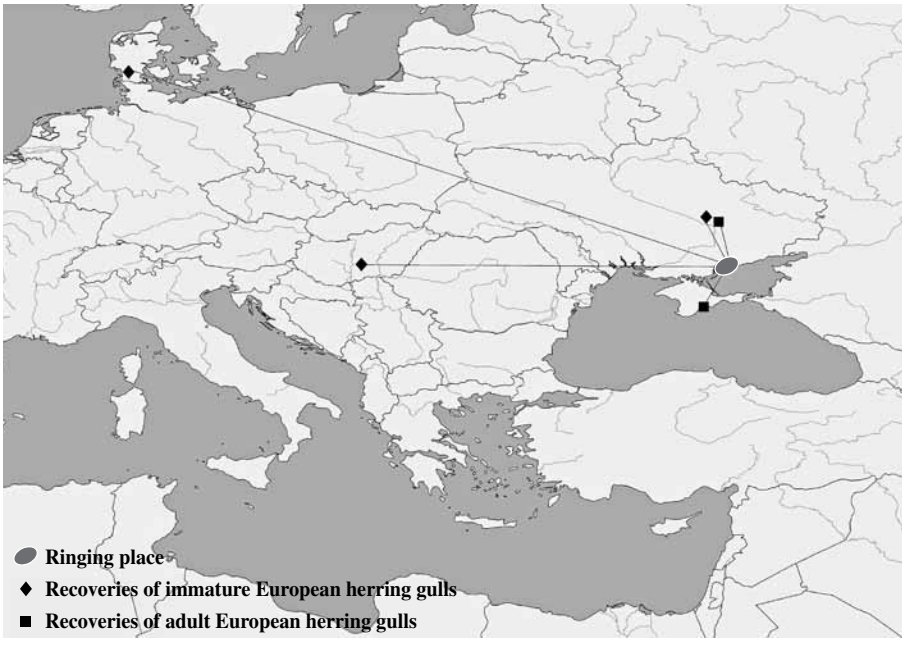

Figure 4. Ringing recoveries of immature and adult gulls ringed in colonies of the North-West Azov in the post-nesting season.

Table 2. Flight distances of ringed Caspian gulls of different ages from their natal colony.

Age of birds	*n*	Average distance (km)	Range
Spring migration *n* = 5			
Young	–	–	–
Immature	4	1120.3	111-1900
Adults	1	202.4	202.4
Nesting season *n* = 25			
Young	3	144.8	7.5-225
Immature	3	720.6	7.5-1900
Adults	19	39.4	7.5-89
Post-nesting season *n* = 47			
Young	37	411.6	7.5-1920
Immature	3	529.0	7.5-1340
Adults	7	134.4	7.5-504
Autumn migration *n* = 56			
Young	36	257.9	7.5-2025
Immature	11	263.0	10-630
Adults	9	411.7	22-1400
Winter season *n* = 16			
Young	4	517.7	10-1495
Immature	10	1011.1	7.5-2172
Adults	2	710.0	70-1350

Note: *n* = number of specimens; range = minimum and maximum distances of the Caspian gull recovering, in km.

eastern and south-western direction, covering considerable distances.

Since the 1990s, new routes of long-distance dispersal of the North Azov Caspian gulls in a southern-western direction was established. The average distance covered by the adult gulls was 341.5 km (range 10-1,400; n = 10) (Fig. 7). They were recorded in Greece and Bulgaria. As regards the north-western direction within the limits of 1500-2000 km, adult birds from different colonies were recorded in Germany.

The total of ringing recoveries during the wintering period amounted to 11% (Fig. 1), from which 5.51% were long-distance returns. In winter, the North Azov Caspian gulls occurred in different territories in the north-eastern and north-western directions. The average distance covered by the gulls during winter season was 849.70 km (range 7.5-2,172; n = 26). The majority of ringing returns from young birds were recorded from Ukraine. This also confirms the considerable degree of the settled lifestyle of the North-Azov Caspian gulls. Since 2000, birds started moving in a southerly direction and wintering birds are now met with on the island of Cyprus. The average flying distance recorded by young gulls in winter was of 517.7 km (range 7.5-1,500; n = 4). During this period immature gulls migrate along the sea coasts and averagely cover a distance of 980.5 km (range 7.5-2,172; n = 10) away from their colonies. 37.5% of the immature gulls were observed in Germany and the Netherlands, mainly at rivers and rubbish dumps. Adult gulls do not cover long

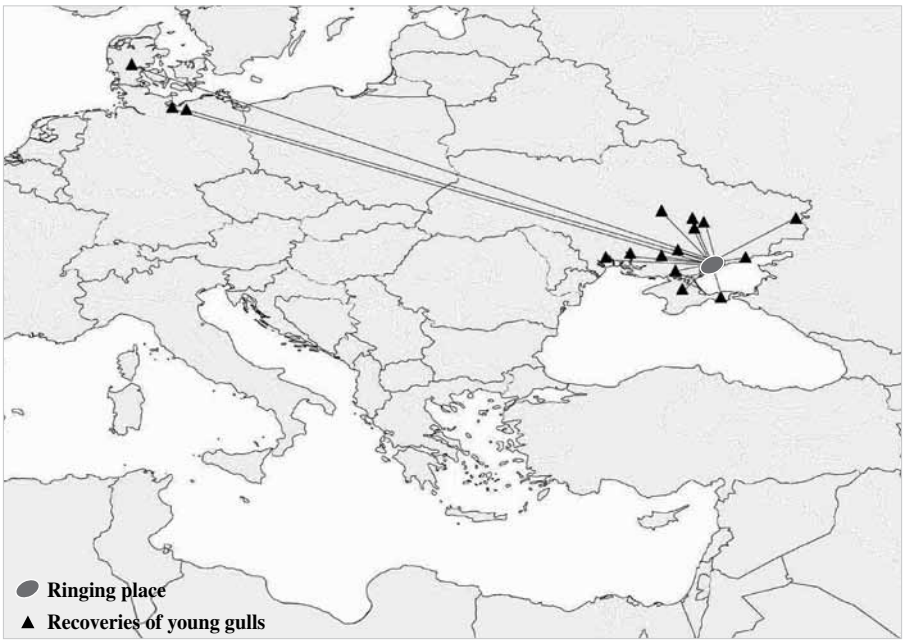

Figure 5. Ringing recoveries of young gulls ringed in colonies of the North-West Azov during the autumn migration.

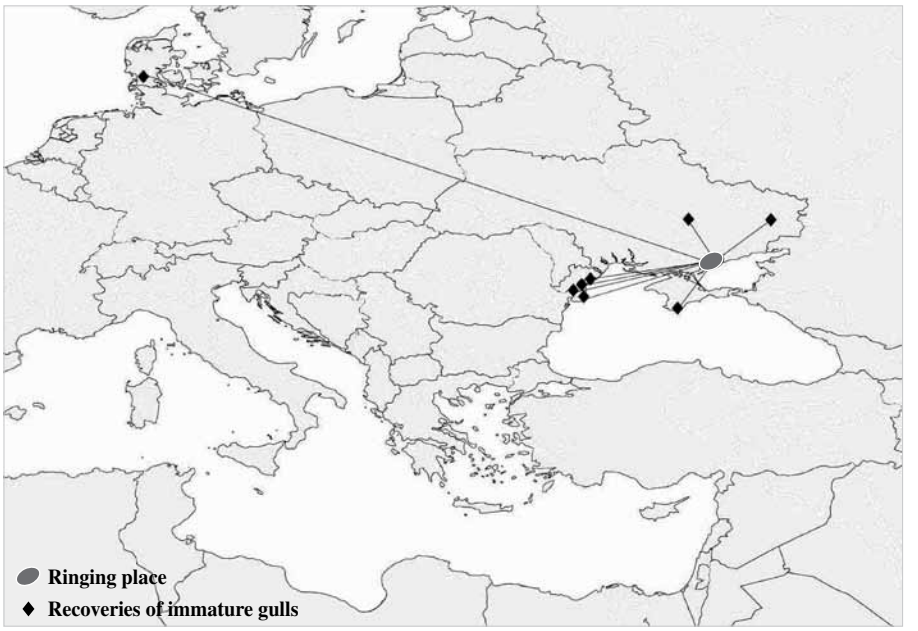

Figure 6. Ringing recoveries of immature gulls ringed in the North-West Azov colonies during the autumn migration.

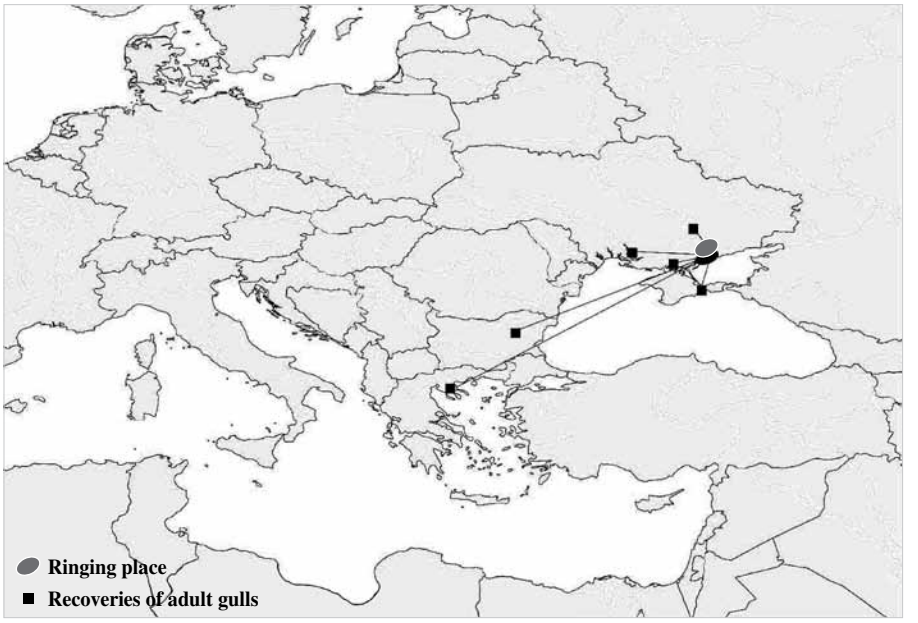

Figure 7. Ringing recoveries of adult gulls ringed in the North-West Azov colonies during the autumn migration.

distances, instead they migrate in a North-eastern direction along the Azov-Black sea coast (Krasnodar, Russia) and averagely fly up to 710 km away from their natal colonies (range 70-1,350; n = 2; Fig. 8).

The majority of ringing returns belonged to adults recovered close to their nesting areas; this proves a largely settled lifestyle of the local gulls. The appearance of Caspian gulls from the North-western Azov colonies of the South-eastern coast of the Azov Sea, where gull colonies also exist, can indicate an exchange in the populations within the whole Azov-Black sea basin.

DISCUSSION

The data obtained confirm the independent character of the local Caspian gull population in North-West Azov, represented by several nesting colonies. Gulls, hatched in the

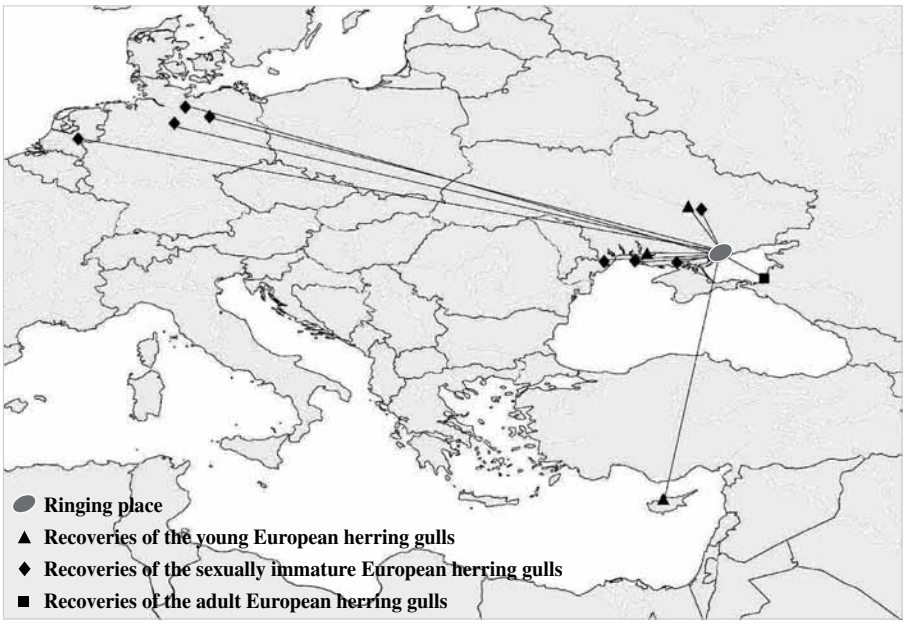

Figure 8. Ringing recoveries of gulls of various age groups ringed in the North-West Azov colonies during winter.

North-west Azov are characterized by: high annual breeding rate; transition to nomadic and sedentary lifestyle; wide range of post-nesting migrations of all age groups; increase in the autumn migration distance of young birds in the North-West direction along with recent development of new migration routes in the South-East; exchange of individuals in certain basins between the neighboring colonies and settlements within the region; and the use of urban and rural landfills throughout the year for forage.

The gulls from North Azov prefer the Dnieper River, concentrating around the bed, or industrial facilities. This phenomenon on the one hand promotes sedentary life of the local population, as the majority of the birds stay within their nesting grounds, on the other, it determines its expansion to mainland areas of Ukraine and to the Nordic countries.

The South-West is the priority flying direction for the Caspian gull, however, some individuals from Molochnyi estuary colonies fly mostly in the north-western direction; the reasons for this have not yet been established. In the post-breeding season during the autumn migration the number of birds remaining near their settlements, within 10-100 km drops sharply, and the migration distance, in turn, increase. In winter, birds settle along the south-western part of the Black Sea coast, but a large part of young gulls migrate to Western Europe.

Poland and Germany appear to attract wintering gulls, especially immature, where they concentrate on landfills.

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