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Article

Is rare bird species restored? Changes in the number and distribution of *Anser anser* (L., 1758) (Anatidae) in the Uvs Nuur Basin, Tuva & Mongolia

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Abstract. This paper presents an analysis of long-term monitoring data on the breeding population of the Greylag Goose (*Anser anser* (L., 1758)) within the Uvs-Nuur Basin (Russia, Mongolia). Situated along the Russia (Tuva)-Mongolia border, the Uvs-Nuur Basin is a globally significant reserve for the Greylag Goose – a species listed in the Red Data Book of the Russian Federation – and serves as an important area for breeding, summer molting, and stopovers during spring and autumn migration. Optimal Greylag Goose habitats are concentrated in the wetlands of Lake Uvs-Nuur and its major tributaries, as well as at several other lakes of the basin. According to the results of the most comprehensive survey of the Mongolian sector of Lake Uvs-Nuur and its tributaries, conducted for the first time in 2014, a total of 2590 Greylag Geese, including juveniles, were recorded. In the Russian sector of the Uvs-Nuur shoreline since 2013, Greylag Geese have been breeding in a mixed-species colony alongside Black-headed Gulls (*Chroicocephalus ridibundus* L., 1758), Great Cormorants (*Phalacrocorax carbo* (L., 1758)), Great Crested Grebes (*Podiceps cristatus* L., 1758), and other waterbirds. The number of breeding pairs observed during seven years of periodic surveys increased from five to 21–35. An increase in both total population size and number of broods has also been recorded at other lakes in the basin. We estimate the current breeding population of the Uvs-Nuur group at approximately 800 pairs, of which around 200 nest within the Russian sector. In recent years, a steady population increase and recolonization of former breeding areas are noted in the Russian part of the basin.

Keywords: population dynamics, population growth, restoration and expansion of breeding sites, transboundary reserve, wetlands

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Научная статья

Редкий вид восстанавливается? Изменение численности и распределение серого гуся *Anser anser* (L., 1758) (Anatidae) в Убсунурской котловине (Тува – Монголия)

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Аннотация. Проанализированы результаты многолетнего мониторинга гнездящейся популяции серого гуся *Anser anser* (L., 1758) в пределах Убсунурской котловины. Убсунурская котловина на границе России (Тувы) и Монголии является резерватом мирового значения для включенного в Красную книгу РФ серого гуся, важным районом гнездования, летней линьки и остановок на весеннем и осеннем пролете его популяций. Оптимальные места обитания серого гуся распространены в водно-болотных угодьях оз. Убсу-Нур и его крупных притоков, а также на нескольких других озерах котловины. По результатам наиболее полного обследования монгольской части акватории озера и его притоков, проведенного в 2014 г. впервые, численность серых гусей составила 2590 птиц вместе с молодыми. В российском секторе побережья озера серые гуси с 2013 г. гнездятся в поливидовой колонии вместе с озерными чайками *Chroicocephalus ridibundus* L., 1758, большими бакланами *Phalacrocorax carbo* (L., 1758), чомгами

(*Podiceps cristatus* L., 1758) и другими водоплавающими. Количество гнездящихся пар за семь лет периодических наблюдений выросло с пяти до 21–35. Рост общей численности гусей и пар с выводками наблюдается и на других озерах котловины. Современную численность убсунурской гнездовой популяции мы оцениваем в 800 пар, в том числе 200 – в ее российском секторе. В течение ряда последних лет наблюдается устойчивый рост численности и возвращение серого гуся в места прежнего гнездования в российском секторе котловины.

Ключевые слова: динамика численности, рост популяции, новые места гнездования, трансграничный резерват, водно-болотные угодья

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Introduction

The Greylag Goose (*Anser anser* (L., 1758)), similarly to many other waterfowl species, exhibits a high degree of sensitivity to alterations in its natural habitat and to direct anthropogenic influences. According to the data provided by Wetlands International¹ (2023), started in the mid XX decline in the species' population, persists in two out of five populations recognized within the territory of Russia – specifically, the Black Sea-Turkish and the West Siberian/Caspian-Iraqi populations. In this regard, the species was included in the Red Data Book of the Russian Federation with category 2 status – a species undergoing a decline in numbers and/or range; in Russia, according to the IUCN scale – EN A2abcde; while in the IUCN Red List globally – LC (the species as a whole), with a total estimated population in 2016 of 55 000–88 000 individuals (Rosenfeld, 2021). Other populations, including those of Central and Eastern Siberia, according to the most recent data, demonstrate stability or a slight increase compared to estimates from 2011–2012. Within the territory of Russia, the total population of the Greylag Goose is currently estimated at approximately 137 000 individuals (Solokha, 2024). The largest breeding groups, such as the group inhabiting the Uvs-Nuur Basin – an important area for breeding, summer molting, and stopovers during migration of the northern populations of the Greylag Goose – are of particular significance for the overall welfare of the species. The Uvs-Nuur Basin is recognized as a world-class nature reserve located along the border of Russia (Tuva) and Mongolia.

¹ Wetlands International, 2023. Web page. URL: <https://www.wetlands.org/knowledge-base/waterbird-populations-portal/> (accessed: 05.10.2024).

The Uvs-Nuur Basin is located in the central part of the Asian continent and constitutes a section of a larger orographic unit – the Basin of the Great Lakes of Mongolia. The northern part of the basin lies within the territory of Russia (Republic of Tuva), while the southern and larger part is situated in Mongolia (Uvs and Tes aimags). Overall, the basin is distinguished by a high level of ecosystem and biotic diversity combined with a low degree of anthropogenic pressure.

The key habitat conditions for wetland bird communities within the basin are provided by the presence of saline and freshwater lakes and rivers, accompanied by ribbon-like floodplain forests composed of poplars and willows, situated amidst extensive steppe, dry-steppe, and semi-desert landscapes interspersed with large sand massifs and granite outcrops. The basin is characterized by an arid, sharply continental climate and a faunal assemblage typical of Inner Asia. The most important habitat area for the Greylag Goose within the basin is the floodplain of the largest endorheic lake of the Central Asian Internal Basin – Uvs-Nuur, covering an area of approximately 3700 km², along with its tributaries, the largest of which is the transboundary Tes-Khem River (known in Mongolia as Tesiin-Gol). In its lower course, Tesiin-Gol branches extensively across a wide floodplain into numerous channels, some of which are overgrown with reed beds. The shores and islands of the lake are predominantly open, gently sloping, and composed of silt, sand, or fine gravel, covered with sparse grassy vegetation or devoid of vegetation altogether. Narrow belts of Reed (*Phragmites australis* (Cav.) Trin. ex Steud.) line the lake shores near river mouths, but do not form any significant reed thickets, except in the northwestern coastal section where the rivers Kholu, Oruku-Shynaa, and Khushid-Ergiin-Gol flow into the lake. Here, reed marshes expand locally up to 600–800 meters, spreading both across the coastal meadows and into the shallow waters. Additionally, numerous small residual lakes surrounded by reed thickets are located among the sand dunes west of the main lake, and extensive oxbow lakes and marshy areas are distributed within the wide delta of the Tes-Khem River. Along the banks of the tributary rivers, patches of floodplain forests composed of Poplars (*Populus* spp.) and Willows (*Salix* spp.); including thickets of sea Buckthorn (*Hippophaë rhamnoides* L.) are widespread. Within the delta of the northern tributary – the Torkhilog (Torgalyk) River – a relict stand of Siberian larch (*Larix sibirica* Ledeb.) has been preserved.

Uvs-Nuur is characterized by long-term cycles of water level fluctuations; from the 1950s to the end of the 20th century, the lake level rose by almost two meters (Saveljev et al., 2015) and has remained at this level to the present day.

In addition to the wetland complex of Uvs-Nuur Lake and its tributaries, Greylag Geese are also found on other lakes of the basin, such as Tore-Khol, the Shara-Nur Lake Complex (Tuva), and Bayan-Nur (Mongolia) (Gombobaatar et al., 2018). All of these water bodies, except for the latter, are located within the cores or the protected zones of the Uvs-Nuur Basin State Nature Biosphere Reserve on the Russian side, and the Uvs Nuur Basin State Nature Reserve in the Mongolian part. In 2011, these two reserves were combined to form the Transboundary Biosphere Reserve «Uvs Nuur Basin»², which later, in 2021, officially received the status of a «biosphere reserve».

In the first half of the 20th century, the Greylag Goose was a scarce breeding species in southern Central Siberia, whereas in Tuva it bred in large numbers, being abundant during migration and molting periods. In adjacent territories, broods were observed at small steppe water bodies, for example, near Minusinsk. Further south, in the Tuva Basin, the Greylag Goose was a common breeder on all major water bodies, including the lower reaches of the Bii-Khem River, along the Sesarlig River, Lake Khadyn, and nearby small lakes (Sushkin, 1938). Broods were also recorded in the Eastern Tuvan Highlands; in autumn, large numbers of migrating Greylag Geese were observed on the islands of the Yenisei River near the city of Kyzyl. However, the greatest concentrations of breeding Greylag Geese were found in the southern part of Tuva, in the extensive valley of the Tes-Khem River and at Uvs-Nuur Lake, where, by late summer, Greylag Geese could be seen gathering in flocks numbering in the thousands (Tugarinov, 1916a, b; Yanushevich, 1952).

In the mid XX, the population of the Greylag Goose in Central Siberia, as well as across the eastern part of Eurasia as a whole, began to decline. In the early 1980s, the Greylag Goose was still encountered in the Altai region and northern Khakassia. Since the 1990s, breeding numbers have decreased severalfold throughout southern Siberia, and the species has become scarce even during migration

² Order of the Government of the Russian Federation of April 21, 2011 No. 709-r "On the signing of the Agreement between the Government of the Russian Federation and the Government of Mongolia on the establishment of the Ubsunur Basin transboundary reserve."

periods. At present, the breeding group of the Greylag Goose in the Minusinsk Basin is virtually on the verge of extinction: no more than 300 individuals remain within the southern part of Krasnoyarsk Krai, Khakassia, and adjacent areas of Kemerovo Oblast (Emelyanov, 2013; Emelyanov and Savchenko, 2014). By the end of the last century, the Greylag Goose had ceased breeding in the Tuva and Turano-Uyuk basins; however, it is still occasionally recorded during migration at lakes in central Tuva, as well as along the Uyuk River, at Lake Belye (Turano-Uyuk Basin), and Lake Myun (Todzha Basin). In eastern Tuva, the Todzha–Kaa-Khem breeding group of the Greylag Goose has been considered extinct since the 1980s (Savchenko et al., 2014).

A large breeding group of the Greylag Goose persisted only in southern Tuva, where in the 1980s–1990s, within the Russian part of the Uvs-Nuur Basin, it was estimated at 1200–1600 individuals (Emelyanov and Savchenko, 1997). The species was also numerous during migration periods: for example, at Lake Tore-Khol, between 1980 and 1985, pre-migratory aggregations of up to 60 000 individuals were recorded. These concentrations were likely attracted by the extensive areas of cereal and perennial forage crops cultivated in the vicinity of the lake until the end of the last century (Emelyanov et al., 1995; Emelyanov and Savchenko, 2001, 2002, 2013; Savchenko et al., 1997; Savchenko and Savchenko, 2014). However, even in this area, the population of the Greylag Goose gradually declined (Zabelin and Archimayeva, 2016). Thus, during a survey of the Tesiin-Gol river channel in June 1989, conducted over a 260-kilometer stretch, only 12 broods were recorded, all of which were observed in the lower course of the river on the Mongolian territory (Saveljev and Makarov, 2000). As of 2019, V.I. Emelyanov and co-authors estimated the post-breeding population of the Greylag Goose in Tuva at approximately 1,500 individuals (Emelyanov et al., 2020). Since Greylag Geese currently breed almost exclusively within the Uvs-Nuur Basin in Tuva, this figure evidently refers entirely to that region.

The primary causes of the population decline and range contraction of the Greylag Goose have been identified as (Rosenfeld, 2021):

- spring hunting, the timing of which coincides with the beginning of incubation;
- disturbance caused by motorboats in areas of active fishing during the breeding season;
- spring burning of reed beds;
- transformation of feeding habitats, including the reduction of arable land and suitable breeding areas due to habitat alteration or decreased water availability;
- high hunting pressure on wintering grounds;
- egg collection; and the capture of molting birds

At the same time, local observations and analyses of general species data from various regions of Russia in recent years indicate the stability of most population groups, and even a slight population increase of the Greylag Goose from the Altai to Transbaikalia (Badmaeva et al., 2023; Bazarov et al., 2022; Bondarev, 2024; Solokha, 2024).

Given such contradictory data, it appears particularly important to analyze the status of the Greylag Goose population in southern Tuva, where long-term ornithological monitoring is being conducted.

The aim of our study is to assess the current state of the Uvs-Nuur group of the Greylag Goose and the trend in its population dynamics over the past three decades.

Materials and methods

The material for this report is based on the original data collected by the authors during long-term field observations conducted from 1999 to 2024. The Russian section of the Uvs-Nuur shoreline and several other smaller lakes within the basin (Tore-Khol, Shara-Nur, among others) were surveyed by the authors during the spring–summer period in the years 1999, 2003–2006, 2008, 2011–2013, 2015, 2018, 2020, 2022, and 2024. In 2003–2006, bird counts were made three times per season (May, June, and July), and in 2008, an additional count was carried out in August.

The most comprehensive survey of the water area and coastal zone of Lake Uvs-Nuur, the delta of the Tesiin-Gol River, and several of its other tributaries was conducted in the summer of 2014 as part of a joint Russian-Mongolian expedition (Archimayeva et al., 2015). Waterbird counts from watercraft were carried out between 21 June and 3 July along the entire shoreline of the lake within the Mongolian territory, excluding a 10-kilometer section in the northeastern part of the Russian sector. In addition, the following areas were surveyed: a 21 km stretch upstream along the Tesiin-Gol River; 24 km along one of its branches, the Jiragiin-Gol; the mouth sections of the rivers Khundlengiin-Khoit-Gol (2.6 km),



Fig. 1. Route of the Expedition 2014 with the surveyed coastal sectors of Uvs Lake. 1 – starting and ending points of the expedition route (Saveljev and Archimayeva, 2015).

Khushid-Ergiin-Gol (3.4 km), as well as the mouths of the Torkhilog and Bor-Tolgoi-Gol rivers (Fig. 1). In total, 227 km of shoreline and 51 km of riverine habitats were surveyed (excluding repeated segments). A 6-meter motorized trimaran and a boat were used for transportation. Visual counts of Geese were conducted from the trimaran while traveling at low speed along the lake's shoreline; all birds and broods observed on the water or along the banks were recorded. On tributaries, which are generally narrow with open banks, all encountered birds – both on the water and along the banks – were also counted. Density calculations were based on the total distance covered, with results expressed as the number of individuals per kilometer of survey route.

From 2013 to 2022, during scientific fieldworks carried out within the framework of the Chronicle of Nature program of the Uvs-Nuur Basin State Nature Reserve, the Russian section of the Uvs-Nuur shoreline was surveyed within the boundaries of the «Uvs-Nuur» cluster and its buffer zone, as well as several other lakes. Surveys were implemented on foot along the shoreline, in early spring over ice and after ice melt by boat. In order to minimize disturbance to incubating birds and reduce observer presence within colonies, biometric data collection on nests and eggs was not conducted. Instead, only species identification, the number of nests, clutch sizes of Geese, and nest mapping using a Garmin 62s GPS navigator were recorded.

Bird species names are cited according to the classification of E.A. Koblik and V.Yu. Arkhipov (2014).

Results

Our observations in the Uvs-Nuur Basin in late XX and early XXI confirm the low abundance of the breeding population in this period: Greylag Geese were observed as isolated pairs without broods. For example, on 2 June 2004, a pair without goslings was recorded in the southern part of Lake Tore-Khol, and another pair was noted in the same area on 26 April 2005. At Lake Shara-Nur, single pairs of Geese were encountered from May to early June in 1999, 2005, and 2006 (Archimayeva and Zabelin, 2010; 2011; Archimayeva-Ozerskaya and Zabelin, 2010).

Migratory Geese were observed in another location – the «Oruku-Shynaa» cluster of the Uvs-Nuur Basin State Nature Reserve, located in the floodplain between the channels of the Oruku-Shynaa and Kosh-Terek rivers. The first Geese typically appear there between 25–26 March, and by early to mid-April, flocks of up to 100 or more individuals may be observed. Beginning in early June, broods are occasionally recorded in this area, though such observations are rare. On 14 May 2000, A.A. Baranov (2003) recorded 32 Greylag Geese along a 10-kilometer route of this location.

Along the Russian sector of the Uvs-Nuur shoreline, which extends for approximately 10 km, Geese were observed regularly during the spring period over the entire 25-year observation span, though only in small numbers, i.e. in groups ranging from five to eleven individuals.

Results of the 2014 Survey of the Mongolian Part of the Lake

The timing of the Russian-Mongolian expedition coincided with the post-breeding period. Over 13 days of fieldwork (21 June – 3 July), a total of approximately 2516 Greylag Geese, including juveniles, were recorded within the surveyed area of Lake Uvs-Nuur. Based on the age of the observed goslings, breeding in the area likely began in mid-April, and hatching had been completed by the time of the survey. Some adult individuals had already begun molting their flight feathers.

The majority of adult and already fledged young geese (75.9%) were concentrated within the lake's water area and along its shores. Pairs with younger broods (downy chicks) were mainly observed along river channels and in the lower reaches of the lake's tributaries (24.1%). These birds had likely nested in the river valleys and were gradually moving downstream with their broods toward the lake. The highest Goose densities and brood concentrations were recorded at the mouths of tributaries where reed thickets were present (Table 1).

Half of all Greylag Geese recorded along the tributaries were concentrated along the Tesiin-Gol River, and slightly more than a quarter along the Jiragiin-Gol River, where the longest survey routes run and favorable habitat conditions were present. The remaining rivers had less suitable riparian biotopes for Geese. The banks of the Bor-Tolgoi-Gol and Torkhilog rivers are covered by poplar–larch forests with dense undergrowth; banks and reed thickets of the Khushid-Ergiin-Gol are hardly surmountable for goslings. Along the Khundlengiin-Gol, suitable areas with good cover and accessible banks are found mainly in the lower reaches, while further upstream the river flows through vast open areas with limited protective vegetation. Families of Greylag Geese were frequently observed in mixed groups together with the Swan Goose (*Anser cygnoides* (L., 1758)), particularly at river mouths.

Within the lake's water area and along its shoreline, the Geese were distributed more or less evenly, except for the northwestern (sector III) and southeastern (sector V) parts of the shoreline (see Fig. 1, Table 2). These sectors had the highest densities of Geese per kilometer of shoreline, as well as the greatest number of broods. Large mixed flocks of adult and juvenile Greylag Geese and swan Geese were also concentrated in these areas. In total, we recorded 11 such groups (approximately 813 Geese, or 42.5% of the total count). Some of these groups contained over 250 individuals that complicated to reliably determine the ratio of adults to juveniles, as the birds dispersed into tall grasses along the shore. In these flocks, we recorded approximately 370 juvenile Greylag Geese. Based on the average brood size, we estimated that in 2014, approximately 500 Greylag Goose pairs bred within the Uvs-Nuur lake-river complex.

During the same period in 2014, on the northeastern Russian sector of the lake's shoreline, 74 Greylag Geese without broods were recorded by staff of the Uvs-Nuur Basin Reserve. No nests were found, although in the reed beds at the mouth of the Kholu River, where nests of Greylag Geese had been discovered in 2013 and in subsequent years, more than 200 pairs of Great Cormorants (*Phalacrocorax carbo* (L., 1758)) were observed breeding.

Table 1. Number of adult and juvenile and parameters of Greylag Goose (*Anser anser*) broods on river tributaries of Lake Uvs.

Parameter	River tributaries of Lake Uvs-Nuur						Total number of birds, ind. / proportion of total, %
	Jiragiin-Gol	Tesiin-Gol	Bor-Tolgoi-Gol	Torkhilog	Khundlengiin-Khoit-Gol	Khushit-Ergiin-Gol	
Date	21.06.2014	22.06.2014	25.06.2014	25.06.2014	27.06.2014	02.07.2014	
Route length, km	24	21	0.2	0.15	2.6	3.4	51.35
Adult birds	68	130	16	6	20	8	248/40.8
Juveniles	102	178	26	15	24	14	359/59.2
Total birds, ind. / % of total count	170/28.0	308/50.7	42/6.9	21/3.5	44/7.2	22/3.6	607/100
Density, ind. / km of route	7.1	14.7	210	140	16.9	6.5	
Number of broods / brood density per 1 km of route	31/1.3	53/2.5	8/40	5/33.3	9/3.5	4/1.2	110
Average brood size, goslings	3.3	3.4	2.3	3.0	2.7	3.5	3.26

Table 2. Distribution of Greylag Goose *Anser anser* by sectors of the water area and coast of Lake Uvs-Nuur (see Fig. 1). Shoreline sectors of Lake Uvs-Nuur: I – Northeastern sector: from Point / observation site 1 to the mouth of the Tesiin-Gol River; II – Northern sector: from the Yaman-Khargana area to the Torkholik River; III – Northwestern sector: from the Torkholik River to the mouth of the Khundlengiin-Khoit-Gol River; IV – Southwestern sector: from the mouth of the Khundlengiin-Khoit-Gol River to the island group; V – Southern sector: from the island group to Cape Jargaltyn-Obo; VI – Narlin-Gol Bay; VII – Southeastern sector: from Cape Jargaltyn-Obo to Point 1.

Distribution of Greylag Geese (<i>Anser anser</i>) across the shoreline sectors of Lake Uvs-Nuur							
Indicator	I	II	III	IV	V	VI	VII
Date	22.06.2014	25.06.2014	26.06.2014	28.06.2014	29.06.2014	30.06.2014	01.07.2014
Route length, km	21.0	16.5	53.9	32.2	63.5	33.2	6.9
Adults, ind. / share of total adults, %	14/3.6	11/2.8	154/39.3	52/13.3	115/29.3	26/6.6	20/5.1
Goslings, ind./ share of total goslings, %	45/6.4	30/4.3	280/39.8	76/10.8	205/29.1	37/5.3	31/4.4
Total birds in mixed groups	–	–	330	–	338	145	–
Total individuals, ind. / share of total birds, %	59/3.1	83/4.3	764/40.0	128/6.7	658/34.5	208/10.9	51/2.7
Density, ind. /1 km of shoreline	2.8	5.0	14.2	4.0	10.4	6.3	7.3
Brood parameters and gosling distribution by sectors							
	I	II	III	IV	V	VI	Boero
Number of broods / share of total broods, %	7/3.7	6/3.2	77/41.2	26/13.9	51/27.3	11/5.9	9/4.8
Average brood size, goslings	6.4	5.0	4.1	2.9	4.0	3.4	3.76
Number of goslings in groups		42	64		175	90	371

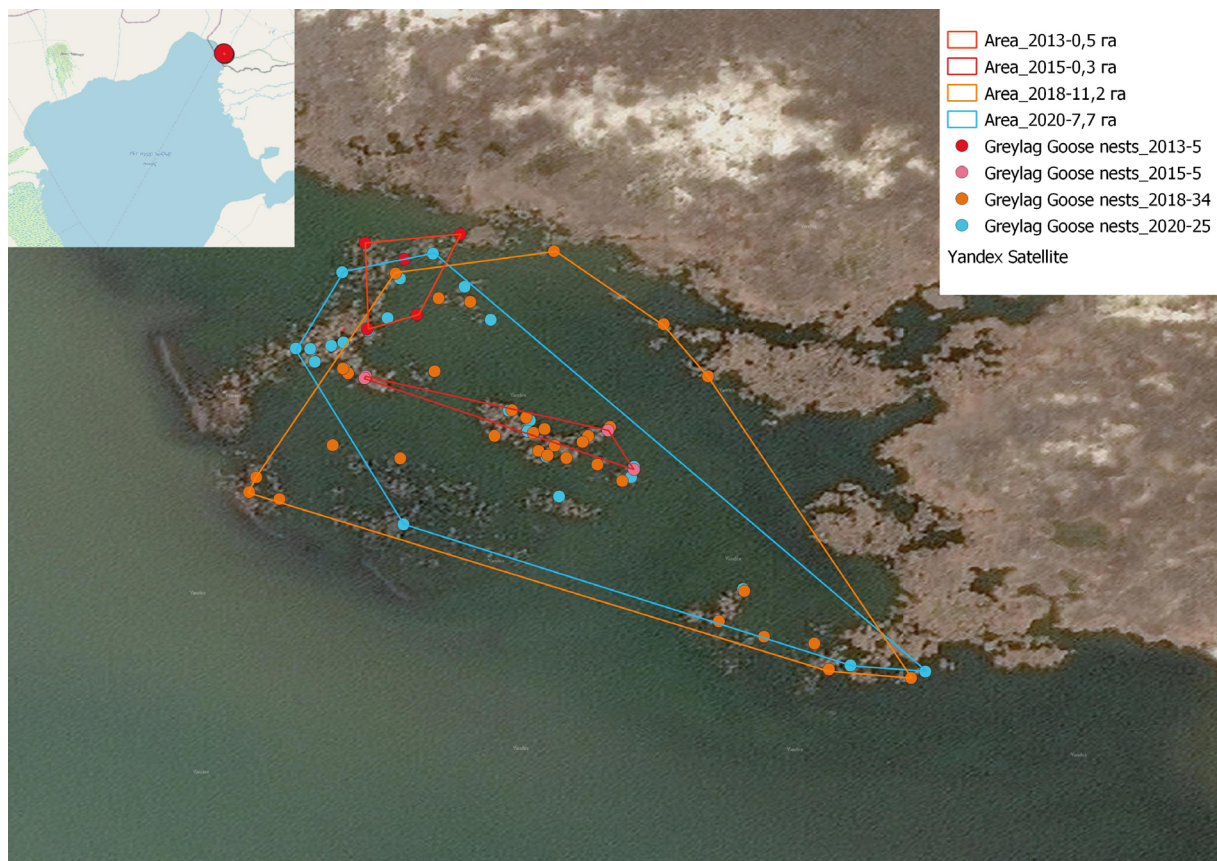


Fig. 2. Location of Greylag Goose (*Anser anser*) nests in different years in the north-eastern coast of Uvs Lake at the mouth of the Kholu River.

Table 3. Parameters of the Greylag Goose (*Anser anser*) colony in different years on the Uvs Lake.

Parameter	Date				
	04.05.2013	06.05.2015	04.05.2018	20.05.2020	19.05.2022
Number of nests with clutches, n	5	5	34	25	33
Clutch size, M (min–max)	2.8 (1–5)	4.2 (4–5)	4.5 (2–8)	4.96 (2–11)	3.5 (3–4)

Monitoring results from the Russian sector of Uvs Lake

Along the shoreline of Uvs Lake, the only known mixed-species colony with currently nesting Greylag Geese is located in the Russian sector near the mouth of the Kholu River. According to observations by the reserve staff and authors, no breeding of Greylag Geese was recorded in this area from the beginning of the 21st century until 2013. The first Greylag Goose nests were discovered on 4 May 2013 on isolated reed tussocks and mats at the river's mouth, within a lagoon of approximately 8.5 hectares. The lagoon is bordered by two narrow strips of reed thickets, extending 310 meters southwest and then 260 meters southeast from the shoreline into the lake. This configuration of reed vegetation provides visual cover and some protection from the prevailing northwesterly and westerly winds, which bring strong spring storms to the area, thereby increasing clutch survival and gosling viability.

In 2013, the lagoon supported a mixed-species colony located among numerous reed patches. Alongside Greylag Geese, the colony also included great cormorants, Black-headed Gulls, Grey Herons (*Ardea cinerea* (L., 1758)), Great Crested Grebes (*Podiceps cristatus* (L., 1758)), and several duck pairs. In the northern part of the colony, five Greylag Goose nests with clutches were found in close proximity to one another (Fig. 2, Table 3). In 2015, five additional nests, each containing four to five eggs, were recorded on 6 May in the central part of the colony within the same lagoon.

In subsequent years, the total area of the colony expanded further into the lake due to the growing number of Great Cormorant nests. During a survey on 4 May 2018, a total of 34 active Greylag Goose nests were recorded in this area, each containing from two to eight eggs.

In 2020, the next survey of this part of the lake was conducted on 21–22 April. At that time, the lake was still covered with ice, with only narrow strips of open water appearing near the shoreline where the ice had begun to retreat. On one of the reed patches, an abandoned Greylag Goose nest containing a clutch of four eggs was discovered. During the same period, active Goose migration was observed along this shoreline: in the early morning hours, flocks of up to one hundred individuals were recorded

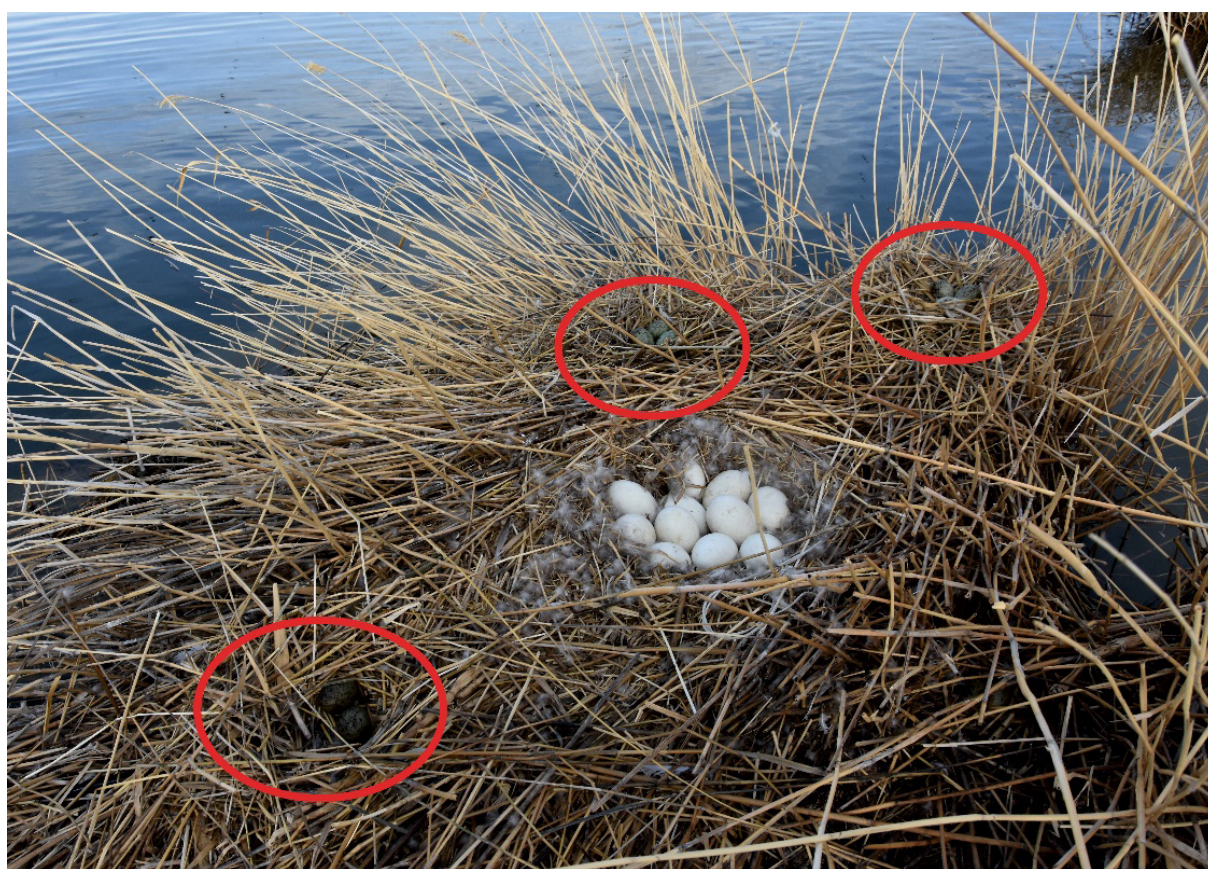


Fig. 3. The location of nests of Greylag Goose *Anser anser* (in the center) and Common Black-headed Gull (outlined in red) on a reed curtain.

flying northward from the lake in the direction of the Tannu-Ola Range. Several solitary birds and pairs were also noted remaining in the reed beds along the shore.

A month later, on 19–20 May, a fully formed mixed-species colony appeared at the same site. Alongside Greylag Geese, Black-headed Gulls, and Great Cormorants, the colony also included breeding Red-crested Pochards (*Netta rufina* (Pall., 1773)), Northern Shovelers (*Anas clypeata* L., 1758), Grey Herons, Eurasian Spoonbills (*Platalea leucorodia* L., 1758), Great Crested Grebes, and Common Moorhens (*Gallinula chloropus* (L., 1758)). As in previous years, Great Cormorants and Black-headed Gulls were the dominant species in the colony. Greylag Geese nested on reed tussocks, occupying the eastern part of the colony closer to the shoreline (Fig. 2). Compared to 2018, the number of Goose nests had slightly decreased. A total of 25 nests were found and inspected, with clutch sizes ranging from two to seven eggs. One nest contained eleven eggs (likely the result of a double clutch). Goose nests were located on isolated reed tussocks at heights of no less than 0.5 meters above the water surface. Other bird species also nested in close proximity to incubating Greylag females on same tussocks. Depending on the tussock's area, between one and seven small nests of Black-headed Gulls were located around the edges of each Goose nest structure (Fig. 3), and in the water adjacent to nearly every Greylag Goose nest, one to three pairs of Great Crested Grebes were breeding.

Only five Greylag Goose females nested without close «neighbors» due to the limited size of their breeding sites, and in one case, a Great cormorant nested nearby. On similar reed tussocks occupied by Cormorants, Spoonbills, and Grey Herons, Gulls and Grebes did not establish nests. Apparently, under conditions of acute breeding site shortage, Greylag Geese demonstrated greater tolerance toward such proximity, and by actively defending their nests, also provided protection to neighboring species.

In May 2022, the layout of the Goose settlement in this area of the Uvs-Nuur shoreline had shifted. A total of 38 geese were recorded, the majority of which had established their nests deep within dense reed thickets along the shoreline. These locations were detected only by observing the behavior of startled females flying out of the vegetation, lingering anxiously nearby, and later returning to the same spots. Three such locations were identified, containing 17, eight, and six individuals, respectively. Only two nests were accessible for inspection—both situated on the outer edge of the reed beds – containing three and four eggs. It is quite possible that the number of breeding pairs was higher; we estimated a minimum of 33 breeding pairs. The area previously occupied by the Goose settlement had been taken over by breeding Cormorants and Grey Herons, which had displaced the geese from that site.

Since 2019, an increase in Greylag Goose numbers has also been recorded at Lake Tore-Khol. In early July 2019, over 130 adult birds and 16 broods of downy goslings were observed in the Russian part of the lake. The average brood size was 3.3 goslings. This was the first documented observation of broods at this lake in the past two decades. Later, on 12 May 2021, 39 Geese were recorded at the same site, and a year later, on 25 May 2022, 93 individuals and a brood of four recently hatched goslings were observed. In the following year, on 15 July 2024, 423 Geese were present on the lake, among which at least 20 pairs with broods of two to five goslings were recorded.

At one of the freshwater lakes of the Shara-Nur complex in spring 2021, only one pair of Greylag Goose was encountered, along with 18 Swan Geese and four Bar-headed Geese (*Anser indicus* (Lath., 1790)). On 14 July 2024, seven adults and one pair with four goslings were found. This was the first recorded breeding at this lake in 25 years of observations.

Discussion

Based on the data presented and accounting for possible underestimation, we can conclude that the number of breeding pairs in the Uvs-Nuur Basin as a whole likely does not exceed 700–800. An additional 500–700 Geese do not participate in breeding but remain in the area during summer and gather for molting. Thus, the total population of the Uvs-Nuur group can be estimated at approximately 1900–2300 individuals, and during the post-breeding period, including juveniles, up to 4000 individuals. The vast majority of breeding Geese reproduce within Mongolian territory – in the valleys of the Tesiin-Gol and other rivers flowing into Uvs Lake, as well as in the southwestern part of Lake Tore-Khol (Mongolia), where optimal biotopes are located. Within the Russian part of the Uvs-Nuur Basin, no more than 200 pairs are currently breeding.

In recent years, the Greylag Goose has also ceased forming large migratory concentrations in the region, as were observed in the past. This is primarily due to the cessation of agriculture throughout the basin and the subsequent restoration of dry and desert steppe vegetation in the areas formerly occupied by cereal crop fields.

Over the past 30 years, the size of the Uvs-Nuur breeding group of the Greylag Goose has increased significantly, and new breeding sites have appeared at the northern edges of optimal biotopes along the shores of Lakes Uvs-Nuur and Tore-Khol. Our findings are consistent with the results of other studies. For instance, a Mongolian-Korean research team (Purevdorj et al., 2019), working in 2018 in western Mongolia, including at Lake Uvs-Nuur, recorded 4401 Greylag Geese for the entire region.

A similar trend has been documented in southern Transbaikalia, in comparable steppe wetland habitats (Badmaeva et al., 2023). In this area, Greylag Geese had not been breeding or observed since the mid XX – that is, for more than 50 years. Since 2021, Greylag Geese have been regularly recorded in small groups or as solitary individuals at various lakes in the Barguzin Basin, along the southern shore of Lake Gusinoye, and along the Selenga River. In 2022, broods were observed in these locations, indicating the species' return to former breeding grounds (Badmaeva et al., 2023; Bazarov et al., 2022).

The trend of recent years toward the gradual restoration of former breeding ranges in Greylag Goose populations of the southern regions of Siberia is likely associated with increased water levels in lake ecosystems, improved habitat conditions, and population growth – a pattern also noted for local groups of other bird species. For example, along the Russian sector of the Uvs-Nuur shoreline, several new species began to breed in the past 10–15 years, including the Eurasian Spoonbill, Common Moorhen, and Great Egret, while the population of the Great Cormorant has increased significantly.

The main limiting factors for Greylag Goose breeding on the lakes of the Uvs-Nuur Basin include:

- Multi-year water level fluctuations, which affect the extent and configuration of breeding-suitable biotopes and the availability of protective conditions during the post-breeding period.
- Weather conditions during the breeding season, particularly abrupt water level changes due to rapid snowmelt or heavy rainfall, as well as strong storm winds capable of destroying both nests with clutches and young goslings before they fledge. Additionally, drought conditions may significantly reduce the wetland surface area.
- Disturbance by humans, increased livestock grazing, and predation by free-ranging shepherd dogs that forage independently.

Several factors contribute to the preservation of the Greylag Goose breeding population in the Uvs-Nuur Basin and support the stability of the lake and its tributaries' entire avifaunal complex. Among these, the most significant is the low human population density, associated with the border regime in both the Mongolian and Russian parts of the basin. During summer, Mongolian pastoralists migrate with their herds to mountain areas with richer pastures, leaving only isolated camps near the lake. The local residents remaining at the lake generally do not possess boats or other watercraft, and both fishing and hunting of waterfowl are undeveloped in the region. As a result, the lake and river mouths are rarely visited by humans.

The transboundary Uvs-Nuur Basin Biosphere Reserve undoubtedly plays a crucial role in the conservation of the Greylag Goose population. The reserve includes cluster units on both the Russian and Mongolian sides. Two clusters – «Uvs-Nuur» (Russia) and «Uvs Nuur» (Mongolia) – encompass the entire water body of Lake Uvs-Nuur, thereby protecting the largest breeding sites of Greylag Geese in the transboundary basin. Two other clusters – «Oruku-Shynaa» (Russia) and «Tesiin Gol» (Mongolia) – protect the wetland habitats of the Tes-Khem (Tesiin Gol) River basin. The transboundary Lake Tore-Khol is protected on the Mongolian side by the «Altan Els» cluster, and on the Russian side by the regional nature reserve «Lake Tore-Khol», which is also part of the buffer zone of the «Tsugeer Els» cluster. Likewise, the Shara-Nur Lake complex is located within the buffer zone of the «Yamaalyg» cluster of the Uvs-Nuur Basin Reserve.

Thus, the wetlands of the Uvs-Nuur Basin – particularly Uvs Lake with the delta of the Tes-Khem (Tesiin Gol) River and its branches, channels, oxbow lakes, and reed marshes – remain the key area for the largest population of Greylag Geese in southern Siberia and northwestern Mongolia.

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