

Supporting Materials

Wintering geese of northwestern Black Sea coasts: results of coordinated monitoring 2017–2022

Table S1. List of EU Special Protection Areas (SPAs in Bulgaria and Romania, identified by their EU codes), and key goose sites in Ukraine's Important Bird Areas along the northwestern Black Sea coast (identified by their IBA codes), monitored in winters 2017/2018 to 2021/2022 which contributed to the count data presented here.

Bulgaria

1. Shabla Lake Complex (BG0000156)
2. Durankulak Lake (BG0002050)
3. Atanasovsko Lake (BG0000270)
4. Burgas Lake (BG0000273)
5. Mandra–Poda complex (BG0000271)
6. Svishtov–Belene Lowlands (BG0002083)

Romania

7. Iezer Calarasi (ROSPA0051)
8. Lacul Strachina (ROSPA0059)
9. Bertestji de Sus–Gura Ialomitei (ROSPA0111)
10. Balta Alba–Amara–Jirlau (ROSPA0004)
11. Balta Mica e Brailei (ROSPA0005)
12. Delta Dunării și Complexul Razim–Sinoie (Pardina) (ROSPA0031)
13. Oltina lake (ROSPA0056)
15. Balta Tataru (ROSPA0006)
14. Ianca-Plopu-Sarat (ROSPA0048)

Ukraine

Danube region

15. Kagul Lake (UA080)
16. Kugurluj and Kartal lakes (UA081)
17. Kytaj lake (UA083)

Odessa district

18. Stentsivs`ko–Zhebriyanivs`ki plavni (UA084)
19. Sasyk lake (UA085)
20. Shagany–Alibej–Burnas lake system (UA087)
21. Janshejs`ke lake (UA086)
22. Budats`kyj lyman (UA089)
23. Dnister delta (UA091)
24. Khadzhybejs`kyj lyman (UA122)
25. Kuyal`nyts`kyj lyman (UA090)
26. Tyligul`skyj lyman (UA092)

Nikolaev district

27. Berezans`kyj lyman (UA121)

Kherson district

28. Yagorlyts`ka and Tendrivs`ka Bays (UA065)
29. Karkinits`ka and Dzharylgats`ka Bays (UA067)
30. Central Syvash (UA115)
31. Askania-Nova Biosphere Reserve (UA068)

AR Crimea

32. Ajgul and Karleut lakes (UA136)
33. Bagerove (UA102)

Zaporodzhye

34. Molochnyi Liman (UA071)
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Table S2. Summary table of all coordinated counts of wintering geese along the northwestern Black Sea coast summarised by national totals from Bulgaria, Romania and Ukraine monitored in winters 2017/2018 to 2021/2022. Bold font = coordinated international counts, x = sections not counted, 0 = counted but no geese present.

Country	Bulgaria		Romania		Ukraine		International coordinated totals	
	RBG	GWFG	RBG	GWFG	RBG	GWFG	RBG	GWFG
Dates								
04–05 November 2017	8	12,380	8	12,380	x	x		
18–19 November 2017*	27	29,638	5002	184,397	x	x		
02–03 December 2017	54	41,988	9771	209,749	9,825	251,735		
16–17 December 2017*	89	48,477	4995	298,292	2,245	23,817	7,329	370,586
29–30 December 2017	13	10,234	x	x	x	x		
13–14 January 2018*	108	146	12726	177,222	3,674	19,758	16,508	197,126
27–28 January 2018	5,851	19,124	8357	100,390	x	x		
10–11 February 2018*	14	1,204	5686	59,265	5,859	30,083	11,559	90,552
24–25 February 2018	0	276	3480	25,500	x	x		
05–06 March 2018	22,124	39,247	x	x	x	x		
10–11 March 2018	3,300	21,412	7550	74,636	x	x		
10–11 November 2018	0	4,938	2285	185,436	x	x		
24–25 November 2018	1	30,919	6213	211,806	x	x		
15–16 December 2018*	1,279	64,155	4320	63,867	5,220	25,082	10,819	153,104
29–30 December 2018	292	25,232	x	x	x	x		
12–13 January 2019*	3,266	84,021	9915	104,005	4,593	19,629	17,774	207,655

Table S2 (continued).

Country	Bulgaria		Romania		Ukraine		International coordinated totals	
	RBG	GWFG	RBG	GWFG	RBG	GWFG	RBG	GWFG
26–27 January 2019	5,774	133,612	x	x	x	x		
09–10 February 2019*	3,346	97,048	9825	54,104	1,488	19,190	14,659	170,342
23–24 February 2019	480	41,816	680	22,000	x	x		
09–10 March 2019	11	19,105	x	x	x	x		
09–10 November 2019	0	5,769	3607	48,513	x	x		
23–24 November 2019*	42	14,133	2962	247,428	2,050	13,024	5,054	301,742
14–15 December 2019*	17	19,580	12056	335,802	988	17,517	13,061	372,899
28–29 December 2019	120	75,000	x	x	x	x		
11–12 January 2020*	320	2,310	10887	323,693	2,534	17,858	13,741	343,861
25–26 January 2020	462	42,402	x	x	x	x		
08–09 February 2020	1,150	36,070	4734	194,933	x	x		
12–23 February 2020*	40	25,887	9353	275,240	3,289	49,352	12,682	350,479
07–08 March 2020	0	0	x	x	x	x		
07–08 November 2020	14	28,845	x	x	x	x		
21–22 November 2020*	167	57,558	14,709	373,858	5,537	14,157	20,468	445,573
05–06 December 2020	146	56,986	14,142	328,985	x	x		
19–20 December 2020*	134	45,056	14,199	288,104	3,421	43,293	17,754	376,453

Country	Bulgaria		Romania		Ukraine		International coordinated totals	
	RBG	GWFG	RBG	GWFG	RBG	GWFG	RBG	GWFG
02–03 January 2021	0	429	x	x	x	x		
16–17 January 2021*	21	569	12,963	217,120	1,053	20,537	14,037	238,226
30–31 January 2021	402	11,542	18,591	337,515	x	x		
13–14 February 2021*	1	4,672	12,279	222,228	6,731	30,736	19,011	257,636
27–28 February 2021	0	55	10,346	165,130	x	x		
13–14 March 2021	1	574	x	x	x	x		
06–17 November 2021	39	24,930	x	x	x	x		
20–21 November 2021*	19	20,965	2,691	351,932	1,206	25,381	3,916	398,278
04–05 December 2021	22	23,345	2,191	402,304	x	x		
18–19 December 2021*	228	81,405	3,019	351,134	7,789	15,360	11,036	447,899
02 January 2022	4	3,693	x	x	x	x		
15–16 January 2022*	32	2,962	11,241	435,732	15,561	18,309	26,834	456,893
29–30 January 2022	557	5,618	23,641	421,376	x	x		
12–13 February 2022*	2	6,141	20,864	465,950	3,444	58,009	24,310	530,100
26–27 February 2022	0	2,476	917	288,412	x	x		
12–13 March 2022	0	4,547	x	x	x	x		

*International count dates

Table S3. Summary table of all coordinated international counts of wintering Greylag Geese along the northwestern Black Sea coast summarised by national totals from Bulgaria, Romania and Ukraine monitored in winters 2017/2018 to 2021/2022. 0 = counted but no geese present.

Country	Bulgaria	Romania	Ukraine	Grand Totals
16–17 December 2017	0	2,167	1,408	3,575
13–14 January 2018	14	3,184	856	4,054
10–11 February 2018	11	1,104	967	2,082
15–16 December 2018	78	468	946	1,492
12–13 January 2019	9	6,339	739	7,087
09–10 February 2019	0	400	240	640
23–24 November 2019	20	9,737	535	10,292
12–13 December 2019	9	6,261	249	6,519
11–12 January 2020	2	1,932	256	2,190
22–23 February 2020	4	14	411	429
21–22 November 2020	147	6,800	1,184	8,131
19–20 December 2020	70	3,768	626	4,464
16–17 January 2021	14	12,487	735	13,236
13–14 February 2021	222	761	990	1,973
20–21 November 2021	31	2,155	1,333	3,519
18–19 December 2021	316	12,188	1,467	13,971
15–16 January 2022	0	1,518	951	2,469
12–13 February 2022	28	6,313	879	7,220

Table S4. Summary table of all counts of wintering Greater White-fronted Geese (GWFG) and Red-breasted Geese (RBG) in Ukraine reported by Kostushyn *et al.* (2011). x = sections not counted, 0 = counted but no geese present. Data on annual mean January temperature from Kherson, Ukraine are also presented for information in the corresponding years.

Site names	1991	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kagul, Kugurlui and Yalpug Lakes	GWFG	x	100	5,500	500	1,000	x	x	x	x	5,008	x	x	10,200	x	x	x	x
Katlabukh, Safi any and Kitai Lakes	GWFG	x	70,000	8,000	500	530	x	x	x	x	0	x	x	0	x	x	x	x
Danube Delta	GWFG	x	4,000	6,700	630	1,100	80	95	x	165	x	x	x	0	x	x	x	x
Sentsosko-Zhebraniovskite Plavni	GWFG	x	40,000	21,000	660	27,000	x	0	5,000	x	x	x	x	x	x	x	x	x
Sasyk Liman	GWFG	20,000	16,000	10,000	3,500	20,000	2,030	6,200	1,000	9,000	x	x	x	x	x	x	x	x
Shagany, Albei and Burnas Limans	GWFG	500	9,500	21,300	23,500	19,500	18,000	6,580	5,000	40,000	x	x	x	x	x	x	x	x
Budakskii and Gribovskii Limans	GWFG	0	0	0	0	0	5,000	120	0	0	x	x	x	x	x	x	x	x
Dniester Liman	GWFG	0	0	0	50	50	0	0	0	50,000	x	x	x	x	x	x	x	x
Dniester Delta and Kuchurganskii Liman	GWFG	x	x	x	0	50	3,000	150	600	5,000	x	x	x	x	x	x	x	x
Sukhoi Liman	GWFG	0	0	0	0	100	500	0	0	0	x	0	x	x	x	x	x	x
Khadzibelskii Liman	GWFG	0	35	0	0	30	1,000	0	0	0	x	x	x	x	x	x	x	x
Odessa Bay	GWFG	x	0	0	0	100	0	0	0	0	0	0	0	0	x	x	x	x
Kuyalinskii Liman	GWFG	0	0	0	0	20	1,500	0	0	0	x	2	x	x	x	x	x	x
Adzhalskii Limans	GWFG	x	x	x	0	60	800	40	0	0	0	0	x	x	x	x	x	x
Tiligalskii Liman	GWFG	500	0	0	0	80	300	0	0	0	0	0	x	x	x	x	x	x
Dniepro-Bugskii Liman	GWFG	x	0	0	0	0	7,000	0	0	0	0	0	x	x	x	x	x	x
Yagorlynskii Bay	GWFG	x	x	0	x	x	10,000	500	0	0	x	x	x	x	x	x	x	x
Tendrovskii Bay	GWFG	300	0	0	x	x	x	20,000	6,000	x	x	x	x	x	x	x	x	x
Dzharylgachskii Bay	GWFG	x	x	x	x	5,840	x	594	3,210	2,500	x	x	1,000	2,700	200	2,336	1,500	0
Southern part of Eastern Sivash	GWFG	x	x	x	x	x	x	x	x	6,879	8,500	x	2,508	4,634	x	x	x	x
Northern part of Eastern Sivash	GWFG	x	x	x	x	x	23,377	x	x	52,071	x	14,780	x	4,133	756	18,579	1,904	707
Southern part of Central Sivash	GWFG	x	x	x	x	x	x	x	x	413	x	x	13,122	0	x	x	x	863
Northern part of Central Sivash	GWFG	x	x	x	x	x	61,665	x	x	x	x	900	x	4,800	97	26,704	1,256	1,042
Western Sivash	GWFG	20,000	x	x	x	x	x	541	72,700	x	x	1,261	434	500	6,000	x	x	x
Utlukskii and Sivashik Limans	GWFG	6,070	x	x	x	x	33,243	x	6,137	14,943	x	4	x	210	255	115	x	x
Molochnyi Liman	GWFG	5,500	x	x	x	0	6,544	0	6,018	4,620	0	0	2561	1,887	5,500	2,696	1	0
TOTAL	GWFG	52,870	25,535	145,400	68,250	48,120	193,589	23,764	43,101	262,247	6,879	30,620	2,995	27,950	30,097	48,434	5,612	3,249

Table S4 (continued).

Site names	1991	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kagal, Kugurlui and Yalpug Lakes	RBG	x	0	60	0	150	x	x	x	x	180	x	x	9	x	x	x	x
Katlubukh, Safi any and Ktati Lakes	RBG	x	1,000	100	100	100	x	x	x	x	0	x	x	0	x	x	x	x
Danube Delta	RBG	x	0	0	0	55	0	0	0	x	0	x	x	0	x	x	x	x
Stentsvosko-Zhebrianovskie Plavn1	RBG	x	700	120	0	815	x	0	0	x	x	x	x	x	x	x	x	x
Sasyk Liman	RBG	0	0	2,000	0	30	80	45	250	600	x	x	x	x	x	x	x	x
Shagany, Albei and Burnas Limans	RBG	0	0	2,500	460	120	7,000	40	0	5,000	x	x	x	x	x	x	x	x
Budaskii and Gribovskii Limans	RBG	0	0	0	0	0	1,500	0	0	0	x	x	x	x	x	x	x	x
Dniester Liman	RBG	0	0	0	0	0	0	0	0	12,000	x	x	x	x	x	x	x	x
Dniester Delta and Kuchurganskii Liman	RBG	x	x	x	0	0	100	0	0	0	x	x	x	x	x	x	x	x
Sukhoi Liman	RBG	0	0	0	0	0	0	0	0	0	x	0	x	x	x	x	x	x
Khadzibeiskii Liman	RBG	0	0	0	0	0	20	0	0	0	x	x	x	x	x	x	x	x
Odessa Bay	RBG	x	0	0	0	0	0	0	0	0	x	0	x	x	x	x	x	x
Kuyalitskii Liman	RBG	0	0	0	0	0	60	0	0	0	x	1	x	x	x	x	x	x
Adzhalytskii Limans	RBG	x	x	x	0	0	30	0	0	0	x	0	x	x	x	x	x	x
Tiligulskii Liman	RBG	0	0	0	0	0	0	0	0	0	x	0	x	x	x	x	x	x
Dniepro-Bugskii Liman	RBG	x	x	0	0	0	80	x	0	0	x	0	x	x	x	x	x	x
Yagorlytskii Bay	RBG	x	0	0	0	0	x	x	0	0	x	x	x	x	x	x	x	x
Tendrovskii Bay	RBG	0	0	0	0	x	x	x	150	80	x	x	x	x	x	x	x	x
Dzharylgachskii Bay	RBG	0	0	0	0	160	x	16	75	0	x	x	0	0	0	1	3	0
Southern part of Eastern Sivash	RBG	x	x	x	x	x	x	x	x	x	2	10	x	0	672	165	30	x
Northern part of Eastern Sivash	RBG	x	x	x	x	x	500	x	x	15,800	x	0	x	28	5	5,279	0	x
Southern part of Central Sivash	RBG	x	x	x	x	x	x	x	x	1,270	x	x	12,116	0	x	x	x	x
Northern part of Central Sivash	RBG	x	x	x	x	x	1,591	x	x	x	x	1,250	x	0	0	14,783	0	120
Western Sivash	RBG	0	x	x	x	x	x	x	0	0	x	0	5	40	x	x	x	x
Utlakskii and Sivashik Limans	RBG	12	x	x	x	x	203	x	0	60	x	0	x	0	0	0	0	x
Molochnyi Liman	RBG	0	x	x	x	0	0	0	0	0	0	124	6	0	17	0	0	0
TOTAL	RBG	12	0	6,200	740	410	12,284	101	475	34,810	2	1,441	129	12,190	686	20,079	166	153
Khereson temperature data																		
data from https://www.tutempo.net/clima/ws-339020.html																		
mean January temperature		-0,2	-1,5	-2,4	-6	-6	-0,9	0	-3,2	1,4	-2,1	-2,4	-0,4	1,3	-7,1	3,7	-3,7	-1,5
mean maximum January temperature		2,7	2,1	0,8	-3,3	-3	1,6	2,5	-0,8	4,3	0,8	0,2	2,1	4,3	-4,2	6,8	0,5	2,2
mean minimum January temperature		-2,9	-5	-5,9	-9,1	-10,4	-3,6	-2,5	-6,5	-1,4	-5	-5,1	-3,1	-1	-9,8	0,3	-6,9	-4,7