Vestnik Zoologii, **53**(4):297–312, 2019
DOI 10.2478/vzoo-2019-0029

UDC 619:578.831:636.5

CURRENT STATUS OF ANSERINAE WINTERING IN AZOV-BLACK SEA REGION OF UKRAINE

Yu. O. Andryushchenko[1], V. S. Gavrilenko[2], V. A. Kostiushyn[3], V. N. Kucherenko[4], A. S. Mezinov[2], Z. O. Petrovich[5], K. A. Redinov[5], I. T. Rusev[6], M. V. Yakovlev[7]

[1]*Ornithological laboratory of the South of Ukraine, Schmalhausen Institute of Zoology, NAS of Ukraine, vul. Hetmanska, 20, Melitopil, Zaporizhzha Region E-mail: anthropoides73@gmail.com*
[2]*Biosphere Reserve "Askania Nova", vul. Parkova, 15, Askania Nova, Kherson Region;*
[3]*Monitoring and animal conservation department Schmalgausen Institute of Zoology, NAS of Ukraine, vul. B. Khmelnytskogo, 15, Kyiv, 01030 Ukraine*
[4]*Tavrida National V. I. Vernadsky University*
[5]*Regional Landscape Park "Kinburnska Kosa", vul. Starofortechna, 16, Ochakiv, Mykolaiv Region*
[6]*National Nature Park "Tuzlovskyi Lymanu", vul. Partyzanska, 2, Tatarbunary, Odesa Region*
[7]*Danube Biosphere Reserve of NAS of Ukraine, vul. Tatarbunarskogo Povstannya, 132 A, Vilkovo*

Current Status of Anserinae Wintering in Azov-Black Sea Region of Ukraine. Andryushchenko, Yu. O., Gavrilenko, V. S., Kostiushyn, V. A., Kucherenko, V. N., Mezinov, A. S., Petrovich, Z. O., Redinov, K. A., Rusev, I. T., Yakovlev, M. V. — In the article is analyzed own field data of the authors and scientific publications on the wintering of Anserinae in the Azov-Black Sea region of Ukraine in 1900–2017, but the main data was obtained in frame of international mid-winter counts (IWC) in 2005–2017. It was found that 9 species of Anserinae occur in this region during the different seasons of the year: *Anser anser* — nesting, wintering and migrating; *Rufibrenta ruficollis, A. albifrons*, *A. erythropus, A. fabalis* — migrating and wintering; *Branta canadensis, Branta leucopsis, Branta bernicla, Chen caerulescens* — vagrant or birds which flew away from captivity (zoo etc.). *Eulabeia indica* — is possible vagrant species. The most numerous wintering species is *A. albifrons*, common — *Rufibrenta ruficollis*, not numerous — *Anser anser*, the other species are not met annually and registered in a very small number. There was almost tenfold drop in number of wintering geese in the Azov-Black Sea region of Ukraine during the period of counts. The main reasons of such reducing of geese amount are the followwing: weather and climate conditions, changes in the forage acessibility, hunting and poaching pressure, poisoning as a result of deratization of agricultural lands, and from 2014 — the militarization of the Syvash area and stop of water supplying of Crimea through the North Crimean channell. It is likely that the factors mentioned above led to relocating of wintering areas of Anserinae, and resulted in decreasing of their amount in this region.
Key words: Anserinae, status of presence, amount, wintering, Azov-Black Sea region, negative factors.

Materials, methods and territory of studies

On the Azov-Black Sea region of Ukraine there are many large wetlands areas which sustain big number of water birds. A significant and diverse forage base (large areas of shallow waters and shoals with appropriate benthic flora and fauna, irrigated territories, soybeans, colza, sunflower, rice), as well as many safe places (shallow water remote from the shores, islands, peninsulas, spits, rarely visited by man and ground predatory animals) contributes to it. Besides, due to the predominance of relatively warm low-snow weather in winter, many wetlands or parts of them are rarely fully covered with ice and the coast is rarely covered with deep snow. Because of above reasons during the winter period most of waterbirds including Anserinae have available food source and regularly winter in the region (Andryuschenko, 2015). Commonly Ukrainian ornithologists split the Azov-Black Sea region of Ukraine into 5 subregions — the North-Western Black Sea subregion (from Danube Delta to Adzhalytskyi Lyman), the Northern Black Sea subregion (from Tylihulskyi Lyman to Perekopsk Bay), the Flat Crimea subregion, the Syvash subregion (Wetland Syvash and the Northern Prysivashshia, including the "Askania Nova" Bisophere Reserve and surrounding areas), North-Western Pryazovia subregion (from Utlyukskyi Lyman to Tubalskyi Lyman).

There are a lot of data about wintering geese in the Azov-Black Sea region, but only part of it was published (Andryuschenko et al., 1997, 2001; Grinchenko et al., 1995; Grinchenko, Kupsha, 1999; Kostin, 1983; Lysenko, 1991). The most complete data were obtained mainly in the last 15 years (Andryushchenko & Popenko, 2012; Andryuschenko et al., 2015, 2017; Gavrilenko & Mezinov, 2005; Gavrylenko & Lystopadskyj, 2010; Grinchenko, 2001; Grinchenko et al., 2003; Mezinov et al., 2013; Petrovych et al., 2008; Rusev et al., 2008; Chernichko et al., 2015; Havrylenko et al., 2004; Kostiushyn et al., 2011), and still there was no attempt to generalize them for the whole region. For the analysis of Anserinae winters, beside publications, own extensive field data of the authors of the paper collected during the 1989–2018 were used, but main information was obtained during mid-winter waterbirds counts (IWC) which took place in January 15–25, from 2005 to 2017 (Itogi ..., 2009, 2011, 2017; own data).

During the reviewing period the territory of the region was surveyed annually from mid-November to mid-March (from the beginning of the formation until ending of winterings of the most species of Anserinae) — from 1 to 8 times during one wintering period, plus — additional short observations, and in the Biosphere Reserve "Askania Nova"— up to 15 times and more per wintering period. Bird counts were conducted on automobile routes along the coasts with stops and observation of the wetlands and adjacent territories; x10–12 binoculars and x30–50 telescopes were used (Andryushchenko, Popenko, 2004; Itogi ..., 2009). Information from rangers, hunters, fishermen, farmers was used only after the data's verification in the field.

Results and discussion

Canada goose (*Branta canadensis*). In Ukraine it is vagrant species (Katalog …, 1993; Gavrys et al., 2007; Gudina, 2007). The reason why Canada goose appeared in Eastern European countries was the expansion of their nesting territories in Western Europe. There were also birds flown away from zoos. In the Azov-Black Sea region only 1 individual was observed on 3.01.2011 in the south of the Tylihulskyi Lyman in the bay near the Lyubopol village, Lymanskyi District of the Odesa Region (Pilyuga, 2011).

Fig. 1. The subregions of the Azov-Black Sea region of Ukraine where Anserinae winter regularly: 1 — North-Western Black Sea subregion, 2 — Northern Black Sea subregion, 3 — Flat Crimea subregion, 4 — Syvash subregion, 5 — North-Western Pryazovia subregion.

Barnacle goose (*Branta leucopsis*). Usually in Ukraine this species was considered as a vagrant (Lysenko, 1991; Gulaj, 1996; Gavrys et al., 2007; Kazannyk et al., 2015), however observations of it has become more frequent during the last 40 years, mainly in the central and northern part of the country, which gives the background to consider the Barnacle Goose as not numerous migratory species there.

Three observations of the Barnacle Goose took place in the Ukrainian part of the Danube Delta: on 18–26.01.1998 — four individuals were counted, on 18.01.1999 — six individuals (unpublished information from M. E. Zhmud, 1999) and on 20.11.2015 — one individual was observed in a flock of the Greater White-Fronted Goose — in the southern part of Sasyk Lake. In the Northern Black Sea subregion, N. G. Pirogov (1996) observed flocks of 16 ind. and 36 ind. in the spring of 1988 and in the autumn of 1989 on the tip of the Kinburnska Spit in the vicinity of Pokrovske village, Ochakiv District, Mykolaiv Region. Seven individuals were counted in the Crimea near Alushta City on 12.01.1997 (Beskaravaynyiy, Kostin, 1997) and 17 ind. — on 6.02. 2005 to the west of Novofedorivka village, Sakskyi District (Kucherenko, 2005). On 22.03.1980 in the North-West Pryazovia subregion a flock of 28 ind. was observed on the Molochnyi Lyman, and probably the same flock was seen at the same day near the Alushta City (Lysenko, 1991). On 26.03.2007 on the Molochnyi Lyman one individual was counted (Chernichko et al., 2015). These data indicate that the Barnacle Goose still remains a vagrant species in the Azov-Black Sea region.

Observations of the Barnacle Goose in the flocks of the Greater White-Fronted Goose in Romania (URL[1]), Bulgaria and southern regions of Ukraine have become frequent in recent decades which confirm the assumption of S. V. Volkov and A. Yu. Tymoshenko (2015) that individuals flying through the Black-Soil region are not vagrant birds. Observations of such birds outside their main flyway in Western Siberia, Trans-Urals and Kazakhstan are within the flyway of the Greater White-Fronted Goose and Red-Breasted Goose which nests in the West Siberian tundra from Yamal to Taimyr. Considering the nature of observations of the Barnacle Goose in Romania, Bulgaria and southern regions of Ukraine and its conservative behavior while choosing places for breeding colonies and migration routes it can be assumed that these birds are part of the population that was recently formed on the Kara Sea coast (Golovnyuk et al., 2015). If this is true than soon the Barnacle Goose will be a common species in the Azov-Black Sea region of Ukraine becoming a migratory and wintering species.

Brent Goose (*Branta bernicla*) in Ukraine is a vagrant species (Lysenko, 1991). There was only observation of one individual it in the Azov-Black Sea region which took place on 28.10.2015 at the Molochnyi Lyman in the south of the Zaporizhzha Region (Dyadicheva, 2016).

Red-Breasted Goose (*Rufibrenta ruficollis*). Despite the fact that it's bones were found in the tombs of the I–IV centuries AD in Olbia, former settlement of ancient Greeks (modern Mykolaiv Region) (Voinstvenskiy, 1967), until the middle of the twentieth century the species was considered vagrant; most of individuals of this species wintered in the southern Caspian, in Transcaucasia, Iran, and Mesopotamia (Ptushenko, 1952). Starting from the 60s, the number of wintering Red-Breasted Geese in the Caspian region began decline and from 1975 there were no winterings of this species in that area (Priklonskiy, 1976). At the same time to the west from Caspian region the number of counted single birds and flocks began to increase, at first slightly, but in the 90s this species became common in the south part of Ukraine, and later along the Black Sea coast of Romania and Bulgaria (Cranswick et al., 2012).

At the end of the 80s the number of wintering Red-Breasted Geese in the North-Western Black Sea subregion did not exceed 100 ind., but in 1995 it already reached 5,766 ind. (Hunter et al., 1999). During the winter of 1996–1997 it decreased again to 370 ind. (Rusev et al., 1997). During the period from 1988 to 2018 the maximum number of Red-Breasted Geese in the North-Western Black Sea subregion was counted in winter of 2000–2001 — 17,680 ind. (Rusev et al., 2002). There are a few scientific publications about winterings of Red-Breasted

Geese in the area of the Danube lakes, the Danube Biosphere Reserve and Sasyk Lake. Comparison of the data of the end of 20 century — the beginning of 21st century (Sabinevskiy, 1977; Zhmud, 1996; Rusev, 2000, 2001; Rusev et al., 1996, 1998, 2001–2005, 2008, 2011) with the results of counts of the last decade, indicates a significant decrease in the number of wintering birds of this species in the North-Western Black Sea subregion. In 2006–2018 on the shores of the Danube lakes and Sasyk Lake were counted only dozens of wintering individuals and during some counts Red-Breasted Geese were not counted at all. In the third decade of February 2016 the number of Red-Breasted Geese together with Greater White-Fronted Geese increased sharply, apparently due to the beginning of spring migration from Romania and Bulgaria. On 26.02.2016 more than 1,000 individual of Red-Breasted Geese were counted on Sasyk Lake and on 25.02.2018 — 120 ind. in the same area. The most favorable for wintering of Red-Breasted Geese in 2006–2018 were areas around Sasyk Lake, Sentsovsko-Zhebriyanovski Plavni, Katlabug and Kitai lakes. In 2011–2014 on Kagul Lake wintering Red-Breasted Geese were several times met in large lodging flocks of the Greater White-Fronted Goose, which during day time flew to feed to the Romanian part of the Danube Delta. In the Flat Crimea subregion 50 ind. were counted on 04.02.2014 near the Okhotnikovo village, Sakskyi District (Chovan, Kazannyk, 2014), in 2015–2017 in the same area were counted 6–20 ind.

Thus in the late 80s — early 90s of the 20 century in the Azov-Black Sea region of Ukraine about 1,000–3,000 wintering individuals and by the early 2000s — about 24,000–27,000 ind. were counted, 25,407 ind. of which were counted in the Syvash subregion in January 2001 (Andryuschenko et al., 2003). Then the number of wintering Red-Breasted Geese in this area began to decline (the maximum number was registered in November–March) at first gradually and then rapidly — in 2017 there were no records of this species at all (Andryuschenko et al., 2017) (table 1). According to the data gathered by ornithologists of the Biosphere Reserve "Askania Nova" on winerings of the Red-Breasted Goose for period of 20 years in the maximum number were 6,500 ind. counted on 12.01.2005 and on 15.12.2007 — 4,200 ind. (Gavrilenko, 2011), but after that number of birds declined steadily. According to mid-winter counts (IWC), a similar decline in number occurred in the entire Azov-Black Sea region of Ukraine.

The mid-winter counts of wintering Red-Breasted Geese in the Azov-Black Sea region which became regular in the 2000s indicate that the reduction the number of this species as well as the other Anserinae species was followed by significant fluctuations in their number.

Table 1. The number and distribution of Red-Breasted Geese in the region according to the results of mid-winter counts in 2005–2017

Year	Number of birds, ind.					
	North-Western Black Sea subregion	Northern Black Sea subregion	Flat Crimea subregion	Syvash subregion	North-Western Pryazovia subregion	**Total**
2005	762	18	0	12,184	6	**12,970**
2006	1,529	10	0	677	0	**2,216**
2007	950	0	0	20,112	137	**21,199**
2008	15	4	52	1,431	0	1,502
2009	3	3	0	197	0	**203**
2010	0	0	0	3,170	0	**3,170**
2011	0	94	0	3,615	0	**3,709**
2012	0	180	8,699	2,234	0	**11,113**
2013	0	186	0	1,230	0	**1,416**
2014	91	458	184	651	0	**1,384**
2015	0	0	0	300	0	**300**
2016	0	0	20	215	0	**235**
2017	0	0	0	0	0	**0**

The reason for this is not only increased disturbing of birds and poaching but also the weather conditions changing in the winter time: first of all the presence or absence deep snow cover, ice-crusted ground and other weather factors which impede birds feeding. Thus, the fluctuations of geese number were caused by their redistribution in the region during one winter, or even moving of the birds outside of it.

Graylag goose (*Anser anser*). It is the only nesting species of the Anserinae in the Azov-Black Sea region. Besides, the species migrates and winters here. The largest number of wintering the Graylag Goose in the region was at the end of the 80s — the beginning of the 90s of the 20th century — about 45,000–55,000 ind., but in the 2000s its number reduces to probably 4,000 ind. and consisted mainly from local breeding birds. The most of wintering Greylag Geese concentrated in Ukrainian part of the Danube Delta on the territory of Danube Biosphere Reserve (Nazarenko et al., 1977). The number of wintering geese reaches peak in 2000–2005 — 3,800–4,500 ind. During 2010–2018 the number of wintering individuals decreased to 700–1,300, but in the post-nesting period it increased up to 6,000–6,700 ind., which has become the biggest amount for all the years of August counts, conducted from 2004. The Danube concentrations of Graylag Geese mainly feeds on water caltrop (*Trapa natans*) in the coastal part of the Danube Delta and moves to the Romanian part of the delta or to the corn fields, only when there is a deficit of water caltrop. In small number the Graylag Goose was also observed on the Danube lakes. In January 2018 195 ind. were counted on Lake Lung (counts conducted together with A. M. Gaidash), in February in the lower reaches of the Katlabug Lake —265 ind., and in the lower reaches of Kagul Lake — 164 ind. The number of species in these areas mainly depends on the ice cover. In the Danube lowlands, in the area of Yalpug, Kartal, Kugurlui lakes, the maximum number of the Graylag Goose was counted in winter of 1998–1999 — 3,750 ind. (Rusev et al., 1999). On the Tylyhulskyi Lyman the largest flock of Graylag Geese was counted on 15.01. 2006 at Tashino village — 610 ind. In the area of the Dniprovsko-Buzkyi and Berezanskyi lymans the maximum number of wintering Graylag Geese was counted on 12.02.2005. — 158 ind. and on 18.02.2007 — 52 ind. (Petrovych et al., 2008). Later, in subsequent winters, only a few birds or just several dozens of individuals which probably belonged to the local breeding population were observed. In the Syvash subregion in 2005–2017 the number of wintering birds also steadily decreased (Andryuschenko et al., 2017 with updates). On the Kerch Peninsula in 2008 in total were counted 170 ind. According to the data of mid-winter counts, such decrease in number of the Graylag Goose is typical for the entire Azov-Black Sea region of Ukraine (table 2).

Presumably, the main reasons of decreasing of the number of the Graylag Goose in the region are hunting, poaching and changes in crop rotation. From the beginning of the 90s of the 20th century the number of goose hunters has increased dramatically and modern technologies (mobile communications, all-terrain vehicles, decoy devices, etc.), and lack of control allowed up to 50 birds to be hunted by one hunter per one day. In addition, the constant disturbance, forced the geese to change their wintering locations. In the same period in the region the forage base has also decreased significantly: many fields were abandoned, the area of crops which are main food for geese (especially corn) has been greatly reduced.

Greater White-Fronted Goose (*Anser albifrons*). According to V. I. Lysenko (1991) it is a common wintering species in the Azov-Black Sea region of Ukraine. In 1985–1993 in the left-bank territory (to the East from the Dnipro River) were counted about 400,000–450,000 wintering birds. The largest concentration of the Greater White-Fronted Goose — about 500,000 individuals — was counted in December 1997 on the territory of the Askania Nova Biosphere Reserve (Gavrilenko, 1997). This has become possible because of winter crops; unharvest fields of corn and intensive hunting and poaching on adjacent lands. But already in the late 90s of the 20th century the number of Greater White-Fronted Geese has decreased and during wintering period there were counted

Table 2. The number and distribution of Graylag Goose in the region according to results of mid-winter counts in 2005–2017

Year	Number of birds, ind.					
	North-Western Black Sea subregion	Northern Black Sea subregion	Flat Crimea subregion	Sivash subregion	North-Western Priazov'e subregion	**Total**
2005	0	17	14	551	139	721
2006	3,917	710	0	42	8	**4,677**
2007	18	150	0	572	80	**820**
2008	0	150	170	60	60	**440**
2009	3,050	0	0	12	0	**3,062**
2010	7	0	0	58	33	**98**
2011	1,247	0	0	0	9	**1,256**
2012	725	35	10	39	3	**812**
2013	2,550	26	3	7	28	**2,614**
2014	748	3,107	0	400	0	**4,255**
2015	399	0	0	0	0	**399**
2016	857	0	0	32	0	**889**
2017	16	500	0	54	0	**570**

about 300,00–400,000 ind., in 2010–2012 — about 100,000–150,000 ind. (Andryuschenko, Popenko, 2012) and in the last years of analyzed period only a few tens of thousands birds were counted. In the late 90s of the 20th century 100,000–120,000 wintering birds were counted only in the north of the Syvash subregion, but in the 2000s the number of the birds (table 3) began to decrease (Andryuschenko et al., 2017, with updates). In the Danube — Dnister interfluve in the mid-90s were counted 67,590 ind. (Rusev et al., 1997) and in winter of 2000–2001 in the entire North-Western Black Sea subregion — 109,643 ind. (Rusev et al., 2002). There are very little data on wintering Greater White-Fronted Geese in the area of the Danube lakes — Kitai, Katlabug, Lung, Yalpug, Kugurluy, Kagul (Smirnov, 1917) and regular monitoring of this area has been conducted only since 2011 (counts conducted together with A. M. Gaidash). In 2005–2018 in this part of the subregion were counted about 2,500–5,000 wintering birds and sometimes there were counted only a few dozens of individuals. There is a bit more data on wintering Greater White-Fronted Geese in the Danube Biosphere Reserve, on Sasyk Lake and adjacent territories (Zhmud, 1996; Rusev, 2001; Rusev et al., 1996, 2005, 2011). During this period there was also a decrease in number of this species. At the same time, in recent years the number of Greater White-Fronted Geese increased sharply in the third decade of February and in some flocks in the area of Sasyk Lake its number reached 10–15 thousand individuals. Presumably, these were geese which migrated in spring from the Balkan Peninsula. During the wintering period of 2011–2014 on the Kagul Lake in the vicinity of Reni City were observed lodging concentrations of Greater White-Fronted Geese up to 13 thousand ind. During the day birds flew off to feed on the Romanian part of the Danube Delta. Apparently, due to the dense location of villages and high level of disturbance, the number of Greater White-Fronted Geese on the shores of the Danube lakes during the daytime was rather small. The decrease in number was observed in the right-bank part of the Northern Black Sea subregion (to the West from the Dnipro River). In 2000–2007 in the area of the Dniprovsko-Buzkyi and Berezanskyi lymans were counted 1,500–5,000 ind. of wintering Greater White-Fronted Geese and on the Tylygulskyi Lyman — up to 2,500 ind. (Petrovych et al., 2008) and during the last three winters the number of the species did not exceed 450 ind. In the Flat Crimea subregion the decrease in numbers was especially noticeable on the Kerch Peninsula — the main wintering area of Greater White-Fronted Geese in this subregion. In 2012 in this area up to 14,000 ind. of Greater White-Fronted Geese were counted. Totally, including birds, species of which was not identified (among which were probably Graylag Geese), it was counted

about to 30,000 ind., but in 2016 their number decreased to only 250 ind. The area of Sasyk Lake remains a place where Greater White-Fronted geese winter regularly — in 2012–2017 in this area 2000 ind. were counted. According to mid-winter counts, the decrease in number of this species occurred in the entire Azov-Black Sea region of Ukraine (table 3).

It is clear that the data on mid-winter counts of the Greater White-Fronted Goose show only general trends for the region, but not it's intraseasonal dynamics. The amplitude of fluctuations in number during one winter often is much larger than between years and it depends on many factors, the dominant of which are weather conditions and, above all, snow and ice cover (Andryuschenko, 2015). Moreover, the number of wintering geese in the Azov-Black Sea region of Ukraine depends on the weather conditions as in other wintering regions as the weather conditions in areas of migrations' stop-overs. During mild winters a significant part of geese, which migrating from the south of Western Siberia and Northern Kazakhstan may stay on in the Kumo-Manych depression (between the Caspian Sea and Sea of Azov) and in severe snowy winters they move to the North-Western (Ukraine) and Western (Romania, Bulgaria) Black Sea Coast. The fluctuation of the intraseasonal birds number is proved by results of series counts during one winter. This is clearly demonstrated by the results of regular (weekly of even each 5 days) counts in the Biosphere Reserve "Askania Nova" in the Big Chapelskyi Pod and at zoo ponds (fig. 2). According to long-term data the peak of the number of birds usually falls on November–December.

The determining factor that caused the decrease of the wintering number of the Greater White-Fronted Goose in the region is intensification of hunting and especially poaching. In the late 90s — early 2000s this was followed by a reduction of winter crops in the area, but at the beginning of 2010 the crop areas were recovered and increased significantly also because of sowing large areas with colza. Apparently combination of factors mentioned above caused a redistribution of wintering geese outside the Azov-Black Sea region of Ukraine as evidenced by an increasing of their number during wintering in Bulgaria and Romania. And in the last decade more snowy winters especially in the North-Western Black Sea subregion and the North-Western Azov Sea subregion of Ukraine could also affect it.

Lesser White-Fronted Goose (*Anser erythropus*). In the middle of the 80s the ornithologists didn't have a good optics (especially telescopes) which would allow them to identify Lesser White-Fronted Geese in flocks of Greater White-Fronted Geese. In January–February 2002 in the Dnipro left-bank part of the Azov-Black Sea region of Ukraine only 5 individuals were counted, 2 of which — in the Central Syvash (Grinchenko et al., 2003).

Table 3. The number and distribution of Greater White-Fronted Goose in the region according to the results of mid-winter counts 2005–2017

Year	Number of birds, ind.					
	North-Western Black Sea subregion	Northern Black Sea subregion	Flat Crimea subregion	Syvash subregion	North-Western Pryazovia subregion	**Total**
2005	9,315	5,888	0	65,863	1,887	82,953
2006	20,370	6,845	6,000	11,509	5,710	**50,434**
2007	17,645	200	23	58,283	2,973	**79,124**
2008	4,550	2,526	5,713	12,713	116	**25,618**
2009	1,990	2,052	9,038	16,588	0	**29,668**
2010	110	400	0	23,384	71	**23,965**
2011	0	1,250	30	39,845	28	**41,153**
2012	15	5,195	32,655	5,923	0	**43,788**
2013	264	2,330	1,081	24,740	143	**28,558**
2014	5,153	5,795	2,363	19,703	0	**33,014**
2015	0	1,000	18	500	0	**1,518**
2016	0	0	660	2,730	0	**3,390**
2017	0	147	0	2,969	0	**3,116**

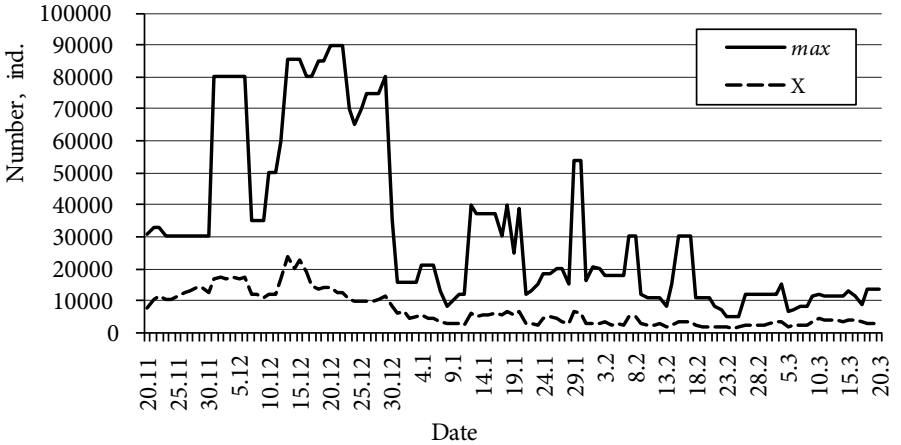

Fig. 2. Intraseasonal dynamics of the number of Greater White-Fronted goose in the Biosphere Reserve "Askania Nova".

In the North-Western Black Sea subregion during the winter of 1996–1997 were registered 2 ind. (Rusev et al., 1997) and in the winter of 1998–1999 — 7 ind. (Rusev et al., 1999). In the south of Sasyk Lake (Odesa Region) 2 ind. in a flock of Greater White-Fronted Geese were counted on 14.01.2016 on a field of winter wheat and in the lower reaches of the Tylygulskyi Lyman on 3.03.2001 — 3 ind., and on 26.11.2002 — 1 ind. (Petrovych et al., 2008). Also single Lesser White-Fronted Geese were observed in flocks of the Greater White-Fronted Geese in the "Askania Nova" Biosphere Reserve (Gavrilenko, Mezinov, 2005). In the Ivano-Rybalchansky area of the Black Sea Biosphere Reserve, Yu. A. Moskalenko observed 1 ind. in the flock of Greater White-Fronted Geese on 11.11.2008 (Moskalenko, Plyushch, 2018).

Taiga Bean Goose (*Anser fabalis*). Since the flyways and wintering territories of the Taiga Bean Goose are located in the northern part of Ukraine (Poluda, 2009), in the Azov-Black Sea region only single birds and small flocks of this species were observed. Thus during the 18.01–2.02.2002 in the steppe part of Crimea and in the Kherson Prysyvashshia were counted only six wintering individuals, occurred near Koyashske Lake on the Kerch Peninsula, four of which were *A. f. fabalis* and two individuals — *A. f. rossicus* (Grinchenko et al., 2003). Single individuals of the Taiga Bean Goose were observed in the North-Western Black Sea region of Ukraine on 16.01.2013 in a flock of the Graylag Goose in the area of the Danube Delta and on 14.01.2016 in the flock of the Greater White-Fronted Goose in the south of Sasyk Lake, and in January 2014 — 35 ind. (observed together with A. I. Korzyukov) on the agricultural fields of Belgorod-Dnistrovskyi District, Odesa Region. In the Northern Black Sea region of Ukraine in the winter of 2004–2005 this species was found in the Ochakovskyi District of the Mykolaiv Region: 15.01.2005 — two ind., on 11 and 12.02. 2005 — four ind. (Petrovych et al., 2008). In the Syvash subregion a flock of 40 ind. was observed on 15.01.2007 near Syvaske village (Novotroitskyi District, Kherson Region). One dead young individual of this species was found in 2009 on the territory the Biosphere Reserve "Askania Nova", apparently poisoned when feeding in the adjacent fields. In the Flat Crimea subregion, one individual was met on 12.12.2015 near Frontove village on the Ak-Monai Isthmus of the Kerch Peninsula.

Snow Goose (*Chen caerulescens*). Observation of this species in Ukraine in early twentieth century (Artobolevskyi, 1926; Kostyuchenko, 1928; Sarandinaki, 1928) allow to suppose that single vagrant individuals could be observed in the region, although the observations of albino birds of other species of geese are more likely. We have counted four geese of white colour in Syvash subregion: three birds in the Eastern Syvash in flocks of the Greater White-Fronted Goose (on 22.01.2001, near Turgenevo village; on 15.01.2007, near

Table 4. Species composition, status of presence and nature conservation status of the geese of the Azov-Black Sea region of Ukraine

No.	Species	Status of presence*								RDB**	
		nesting		migratory		wintering		vagrant			
		ukr.	reg.	ukr.	reg.	ukr	reg.	ukr.	reg.	ukr	reg.
1.	*Branta canadensis*							+	+		
2.	*Branta leucopsis*			+					+		
3.	*Branta bernicla*							+	+		
4.	*Rufibrenta ruficollis*			+	+	+	+			+	+
5.	*Anser anser*	+	+	+	+	+	+				
6.	*Anser albifrons*			+	+	+	+				
7.	*Anser erythropus*			+	+	+	+			+	+
8.	*Anser fabalis*			+	+	+	+				
9.	*Chen caerulescens*							+	+		
10.	*Eulabeia indica*							+	?		
11.	*Alopochena egyptiacus*							+			
	Total	1	1	6	5	5	5	5	4–5	2	2

* Status of presence: 'ukr." — in the wholeUkraine, "reg."— in the Azov-Black Sea region of Ukraine; ** RDB — species included in Red Data Book of Ukraine (2009).

Chaikino village; on 25.11.2010 at the Solonoozerne village, Dzhankoyskyi District, Crimea and one bird — 30.03.2017 on the Central Syvash, not far from the Vasylivka village, Novotroitskyi District, Kherson Region. In all cases birds were first mistaken for Snow Geese, but thanks to powerful telescope (which researchers did not have at the beginning of the century) it turned out that all of them were albino of the Greater White-Fronted Goose. V. I. Lysenko (1991) gives example of several observations of the Snow Goose in Southern Ukraine since 60s of the twentieth century and explains that these individuals had escaped from the zoo "Askania Nova" where since 1963 Snow Geese were breeding and for 20 years more than 200 individuals have flown away from the zoo (Zubko, 1980; Lysenko, 1991; Zubko et al., 1996). Single summer and autumn observations of the species are known in the Ukrainian part of the Danube Delta (Zhmud, 1996). In winter, in that region, only one individual of this species was observed 16.01.1978 on the shore of the estuary of Bystroye Canal of the Danube Delta (Petrovych, 2015).

Bar-Headed Goose (*Eulabeia indica*). 1 ind. was met on the Kuchurganskyi Lyman — the lower reaches of the Dniester River on the border of the Odesa Region and Moldova (Arhipov, 1996) — this fact has no reliable evidence although it is possible that this is also a fugitive from the zoo. In the Syvash subregion this species wasn't observed, but meetings of the fugitives are quite possible because the Bar-Headed Geeese are contained in small zoos on the Crimean coast in the Krasnoperekopskyi and Dzhankoiskyi Districts and in the Kherson Region in "Askania Nova".

Egyptian Goose (*Alopochen aegyptiacus*). In Ukraine it is a very rare vagrant species (Gleba, 2015), but in the Azov-Black Sea region it has not been observed.

Thus out of 11 geese species found in Ukraine (Grishchenko, 2004; Fesenko, Bokotej, 2007; Gleba, 2015), 10 are observed in the Azov-Black Sea region of Ukraine: 1 species — nests, migrates and winters, 4 — migrates and winters, 4 — vagrants, 1 — supposedly vagrant (table 4). Two geese species are listed in the Red Book of Ukraine (2009).

General patterns of geese number changes and their distribution by subregions

The most common forage for geese in winter are residues of corn, sunflower, cereals, soybean, seedlings of early grain crops (winter wheat, barley) as well as colza. Corn is the

most valuable among the forage listed above and due to irrigation areas sown with corn has greatly increased. In the late 90s of the XXth century the area of irrigation has sharply decreased including the fields with maize sown for grain. During this period in many areas of the Azov-Black Sea region the sowing of maize for grain was stop, and in some areas where corn was still sowed, fields that were harvested usually were plowed up before winter. This circumstance had great influence on the special redistribution of the Graylag Goose, the number of which significantly decreased in the region during this period. Apparently, the same factors had influenced on the distribution of the Lesser White-Fronted Goose and Taiga Bean Goose, but it is hard to say for sure because of the small number of these species and small number of their registration by ornithologists.

A significant reduction of the area of winter cereals which took place in the second half of the 90s of the XXth century did not affect drastically the number of wintering geese in the Azov-Black Sea region. The same about the increase of winter crops areas and the appearance colza and soybeans in the beginning XXIth century did not lead to increase in the number of geese. At the same time, a certain spatial redistribution of birds was caused by increasing of the disturbance, especially from illegal hunting. This was aggravated by the modernization of hunting equipment (shotguns, luring and tracking devices), using off-road vehicles, and a significant decrease of control on harvesting quotas.

The number and distribution of wintering geese depends on available feeding, drinking and resting territories. It is important that at all types of the territories should not be disturbance of birds. At the same time, so called "reproduction areas" which are in all game reserves can't ensure this for Anseriformes, first of all because of intensification of poaching on these areas (this is especially true for people in power.). As a result of this large number of Greater White-Fronted Geese that could be observed before almost everywhere, now can be seen only in hard-to-reach places (territories with strong mudslides, with large non-freezing wetlands and foraging areas within a radius of up to 40 km, in protected areas with wetlands) where factor of disturbance is minimal, especially in evening and at night. However, this did not change the general trend of a steady decrease in number of wintering geese traced until to 2017. At the same time to the west from Ukraine there was a significant increase in the number of wintering geese. From 1995 to 2008 only in Northwestern Europe the number of wintering geese increased by 24 % from 3.5 million to 4.3 million individuals (Fox et al., 2010). Such an increase in number of wintering birds in Europe led to an increase in the number of birds at migration stops in northeastern Ukraine (Banik et al., 2011).

According to 2005–2017 counts among the geese regularly wintering in the region the most numerous are the Greater White-Fronted Goose and the Red-Breasted Goose (fig. 3).

The Graylag Goose mainly winters in the North-Western Black Sea region, primarily in the Danube Delta. The most of Red-Breasted Geese and Greater White-Fronted Geese winter in the Syvash subregion, where Red-Breasted Geese concentrates in the north of the Central Syvash and Greater White-Fronted Geese — in the "Askania Nova" region. The most important as a wintering territory for all Anserinae species is the Syvash subregion and the least important is the North-West Azov Sea region where over the last 20 years the territories suitable for regular winterings of birds have practically disappeared (fig. 4).

In general, during the studied period there was a general decrease in number in most of Anserinae species in the Azov-Black Sea region of Ukraine (fig. 5). Despite this, it remains quite valuable for maintaining this group of birds in the winter time. This value fluctuates over time depending on the natural and anthropogenic changes of the region. The most defining natural factors are the weather conditions during winter and the status of bird populations wintering in the region (not only depends on successful breeding in the previous spring-summer period, but also from long-term population trend). Among the anthropogenic factors the most significant for birds are, first of all, the hydrological regime of wetlands (related to land irrigation) and vegetation on agricultural lands (feed availabil-

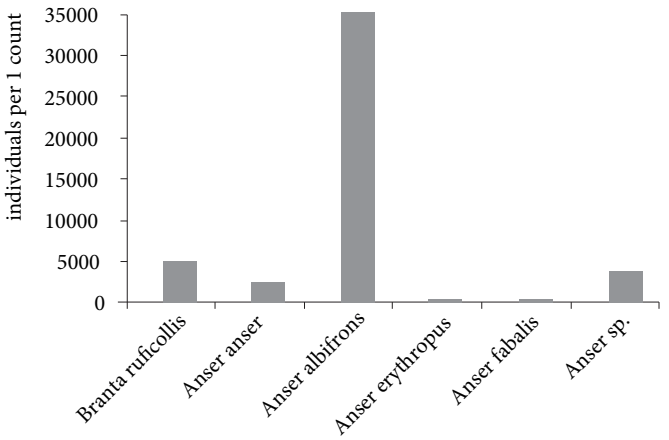

Fig. 3. Average number of Anserinae species, wintering in the Azov-Black Sea region of Ukraine (based on 13 mid-winter counts 2005–2017).

ity). The factor of disturbance is also important, and for hunting species it is crucial one, and depends on many circumstances, mainly from poaching (Andryuschenko et al., 2017).

Thus, in the last decades there has been a significant decrease in the number of wintering Anserinae in the region, mainly — Graylag and Greater White-Fronted geese species. The Red-Breasted Goose is an exception — its number in the region in previous period decreased smoothly, but in the last 6 years it has decreased abruptly (table 5). The few observations of the Lesser White-Fronted Goose and Taiga Bean Goose do not allow evaluating any tendencies of their wintering: the Lesser White-Fronted Goose is a rare species because of its small number in general, and the Taiga Bean Goose winters mainly in Western, Southwestern and Central Europe (Poluda, 2009). Depending on weather conditions during the winter time (the presence or absence of deep snow cover, ice and other adverse weather factors that impede birds feeding) geese are constantly redistributed within the region or migrating outside its territory (Andryuschenko & Popenko, 2012).

Summarizing the above we can conclude that the main reasons for the change in number and territorial redistribution of geese wintering in studied region in recent decades are the

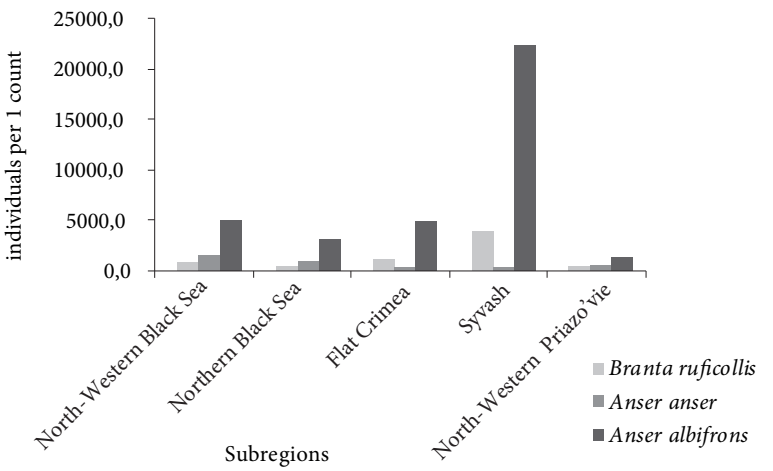

Fig. 4. Distribution of regularly wintering Anserinae in the Azov-Black Sea region of Ukraine (based on 13 mid-winter counts 2005–2017).

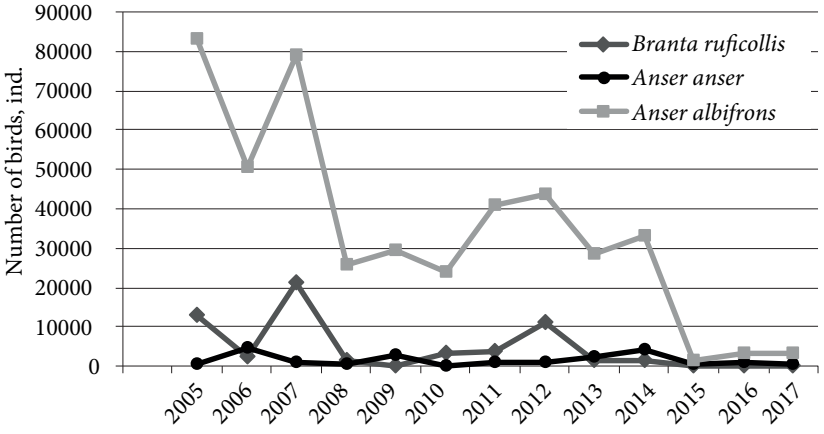

Fig. 5. The long-term dynamics of number of Red-Breasted Geese, Graylag Goose and Greater White-Fronted Geese in the Azov-Black Sea region of Ukraine according to the results of mid-winter counts in 2005–2017.

following (Andryushchenko, Popenko, 2018): changes of weather and climate conditions (temperature, precipitation, force of wind, etc.), determining the presence, height and area of snow cover which are very important for birds feeding (Andryuschenko, 2015) — during the warm winters birds can stay on eastern wintering areas (for example, at the Kumo-Manych depression (Russia) or the North-Western Azov Sea Region of Ukraine), however, after decrease of temperature and formation of snow cover, they move to the west of the Azov-Black Sea region of Ukraine, and in case of deep snow there, wintering birds move to the Balkan region; a significant extension of areas with agricultural crops which can be used by geese as feeding areas, not only winter wheat, but also colza as well as sunflower and soybeans (spawned during harvest or not harvested seeds) on irrigated lands is very important for distribution of birds; violation of deratization technology when birds feed on poison grain scattered over the soil surface despite of the requirements to place grain in rodent holes and then to cover them with soil (Andryushchenko et al., 2015), as well as the use of prohibited chemicals (zinc phosphide), results of which is the mass death of geese feeding on crops; large-scale and almost uncontrolled poaching, with using modern devices and technologies (transport, weapons, decoys, navigators, the Internet, etc.) and absence in fact territories where hunting is completely prohibited, excluding comparatively small territories national parks, or biosphere reserves, like "Askania Nova" since 2014, negative influence of disturbance in the region was significantly increased because of the militarization of the area around Syvash (between Crimean and Kherson Region), which is the "demarcation line" and where now located a significant number of armed people, military vehicles, conducting of military trainings etc. — all this led to scaring and shooting birds; also since 2014 a significant decrease in number of winter wheat and colza on irrigated lands as well as the cessation of rice cultivation in the Crimea due

Table 5. The long-term dynamics the estimated number of Anserinae species wintering in the Azov-Black Sea region of Ukraine

Species	Number of birds, ind.		
	1997	2007	2017
Rufibrenta ruficollis	24,000–27,000	20,000–21,000	100–300
Anser anser	45,000–55,000	800–1,000	600–700
Anser albifrons	450,000–500,000	100,000–150,000	3,300–5,000
Total	517,000–560,000	120,000–170,000	4,000–6,000

to the stop of water supplying through North-Crimean channel from Kherson Region led to reducing of geese forage base; changes of migration routes and wintering areas mostly caused by the factors listed above. For example, geese almost were not counted during the winter of 2016–2017 but in March there was massive migration of birds that obviously wintered somewhere west and south-west of Ukraine. It is possible to suppose this because a surprisingly short scare distance the birds — the Greater White-Fronted Goose and Red-Breasted Goose did not take off when cars stopped at a distance of 150–200 m, people could get close even up to 100–150 m, and the birds took off returned to the same field again, landing only a little further. This did not took place even in the 80s and 90s of the XX century, when the number of wintering geese reached it's peak and poaching was not at so high level as now; possible reduction in the size of nesting populations.

Conclusion

Thus, out of 11 species of the Anserinae in Ukraine in the Azov-Black Sea region, 9 species were observed: the Graylag Goose nests winters and migrates here; the Red-Breasted Goose, Greater White-Fronted Goose, Lesser White-Fronted Goose and Taiga bean goose — migrate and winter; Snow Goose, Canada Goose, Barnacle Goose and Brent Goose — vagrant or individuals that flew away from captivity. The Bar-Headed Goose can also be a vagrant species. Among regularly wintering species only the Greater White-Fronted Goose is very numerous, the Red-Breasted Goose is numerous, the Graylag Goose is non-numerous — quite small in amount. During the last 15–20 years number of wintering birds decreased in about ten times. The main reasons for this are changes in weather and climate conditions; changes of forage accessibility; high pressure from hunting and poaching; poisoning from agriculture chemicals; since 2014 — the militarization of the Syvash region and the stop of water supplying to the Crimea from Kherson Region; and, probably, change of wintering areas, caused by the factors listed above.

References

Andryuschenko, Yu. A. 2015. O vliyanii snezhnogo i ledovogo pokrovov na sostoyanie zimovok ptits v suhostepnoy podzone Ukrainy. *Berkut*, 24 (1), 18–36 [In Russian].

Andryuschenko, Yu. A., Gorlov, P. I., Kinda, V. V. & Kasyanov V. I. 1997. Rezultatyi uchetov zimuyuschih ptits Severo-Zapadnogo Priazov'ya v yanvare 1997 goda. *Ekosistemy dikoy prirody*, 1–3 [In Russian].

Andryuschenko, Yu. A., Gorlov, P. I., Kinda, V. V., Kostyushin, V. A., Koshelev, A. I., Koshelev, V. A., Oleynik, D. S., Peresadko, L. V., Pokusa, R. P., Popenko, V. M., Popenko, K. V., Falko, A. M. & Chernichko, I. I. 2001. Itogi srednezimnih uchetov ptits na Sivashe i v Severo-Zapadnom Priazov'e v 2000 g. *Zimnie uchety ptits na Azovo-Chernomorskom poberezhe Ukrainy.* Odesa, Kyiv, 3, 29–33 [In Russian].

Andryuschenko, Yu. A., Kostyushin, V. A., Kucherenko, V. N. & Popenko, V. M. 2015. Gusi i drugie vodno-bolotnyie ptitsy suhostepnoy podzony Ukrainy zimoy 2011/2012 gg. *Branta: Sbornik trudov Azovo-Chernomorskoy ornitologicheskoy stantsii*, 18, 40–63 [In Russian].

Andryuschenko, Yu. A., Popenko, V. M. 2012. Sovremennoe sostoyanie zimovok gusey v podzone suhikh stepey Ukrainy k vostoku ot Dnepra. *Kazarka, Byulleten Rabochey gruppy po guseobraznym Severnoy Evrazii*, 15 (2), 139–163 [In Russian].

Andryuschenko, Yu. A., Chernichko, I. I., Arsievich, N. G. & Oleynik, D. S. 2003. Rezultaty srednezimnih uchotov ptits na Sivashe v 2001 godu. *Branta: Sbornik trudov Azovo-Chernomorskoy ornitologicheskoy stantsii,* 6, 173–178 [In Russian].

Andryushchenko, Yu., Popenko, V. 2004. Methodologicals proposals on Geese census in the Black Sea region. *8th Annual Meeting of the Goose Specialist Group (5–10 March 2004).* Odesa, Ukraine, 17–20.

Andryushchenko, Yu., Popenko, V. 2018. Causes of degradation of geese wintering in south of Ukraine. *Conference abstracts "The 18th conference of Goose Specialist Group (27–30 March 2018, Klaipeda)"*. Klaipeda, 22.

Andryuschenko, Yu. A., Popenko, V. M., Chernichko, R. N. & Andryuschenko, A. Yu. 2017. Sovremennoe sostoyanie zimovok guseobraznyih v Sivashskom subregione. *Branta: Sbornik trudov Azovo-Chernomorskoy ornitologicheskoy stantsii*, 20, 154–186 [In Russian].

Arhipov, A. M. 1996. Vstrecha gornogo gusya (*Anser indicus*) v Odesskoy oblasti. *Pratsi Ukr. ornitol. Tovaristva,* 1, 220.

Artobolevskyi V. I. 1926. Materialy do spysku ptakhiv pivdennoi polovyny Chernihivshchyny. *Zbirka Kyivskoho instytutu narodnoi osvity*. Kyiv, 113–126 [In Ukrainian].

Banik, M. V., Belik, V. P., Atemasov, A. A., Atemasova, T. A., Goncharov, G. L. 2011. Vesennyaya migratsiya gusey i mesta ih ostanovok v tsentralnoy chasti Vostochno-Evropeyskoy ravniny. *Kazarka, byulleten Rabochey gruppy po guseobraznym Severnoy Evrazii*, 14, 90–123 [In Russian].

Beskaravaynyiy, M. M., Kostin, S. Yu. 1997. Osobennosti zimovki ptits na Yuzhnom beregu Kryma. *Ekosistemy dikoy prirody*, 5–7 [In Russian].

Chernichko, R. N., Andryuschenko, Yu. A. & Popenko, V. M. 2015. Rol' zimuyuschikh na yuge Ukrainy guseobraznykh v perenose vozbuditeley nekotorykh bolezney zhivotnykh i cheloveka. *Tezisy dokladov Mezhdunarodnoy konferentsii "Guseobraznyie Severnoy Evrazii: izuchenie, sokhranenie i ratsionalnoe ispolzovanie. 30 noyabrya–6 dekabrya 2015 g. Salekhard, Rossiya"*. RGG Severnoy Evrazii, Salehard, 98–99 [In Russian].

Chernichko, I. I., Popenko, V. M., Dyadicheva, E. A., Chernichko, R. N., Andryuschenko, Yu. A., Kinda, V. V., Gorlov, P. I., Koshelev, A. I. & Vinokurova, S. V. 2015. Sezonnye migratsii, kochevki i lin'ka. *Byulleten ROM*: *Itogi regionalnogo ornitologicheskogo monitoringa. Spetsyalnyi vypusk. Retrospektiva rezultatov ornitologicheskogo monitoringa v vodno-bolotnykh ugodyakh:* Molochnyi liman, 9, 17–42 [In Russian].

Chovan, O. O., Kazannyk, V. V. 2014. Zymova zustrich chervonovoloi kazarky (*Rufibrenta ruficollis*) u Kyivi. *Berkut*, 23 (1), 23 [In Ukrainian].

Cranswick, P., Raducescu, L., Hilton, G., Petkov, P., Isayeva, A., Sultanov, E., Georgiev, D., Iankov, P., Ivanov, I., Stefanov, T., Dereliev, S., Martin, K., Handrinos, G., Kastritis, T., Oláh, J., Brombacher, M., Koshkina, M., Sklyarenko, S., Timoshenko, A., Vilkov, V., Yerokhov, S., Bugariu, S., Petrescu, E., Fantana, C., Hulea, D., Marin, V., Szekely, P., Teodor, P., Anisimova, O., Badmaev, V., Derviz, D., Kharitonov, S., Litvin, K., Miliutina, M., Morozov, V., Popovkina, A., Pospelov, I., Poyarkov, N., Rozenfeld, S., Skuratov, N., Solokha, A., Syroechkovskiy, F., Tavares, J., Osadcha, O., Korzuykov, A., Rusev, I., Andryushchenko, Yu., Cook, N., Day, M. 2012. *Draft international single species action plan for the conservation of the Red-Brested goose*. AEWA, 1–42.

Dyadicheva, O. A. 2016. Inventaryzaciya ornitofauny. *Litopys pryrody Pryazovskogo nacionalnogo pryrodnogo parku (2015 rik). Melytopol*, 5, 1–632 (Dep. v DNTB Ukrayiny 22.06.2016: N 7–Uk 2016. Referat opubl. v RZ "Deponovani naukovi roboty", 2016, 1–2) [In Russian].

Fesenko, G. V., Bokotej, A. A. 2007. *Anotovanyj spysok ukrayinskykh naukovykh nazv ptakhiv fauny Ukrayiny*. Kyiv, Lviv, 1–111 [In Ukrainian].

Gavrilenko, V. S. 1997. O neobkhodimosti sozdaniya ekologicheskikh koridorov na migratsionnykh putyakh okolovodnykh ptits v Severnom Prichernomorye. *Ekosistemy dikoy prirody: okhrana. prirodopolzovaniye. monitoring.* Odessa, 10–11 [In Russian].

Gavrilenko, V. S., Mezinov, A. S. 2005. Prichiny i osobennosti zimovok guseobraznyh v regione Biosfernogo zapovednika "Askaniya-Nova". *Tezisy dokladov III mezhdunarodnogo simpoziuma "Guseobraznye ptitsy Severnoy Evrazii"*. Sankt-Peterburg, 70–72 [In Russian].

Gavrylenko, V. S., Lystopadskyj, M. A. 2010. *Vzayemodiya gusey ta zhuravliv z agrocenozamy v regioni Biosfernogo zapovidnyka "Askaniya-Nova" i shlyaxy zmenshennya yix vplyvu (anality chnyj oglyad z metody chnymy vkazivkamy).* Askaniya-Nova, 1–36 [In Ukrainian].

Gavrilenko, V. S. 2011. Ptitsy "Krasnoy knigi Ukrainy" v ekosistemah biosfernogo zapovednika "Askaniya-Nova". *Ridkisni i znykayuchi ptakhy Pivnichno-Zakhidnogo Prychornomor'ya*, 19–25 [In Russian].

Gavrys, G. G., Kuzmenko, Yu. V., Mishta, A. V., Kocerzhynska, I. M. 2007. *Fauna khrebetnykh tvaryn natsionalnogo pryrodnogo parku "Desnyanko-Starogutskyi": kolektyvna monografiya.* Sumy, 1–120 [In Ukrainian].

Gleba, V. N. 2015. Vstrecha egipetskogo gusya *Alopochen aegyptiacus* v Zakarpatskoy oblasti. *Russkiy ornitologicheskiy zhurnal,* 24 (1170), 2634–2635 [In Russian].

Golovnyuk, V. V., Popovkina, A. B., Solovyov, M. Yu. 2015. Pervyiy sluchay gnezdovaniya beloschokoy kazarki na Taymyre. *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 18, 25–29 [In Russian].

Grinchenko, A. B. 2001. Prolet i zimovka piskulek v Krymu. *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 7, 130–136 [In Russian].

Grinchenko, A. B., Koshelev, A. I., Chernichko, I. I. 1995. Migratsionnye i zimovochnye skopleniya gusey i kazarok v Azovo-Chernomorskom regione Ukrainy i perspektivy ikh okhrany. *Novye issledovaniya po gusyam Palearktiki*. Zaporozh'e, 54–56 [In Russian].

Grinchenko, A. B., Kupsha, A. S. 1999. Ekstremalnaya zimovka ptits na territorii Krymskogo poluostrova v 1984–1985 gg. *Sb. nauchnykh statey, posvyaschennykh pamyati Kostina Yu. V.* Melitopol, 50–53 [In Russian].

Grinchenko, A. B., Popenko, V. M., Aarvak, T., Nordensvan, G., Pinnonen, Yu. 2003. Uchety zimuyuschikh gusey v Prisivash'e i stepnykh rayonakh Kryma. *Kazark, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 9, 313–316.

Grishchenko, V. 2004. Checklist of the Birds of Ukraine. *Berkut*, 13 (2), 142–154.

Gudina, A. N. 2007. Redkie i maloizuchennyie ptitsy Vostochnoy Ukrainy. T. 1. Gaviformes — Galliformes. Zaporozh'e, 1–232 [In Russian].

Gulaj, V. I. 1996. Zalit biloshhokoyi kazarky na Podillya. *Materialy konf ."Terytoriyi, shho vazhlyvi dlya zberezhennya ptaxiv v Ukrayini".* Nizhyn, 80–81 [In Ukrainian].

Havrylenko, V. S., Zubko, V. N. & Mezinov, A. S. 2004. Autumn-winter concentrations of geese at the Askania Nova Biosphere reserve reservoirs. *8th Annual Meeting of the goose specialist group Wetland International, 5–10 March 2004.* Odessa, 37–42.

Hunter, J. M., Black, J. M., Rusev, I. T., Michev, T., Munteanu, D. 1999. Red-breasted Goose — *Branta ruficollis. Goose populations of the western palearctic: a review of status and distribution.* Wetlands international Publication, 48, 328–340.

Itogi srednezimnego ucheta vodno-bolotnykh ptits 2006 goda v Azovo-Chernomorskom regione Ukrainy: adaptatsiya metodik IWC i ikh aprobatsiya. *Byulleten ROM* (2009), 4, 1–24 [In Russian].

Itogi srednezimnih uchetov vodno-bolotnykh ptits 2005, 2007-2010 godov v Azovo-Chernomorskom regione Ukrainy. *Byulleten ROM* (2011), 7, 1–64 [In Russian].

Itogi zimnikh uchetov 2011–2017. *Byulleten ROM* (2017), 11, 1–99 [In Russian].

Kazannyk, V. V., Moroz, V. O., Bijlmakers, R. 2015. Zalit biloshhokoyi kazarky (*Branta leucopsis*) u Kyivsku oblast. *Avifauna Ukrayiny*, 6, 48–50 [In Ukrainian].

Katalog ornitofauny zakhidnykh oblastej Ukrayiny: Ornitofaunistychni sposterezhennya za 1991–1992 rr. *Volove ochko*, (1993), 3, 7 [In Ukrainian].

Kostin, Yu. V. 1983. *Ptitsy Kryma.* Moskva, 1–240 [In Russian].

Kostiushyn, V., Andryuschenko, Yu., Goradze, I., Abuladze, A., Mamuchadze, J., Erciyas, K. 2011. *Wintering Waterbird Census in the Azov-Black Sea Coastal Wetlands of Ukraine, Georgia and Turkey.* Wetlands International Black Sea programme, Kyiv, 1–130.

Kostyuchenko A. 1928. Zaletnyie ptitsy gosudarstvennogo zapovednika "Obitochnaya kosa". *Ukrayinskyj myslyvecz ta rybalka*, 11, 16–18 [In Russian].

Kucherenko, V. N. 2005. O vstreche beloschekoy kazarki *Branta leucopsis* (Bechatein, 1803) v Krymu. *Branta: Sbornik trudov Azovo-Chernomorskoy ornitologicheskoy stantsii*, 8, 194–195 [In Russian].

Lysenko, V. I. 1991. *Fauna Ukrainy. T. 5. Ptitsy. Vyp. 3. Guseobraznyie*, Kiev, 1–206 [In Russian].

Mezinov, O. S., Gavrylenko, V. S., Chegorka, P. P. 2013. Osoblyvosti perebuvannya gusky siroyi *Anser anser* v biosfernomu zapovidnyku "Askaniya-Nova". *Visti Biosfernogo zapovidnyka "Askaniya-Nova",* 15, 86–90 [In Ukrainian].

Moskalenko, Yu. O., Plyushch, S. O. 2018. *Materialy sposterezhen vydiv ptakhiv Chervonoyi knygy Ukrayiny na terytorii arennykh dilyanok Chornomorskogo biosfernogo zapovidnyka NAN Ukrainy* (2006–2017 gg.). Materialy do 4-go vydannya Chervonoyi knygy Ukrayiny. Tvarynnyj svit. Kyiv, 2, 39–48 [In Ukrainian].

Nazarenko, L. F., Nikolaevskiy, O. V., Tille, A. A. 1977. Sostoyanie zapasov serogo gusya v severo-zapadnom Prichernomor'e. *Fauna i biologiya guseobraznyih ptits.* Moskva, 55–57 [In Russian].

Petrovych, Z. O. 2015. Materialy do ornitofauny Ukrayinskoyi chastyny delty Dunayu ta pryleglykh terytorij. *Avifauna Ukrayiny*, 6, 1–32 [In Ukrainian].

Petrovych, Z. O., Redinov, K. O., Formanyuk, O. O. 2008. Gusy v Mykolayivskij oblasti. *Berkut*, 17 (1–2), 25–32 [In Ukrainian].

Pilyuga, V. I. 2011. Vstrechi redkikh maloizuchennykh i zaletnykh vidov ptits Severo-Zapadnogo Prichernomor'ya. *Ridkisni j znykayuchi ptakhy Pivnichno-Zakhidnogo Prychornomor'ya.* Odessa, 48–53 [In Russian].

Pirogov, N. G. 1996. K izucheniyu proleta ptits v rayone Chernomorskogo zapovednika. *Zapovidna sprava v Ukraini,* 2, 42–48 [In Russian].

Poluda, A. M. 2009. Zakonomernosti migratsionnykh peremescheniy belolobyikh gusey *Anser albifrons* i gumennikov *Anser fabalis* (Aves, Anseriformes, Anatidae) na territorii Ukrainy. *Branta: Sbornik trudov Azovo-Chernomorskoy ornitologicheskoy stantsii*, 12, 110–125 [In Russian].

Ptushenko, E. S. 1952. Krasnozobaya kazarka *Rufibrenta ruficollis* Pall. *Ptitsy Sovetskogo Soyuza.* Ed. Dementyev, T. P., Gladkov, H. A. Moskva, 326–330 [In Russian].

Priklonskiy, S. G. 1976. O chislennosti krasnozoboy kazarki v Kyzyl-Agachskom zapovednike v 1960–1975gg. *Trudy Okskogo zapovednika,* 13, 52–53 [In Russian].

Red Book of Ukraine. Animals. 2009. Kyiv, 1–623 [In Ukrainian].

Rusev, I. T., Gerzhik, I. P., Vasil'kov, I. A., Pavlov, A. V., Potapov, O. V., Korzyukov, A. I. 1996. Rezultaty uchetov zimuyuschikh guseobraznykh v Severo-Zapadnom Prichernomor'e 11–26 yanvarya 1995 g. *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 2, 285–291 [In Russian].

Rusev, I. T. 1998. Osobennosti zimovki krasnozoboy kazarki v 1997–1998 gg. v Severo-Zapadnom Prichernomor'e. *Rol ohranyaemykh prirodnykh territoriy v sokhranenii bioraznoobraziya; materialy konferentsyi, posvyaschennoy 75-letiyu Kanevskogo prirodnogo zapovednika.* Kanev, 232–233 [In Russian].

Rusev, Y. T. 2000. Nacionalnyj plan dij zi zberezhennya kazarky chervonovoloyi (*Branta ruficollis*). *Nacionalni plany dij zi zberezhennya globalno vrazlyvykh vydiv ptakhiv.* Kyiv, 67–82 [In Ukrainian].

Rusev, I. T. 2001. *Proryv Sasykskoy blokady: ternistyiy put vozrozhdeniya zhemchuzhiny Prichernomor'ya*. Odessa, 1–461 [In Russian].

Rusev, I. T., Korzyukov, A. I., Formanyuk, O. A., Panchenko, P. S. 2002. Zimovki vodoplavayuschikh i vodnobolotnykh ptits v Severo-Zapadnom Prichernomor'e v 2000-2001 gg. *Monitoring zimuyuschikh ptits v Azovo-Chernomorskom regione Ukrainy*. Odessa, Kiev, 54–74 [In Russian].

Rusev, I. T., Andryuschenko, Yu. A., Belinskiy, A. V., Grinchenko, A. B., Zhmud, M. E., Kinda, V. V., Korzyukov, A. I., Moskalenko, Yu. A., Petrovich, Z. I., Popenko, V. M., Yaremchenko, O. A. 2005. Rezultaty uchetov krasnozoboy kazarki (*Branta ruficollis*) v Azovo-Chernomorskom regione Ukrainy v 2003–2004 gg. *Guseobraznye ptitsy Severnoy Evrazii: Tezisy dokladov Tretego mezhdunarodnogo simpoziuma (Sankt-Peterburg, 6–10 oktyabrya 2005 g.).* SPb, 229–231 [In Russian].

Rusev, I. T., Zhmud, M. E., Korzyukov, A. I., Gerzhik, I. P., Satsyk, S. F., Potapov, O. V. 1997. Rezultaty rozhdestvenskogo ucheta zimuyuschikh ptits v Severo-Zapadnom Prichernomor'e v 1997 g. *Ekosistemy dikoy prirody*, 6, 19–50 [In Russian].

Rusev, I. T., Zhmud, M. E., Korzyukov, A. I., Gerzhik, I. P., Satsyk, S. F., Potapov, O. V., Roman, E. G.1998. Kharakter zimovki ptits v Severo-Zapadnom Prichernomor'e v 1998 g. *Zimnie uchety ptits na Azovo-Chernomorskom poberezhe Ukrainy.* Alushta, Kiev, 1, 22–47 [In Russian].

Rusev, I. T., Korzyukov, A. I., Satsyk, S. F. 1999. Monitoring zimuyuschikh ptits v Severo-Zapadnom Prichernomor'e v 1999 g. *Zimnie uchety ptits na Azovo-Chernomorskom poberezh'e Ukrainy.* Alushta, Kiev, 2, 46–60 [In Russian].

Rusev, I. T., Korzyukov, A. I., Satsyk, S. F., Formanyuk, O. A., Panchenko, P. S., Belinskiy, A. V. 2001. Ptitsy Severo-Zapadnogo Prichernomor'ya v zimniy period. *Zimnie uchety ptits na Azovo-Chernomorskom poberezh'e Ukrainy*. Odessa, Kiev, 3, 3–28 [In Russian].

Rusev, I. T., Korzyukov, A. I., Formanyuk, O. A., Panchenko, P. S., Gerzhik, I. P. 2003. Rezultaty monitoringa zimuyuschikh ptits v pribrezhnoy zone Odesskoy oblasti v period 2002–2003 gg. *Materialy nauchno-prakticheskoy konferentsii Azovo-Chernomorskogo ornitologicheskogo soyuza*. Nikolaev, 78–81 [In Russian].

Rusev, I. T., Korzyukov, A. I. & Gerzhik, I. P. 2004. Vliyanie anomalnoy zimy 2002–2003 gg. na vidovoy sostav i chislennost zimuyuschikh ptits v pribrezhnoy zone Odesskoy oblasti. *Visnyk Odeskogo universytetu*, 9 (1— Biologiya), 193–202 [In Russian].

Rusev, I. T., Andryuschenko, Yu. A., Belinskiy, A. V., Grinchenko, A. B., Zhmud, M. E., Kinda, V. V., Korzyukov, A. I., Moskalenko, Yu. A., Petrovich, Z. I., Popenko, V. M. & Yaremchenko, O. A. 2008 Sovremennyiy status krasnozoboy kazarki v Azovo-Chernomorskom regione Ukrainyi. *Kazarka, Byulleten rabochey gruppy po guseobraznym Severnoy Evrazii*, 11 (1), 49–60 [In Russian].

Rusev, I. T., Korzyukov, A. I. & Petrovich, Z. I. 2011. Krasnozobaya kazarka na severo-zapadnom poberezhe Chernogo morya (Ukraina): sovremennoe sostoyanie populyatsii i problemy okhrany. *Tezisy dokl. Mezhdunarodnoy konferentsii "Gseobraznyie Evrazii: geografiya, dinamika i upravlenie populyatsiyami".* Elista, 75–76 [In Russian].

Sabinevskiy, B. V. 1977. O prolete i zimovke krasnozobykh kazarok v nizovyakh Dunaya. *Fauna i biologiya guseobraznykh ptits: Chetvertoe Vsesoyuznoe soveschanie (20–23 noyabrya 1977 g.).* Moskva, 73–74 [In Russian].

Sarandinaki, E. O. 1928. O prolete belogo gusya i rzhanki. *Ukrayinskyj myslyvecz ta rybalka*, 5/6, 46 [In Russian].

Smirnov, N. A. 1917. Dopolnitelnyya svedeniya o prolete beloloboy kazarki v nizov'yakh Dunaya. *Ornitologicheskiy vestnik*, 3–4, 180–181 [In Russian].

URL[1]:https://rombird.ro/ro/src/index?&scr=%20Branta%20leucopsis

Voinstvenskiy, M. A. 1967. Iskopaemaya ornitofauna Ukrainy. *Prirodnaya obstanovka i faunyi proshlogo*, 3, 3–77 [In Russian].

Volkov, S. V., Timoshenko, A. Yu. 2015. Nahodki beloschokih kazarok vne osnovnogo prolotnogo puti — sluchaynye zaloty ili regulyarnoe yavlenie? *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 18, 30–37 [In Russian].

Zhmud, M. E. 1996. Sovremennoe sostoyanie gusey ukrainskoy chasti delty r. Dunay i sopredelnykh territoriy. *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 2, 292–301[In Russian].

Zubko, V. N. 1980. Belye gusi v Askanii-Novoy. *Okhota i okhot. khoz-vo*, 9, 22–23 [In Russian].

Zubko, V. N., Popovkina, A. B., Chernobaeva, T. N. 1996. Osobennosti razletov belykh gusey iz Askanii-Nova. *Kazarka, Byulleten rabochey gruppy po gusyam Vostochnoy Evropy i Severnoy Azii*, 2, 221–228 [In Russian].

Received 2 February 2019
Accepted 5 March 2019