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THE RED DATA BOOK WATERBIRDS IN THE COASTAL WETLANDS OF THE AZOV-BLACK SEA REGION OF UKRAINE — THE RESULTS OF THE AUGUST COUNTS 2018 AND 2021

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The Red Data Book Waterbirds in the Coastal Wetlands of the Azov-Black Sea Region of Ukraine — the Results of the August Counts 2018 and 2021. Chernichko, J. I., Kostiushyn, V. A. & Vinokurova, S. V. — The article analyses data from the August Counts of 2018 and 2021, which covered the 40 most important wetlands on the Azov-Black Sea coast of Ukraine. Of the 106 wetland bird species recorded during the censuses, 35 species are listed in the Red Data Book of Ukraine. The number of them was about 50 thousand individuals or 7.6 % of the total number of counted birds: in 2018 — 24.1 thousand individuals and in 2021 — 25.8 thousand individuals. Detailed information on the number of bird species and the list of the most important sites for each species can be found in the publication. The comparison of the current data with the previous survey period 2004–2015 (Chernichko et al., 2018) showed that the abundance of 17 waterbird species decreased, and 7 species increased their abundance. It is assumed that these changes are caused by the aridification of the climate, leading to the drying out of the shallow parts of the region's wetlands in the second half of the summer.
Key words: Ukraine, Azov-Black Sea coast, water birds, August counts.

Introduction

The Regional Ornithological Monitoring Program was launched in 2004. The main idea of ROM is to carry out simultaneous counts in all the important coastal wetlands of the Azov-Black Sea region in order to assess the abundance of local birds. August is the best month for this — the nesting season is over and concentrations of pre-migratory birds are beginning to form, although migration has not yet begun, except for some terns and waders. The second important reason is to conduct counts before the start of the hunting season, which leads to big changes in the spatial distribution of birds. In a previous publication, we analysed the results of five August counts (2004, 2006, 2009, 2012 and 2015) in relation to the number and distribution of Red Data Book (RDB) (Akimov, 2009) wetland bird species (Chernichko et al., 2019). The aim of this publication is to analyse the results of the August Counts of the years 2018 and 2021 on RDB waterbird species of Ukraine, many of which are also priority species under the Bern and Bonn Conventions, AEWA and some other international agreements. Basic information on the results of the August Counts are published in the ROM Bulletin (2019, 2021) in the format of a collection of small papers presenting the results of the counts for each counted wetland.

Material and Methodology

The coverage of wetlands of the Azov-Black Sea coast of Ukraine by counts was: 2018 — 30 sites, 2021 — 40 sites (2 small sites were included in Syvash Central), a total of 40 different wetlands or their parts (fig. 1).

A total of 656.6 thousand individuals of 106 wetland bird species were counted during the two August Counts, of which 35 species were included in the Red Book for the 4th edition. The total number of counted Red Book birds counted was 49,950 individuals or 7.6 % of the total number of registered birds, including 24,113 individuals in 2018 and 25,837 individuals in 2021.

Results and Discussion

The number of bird species of the different protection categories of the list for the 4th edition of the RDB, the amount of birds and their ratio are shown in table 1.

Recurvirostra avosetta Linnaeus, 1758 was the most numerous species among the RDB wetland related birds — 20.50 % of the total number of waterbirds counted in 2018 and

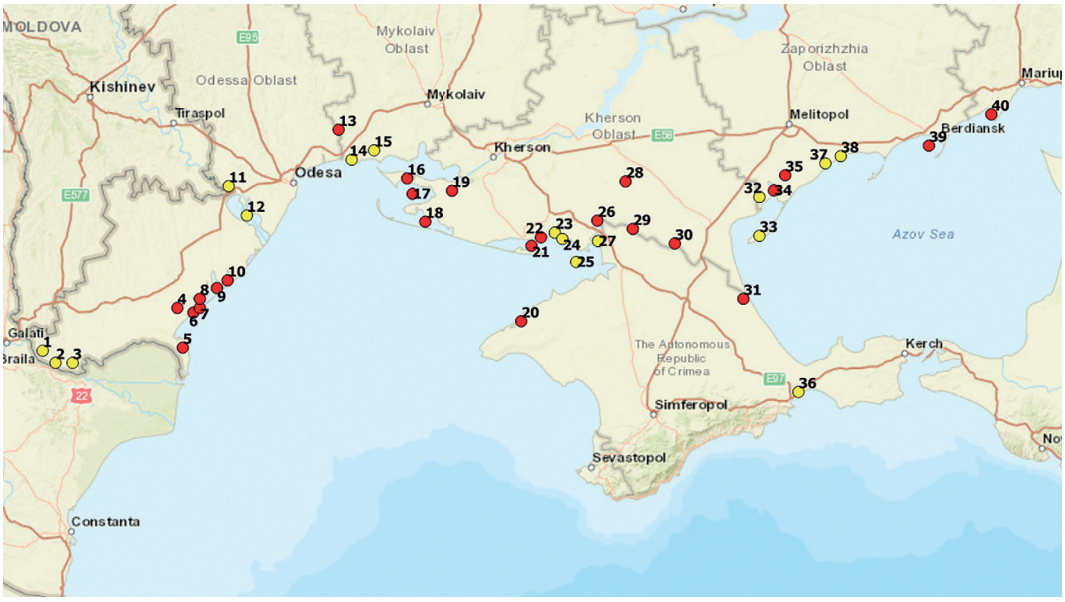

Fig. 1. Coverage of wetlands of Azov-Black Sea coast of Ukraine in 2018 and 2021 (yellow — 1 count, red — 2 counts). The numbers of the wetlands (1–40) correspond to those in table 3.

Table 1. Number of wetland bird species of different RDB categories, their amount and its ratio ,% recorded during August Counts 2018 and 2021

Red Data Book categories*	Species number	Amount of birds, ind.	Ratio, %
Endangered (E)	11	14818	29.67
Vulnerable (V)	12	19014	38.07
Rare (R)	11	16103	32.24
Not evaluated (NE)	1	15	0.03

*Red Data Book of Ukraine includes the following categories: Extinct, Extinct in Wild, Endangered (could extinct in nature without conservation measures), Vulnerable (because of decreasing could be included soon in E), Rare (more safety than E and V, but also has negative tendency), Not Evaluated (possibly belong to E, V or R) , Not Enough Known (not enough data to classify them).

2021, *Pelecanus onocrotalus* Linnaeus, 1758 — 15.48 % and *Himantopus himantopus* (Linnaeus, 1758) — 11.93 %. Figure 2 shows the species for which the number of individuals exceeded 1 % of the total number of birds counted.

Detailed information on the numbers of each of the 35 RDB wetland bird species and their percentage of the total count data is provided in table 2.

Figure 3 shows wetlands where the mean abundance of waterbirds exceeded 1 % of the sum of the mean abundance of birds for all wetlands covered by the surveys in 2018

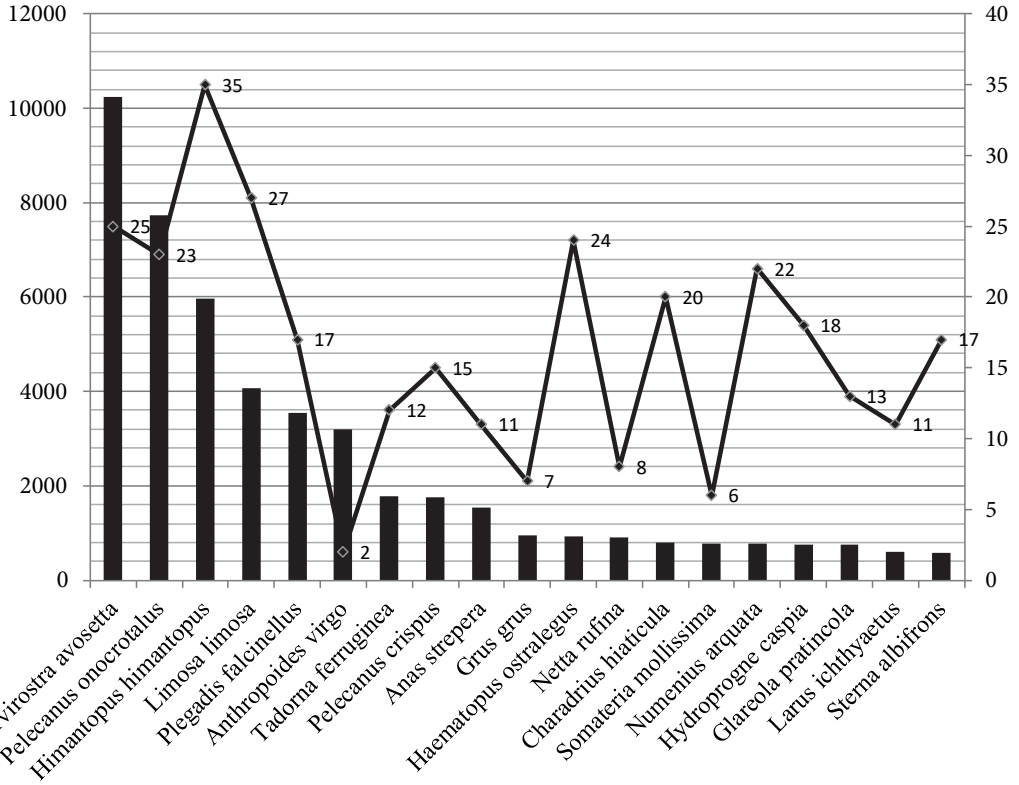

Fig. 2. The most numerous RDB wetland birds species, recorded during August Counts 2018 and 2021 (bar chart — amount of birds, line chart — number of sites were species was recorded).

Table 2. Species composition and amount of the RDB wetland bird species, recorded during August Counts 2018 and 2021 years in Azov-Black Sea region of Ukraine

No	Species Name	RDB category	Amount in 2018	Amount in 2021	Total amount	%	Number of wetlands	The most important wetlands*
1	*Podiceps grisegena* (Boddaert, 1783)	V	9	1	10	0.02	2	Karkinitskyi Bay — 60.00, Kinburnska Spit — 40.00
2	*Pelecanus onocrotalus* Linnaeus, 1758	E	4733	3003	7736	15.48	23	Danube Delta — 38.62, Syvash Central — 16.09, Tendrivskyi Bay — 11.96
3	*Pelecanus crispus* Bruch, 1832	E	1524	225	1749	3.50	15	Karkinitskyi Bay — 79.82
4	*Phalacrocorax aristotelis (*Linnaeus, 1761)	E		1	1	0.002	1	Dzharylgachskyi Bay
5	*Phalacrocorax pygmaeus* (Pallas, 1773)	E	49	60	109	0.22	6	Danube Delta — 49.54, Dniester and Turunchuk rivers interfluve — 15.60
6	*Ardeola ralloides* (Scopoli, 1769)	R	118	139	257	0.51	5	Danube Delta — 53.7, Kartal Lake — 31.91
7	*Platalea leucorodia* Linnaeus, 1758	V	334	244	578	1.16	18	Danube Delta — 19.38, Tendrivskyi Bay — 18.34, Syvash Central — 12.46
8	*Plegadis falcinellus* (Linnaeus, 1766)	V	490	3061	3551	7.11	17	Shpindiyar Area — 56.52, Syvash Central — 21.35
9	*Ciconia nigra* (Linnaeus, 1758)	R	18	1	19	0.04	4	Karkinitskyi Bay — 84.21
10	*Tadorna tadorna* (Linnaeus, 1758)	V	720	1060	1780	3.56	12	Velykyi Chapelskyi Pod — 52.81, Syvash Central — 31.35
11	*Anas strepera* Linnaeus, 1758	R	1258	274	1532	3.07	11	Danube Delta — 85.9, Tendrivskyi Bay — 4.57
12	*Netta rufina* (Pallas, 1773)	R	401	512	913	1.83	8	Syvash Central — 72.62, Shpindiyar Area — 21.58
13	*Aythya nyroca* (Guldenstadt, 1770)	V	48	63	111	0.22	7	Danube Delta — 73.8, Utliutskyi Lyman — 8.11, Syvash Central — 6.31
14	*Bucephala clangula* (Linnaeus, 1758)	R		10	10	0.02	3	Perekopskyi Bay — 80.00
15	*Somateria mollissima* (Linnaeus, 1758)	V	515	251	766	1.53	6	Kinburnska Spit —83.29 % , Tendrivskyi Bay — 10.97 %
16	*Oxyura leucocephala* (Scopoli, 1769)	E		1	1	0.002	1	Syvash Central (Syvash Depression area)
17	*Pandion haliaetus* (Linnaeus, 1758)	E	1	1	2	0.004	2	Molochnyi Lyman, Tyligulskyi Lyman
18	*Circus pygargus* (Linnaeus, 1758)	V	13	22	35	0.07	12	Syvash Central — 25.71, Molochnyi Lyman — 14.29, Biryuchyi Island Spit— 14.29
19	*Haliaeetus albicilla* (Linnaeus, 1758)	R	22	22	44	0.09	8	Dzhantsheiskyi Lyman — 37.21, Danube Delta — 30.23
20	*Grus grus* (Linnaeus, 1758)	R	532	425	957	1.92	7	Syvash Central — 46.80, Velykyi Chapelskyi Pod — 32.08, Utliutskyi Lyman — 13.48 %
21	*Anthropoides virgo* (Linnaeus, 1758)	E	1585	1608	3193	6.39	2	Syvash Central — 67.9, Dzharylgach and Yarylgach Lakes (Crimea) — 32.1
22	*Burhinus oedicnemus* (Linnaeus, 1758)	NE	3	12	15	0.03	2	Utliutskyi Lyman — 73.33, Shagany Lyman — 26.67

23	*Charadrius hiaticula* Linnaeus, 1758	R	488	304	792	1.59	20	Utliutskyi Lyman — 49.85, Kinburnska Spit — 15.28, Tendrivskyi Bay — 13.89
24	*Charadrius alexandrinus* (Linnaeus, 1758)	V	257	202	459	0.92	14	Kinburnska Spit — 56.86, Shagany Lyman — 26.80
25	*Himantopus himantopus* (Linnaeus, 1758)	V	957	5005	5962	11.94	35	Syvash Central — 54.03, Shpindiyar Area — 17.13
26	*Recurvirostra avosetta* Linnaeus, 1758	R	5923	4321	10244	20.51	25	Syvash Central — 38.86, Karkinitskyi Bay — 20.17
27	*Haematopus ostralegus* Linnaeus, 1758	V	433	504	937	1.88	24	Alibei and Karachaus Lymans — 16.76, Danube Delta — 16.54, Berdyanska Spit — 10,89
28	*Tringa stagnatilis* (Bechstein, 1803)	E	364	67	431	0.86	16	Tendrivskyi Bay — 31.79, Berdyanska Spit — 28.77, Utliutskyi Lyman — 28.07
29	*Numenius arquata* (Linnaeus, 1758)	E	391	375	766	1.53	22	Yagorlytskyi Bay — 23.63, Shagany Lyman — 13.84, Danube Delta — 11.75
30	*Numenius phaeopus* (Linnaeus, 1758)	E	83	83	166	0.33	15	Shagany Lyman — 34.94, Alibei and Karachaus Lymans — 28.31
31	*Numenius* sp.		8	52	60	0.12	5	—
32	*Limosa limosa* (Linnaeus, 1758)	V	1169	2893	4062	8.13	27	Syvash Central — 36.48, Kinburnska Spit — 11.94
33	*Glareola pratincola* (Linnaeus, 1766)	R	620	130	750	1.50	13	Syvash Central — 54.27, Karkinitskyi Bay — 22.40
34	*Larus ichthyaetus* Pallas, 1773	E	411	193	604	1.21	11	Sasyk Reservoir — 35.43, Danube Delta — 33.44
35	*Hydroprogne caspia* (Pallas, 1770)	V	349	414	763	1.53	18	Danube Delta — 27.39, Sasyk Reservoir — 23.33
36	*Sterna albifrons* Pallas, 1764	R	287	298	585	1.17	17	Bilosaraiska Spit — 27.35, Tyligulskyi Lyman — 13.85, Kinburnska Spit — 13.68
Total			24 113	25 837	49 950	100,00		

*Percentage of the total amount of birds of this species.

and 2021 (table 3, last column). The proportion for each of the remaining wetlands was less than 1 %. According to the results of the 2018 and 2021 surveys, the Sivash Central was the most valuable wetland for the protected waterbird species. Twenty-five species were recorded and the average number of birds in this wetland with adjacent small water bodies was 7,500 individuals or 25.95 % of the total. The second place was taken by Karkinitskyi Bay — 16 species and 4,162 individuals (14.40 %). In descending order — the Danube Delta — 21 species and 2,984 ind. (10.32 %), the Shpindiyar area — 12 species and 1,839 ind. (6.36 %) and the Syvashyk Lyman — 11 species and 1,594 ind. (5.51 %).

Detailed information on the nuber of RDB water birds in the wetlands of the Azov-Black Sea coast of Ukraine is presented in the following table 3.

As mentioned at the beginning of the article, the August counts have been conducted since 2004. Data on waterbirds in the RDB for the period 2004–2015 (5 counts) were sum-

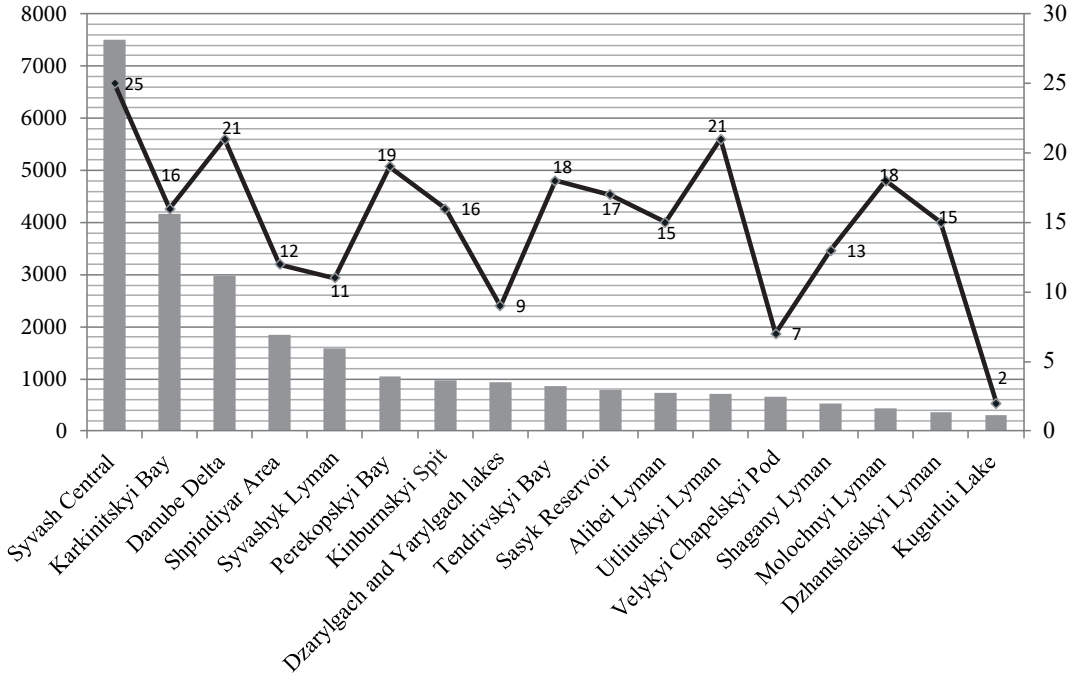

Fig. 3. The most important wetlands for RDB wetland bird species according to August Counts 2018 and 2021 (bar chart — average amount of birds, line chart — number of the species recorded at the site).

Table 3. The amount of RDB water birds in different wetlands of the Azov-Black Sea coast of Ukraine according to the results of 2018 and 2021 counts

No	Name of wetland	Number of counts	Number of species (2018 + 2022)	Amount of birds Min–Max	Total amount of birds (2018 + 2022)	Average amount of birds per count
1	Kagul Lake	1	1	15	15	15
2	Kartal Lake	1	3	93	93	93
3	Kugurlui Lake	1	2	301	301	301
4	Danube Delta	2	21	1784–4183	5967	2983.5
5	Sasyk Reservoir	2	17	491–1100	1591	795.5
6	Malyi Sasyk Lyman	2	10	26–194	220	110
7	Dzhantsheiskyi Lyman	2	15	299–423	722	361
8	Shagany Lyman	2	13	289–757	1046	523
9	Alibei Lyman	2	15	540–921	1461	730.5
10	Burnas Lyman	2	11	193–200	393	196.5
11	Dniester Lyman	1	7	94	94	94
12	Dniester and Turunchuk rivers interfluve	1	6	81	81	81
13	Tyligulskyi Lyman	2	17	137–407	544	272
14	Lake near Morske Village	1	2	78	78	78
15	Berezanskyi Lyman	1	4	15	15	15
16	Kinburnska Spit	2	16	767–1184	1951	975.5
17	Odzygolskii Lakes	2	4	1–119	120	60
18	Yagorlytskyi Bay	2	13	224–296	520	260
19	Tendrivskyi Bay (eastern part)	2	18	813–911	1724	862

20	Dzharylgachskyi Bay	2	8	31–61	92	45.5
21	Karzynskyi Bay	2	7	5–109	114	57
22	Kalanchakshyi Bay	1	10	133	133	133
23	Khorly Peninsula and Ustrichni Islands	1	5	33	33	33
24	Perekopskyi Bay	1	19	1041	1041	1041
25	Karkinitskyi Bay (nothern part)	1	16	4162	4162	4162
26	Syvash Western	2	13	36–207	243	121.5
27	Shpindiyar Area	2	12	555–3112	3677	1838.5
28	Velykyi Chapelskyi Pod	2	7	483–824	1307	653.5
29	Syvash Central	2	25	5800–9200	15 000	7500
30	Syvash Eastern	2	11	32–199	231	115.5
31	Dzarylgach and Yarylgach Lakes	2	9	532–1332	1864	932
32	Kuchuk-Adzyhol Lake	1	3	128	128	128
33	Syvashyk Lyman	1	11	1594	1594	1594
34	Utliutskyi Lyman	2	21	564–854	1418	709
35	Biruchyi Islands	1	5	39	39	39
36	Korsak River Mouth	1	5	26	26	26
37	Molochnyi Lyman	2	18	275–603	878	439
38	Tubalskyi Lyman	1	5	33	33	33
39	Berdyanska Spit	2	9	167–285	452	226
40	Bilosaraiska Spit	2	11	83–465	548	274

marised by us in a previous article (Chernichko et al., 2018). Considering the fact that the number of sites covered by the counts (small wetlands in their entirety or parts of large water bodies) varies from year to year, some sites are surveyed regularly, while others are surveyed irregularly, in some cases only once. This unstable coverage severely limits the ability to compare data collected over different time periods. However, we will try to provide a brief comparison of the results of the two periods of censuses as far as possible: 2004–2015 and 2018–2021 (also — 1st and 2nd period).

The average number of RDB birds per count in 2004–2015 was around 36 thousands individuals, ranging from 21 to 55 thousands birds. At the same time, an average of 40 sites were surveyed (ranging from 22 to 68). In the period 2018–2021 — the average number of RDB birds per count was around 25 thousands individuals (24 in 2018 and around 26 in 2021) and the counts covered an average of 35 sites per year.

A total of 42 RDB bird species were recorded during the surveys from 2004 to 202, although *P. grisegena* and *L. limosa* were not included in the Red Data Book of Ukraine until 2021. Five species are not associated with wetlands and were not the purpose of the surveys, but were recorded incidentally: *Circus cyaneus* (Linnaeus, 1766), *Buteo rufinus* (Cretzschmar, 1827), *Falco cherrug* Gray, 1834, *Falco peregrinus* Tunstall, 1771, *Tetrax tetrax* (Linnaeus, 1758), because of this we have exclude them from the analysis. Of the 6 species that differed between the 1st and 2nd count periods, one is a very rare species on a global scale — *Numenius tenuirostris* Vieillot, 1817, three — are rarely found in the region during the census period — *P. aristotelis, P. haliaetus, Gallinago media* (Latham, 1787), and there is no point in considering them in the context of changes in the bird species composition of the region. In fact, we can only speak of two wetland bird species

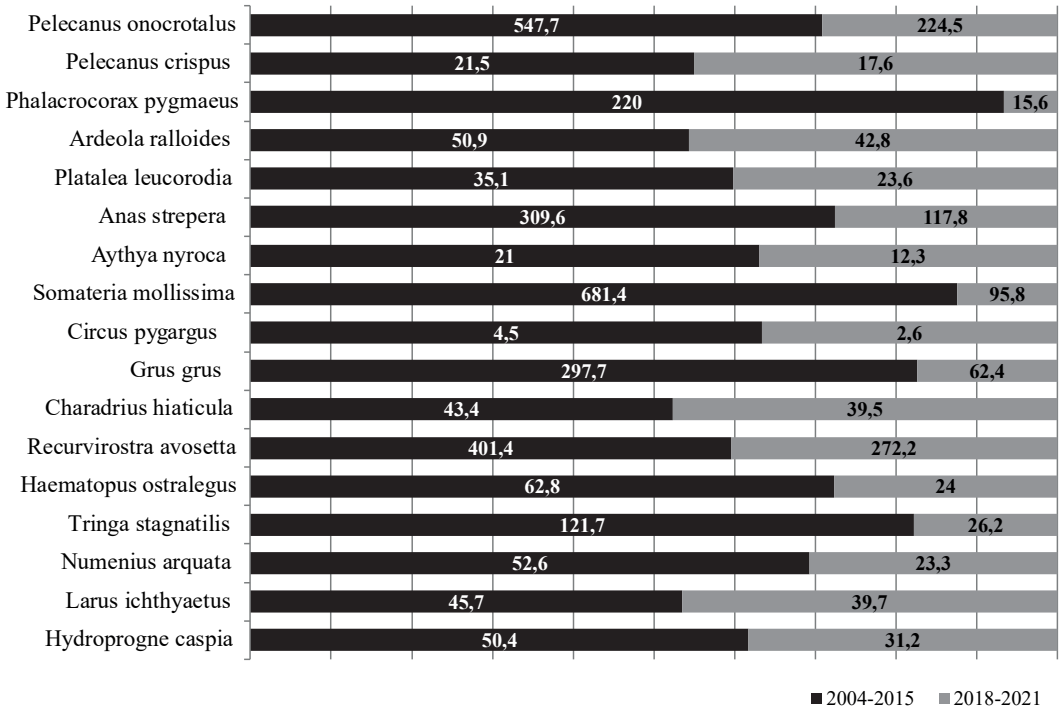

Fig. 4. Waterbird RDB species, the amount of which has decreased (average amount of individuals per count per one site).

that were recorded in the 1st period and were not recorded in the 2nd period — *Glareola nordmanni* Nordmann, 1842 and *Mergus serrator* Linnaeus, 1758. *G. nordmanni* stopped nesting in the region many years ago. *M. serrator* significantly reduced its abundance and was therefore not counted in the 2nd period. Thus, 31 species of waterbirds listed in the Red Data Book of Ukraine (including *P. grisegena* and *L. limosa*) were recorded in both periods.

When comparing the number of birds per species in the 1st and 2nd periods, we used an indicator such as the average number per count in a site (whole small wetland or part of a large wetland). In our opinion, this allows to a large extent to level out the influence

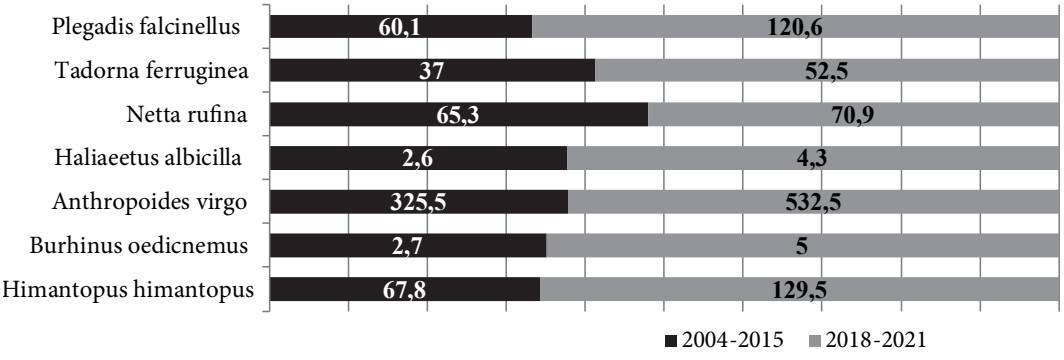

Fig. 5. Waterbird RDB species, the amount of which has increased (average amount of individuals per count per one site).

of both the different number of sites covered by the counts in different years and, consequently, the different number of counts per site. It is clear that the indicator calculated in this way is not a standard statistic for which a confidence interval can be calculated and the significance of the difference in mean values can be properly assessed. Nevertheless, we consider it possible to use it to compare the number of birds in the 1st and 2nd periods, especially when the differences are large. As a result of using this indicator, it was found that the number of 17 species decreased significantly (fig. 4), for some cases even by several times. For example, *P. pygmaeus* — 14 times, *S. mollissima* — 7 times, *T. stagnatilis* — 4.6 times, *P. onocrotalus* — 2.4 times.

An increase in the number of records was observed for 7 other species (fig. 5). The most significant increase was recorded for *P. falcinellus* — 2 times, *H. himantopus* — 1.9 times, *B. oedicnemus* — 1.9 times.

For other species there was no change in abundance or the change was so small that it was not meaningful to compare between periods.

It is clear that the observed changes in species abundance may be the result of two factors. The first is changes in the nesting abundance of species, but it is not clear at what geographical scale — from local to the whole AEWA region. The second is the spatial redistribution of birds in the post-nesting period due to changes in the state of coastal wetlands under the influence of anthropogenic factors or climate change, which to some extent may also be caused by human activities. First of all, there are changes in the water levels in the wetlands, resulting in the drying up of shallow parts of the wetlands at the end of the summer due to the aridification of the climate, which has been observed frequently in the last decade. The influence of this factor is confirmed, in our opinion, by the fact that 12 of the 17 species that have declined in abundance also occur in a larger number of wetlands surveyed, i. e. they are distributed over a larger area. This trend was observed not only for the birds in this group, but for 20 RDB bird species in total. Interestingly, some other RDB waterbird species showed a reverse trend. This may be due to differences in the ecological requirements of the bird species, but explaining these trends requires detailed analysis, which is beyond the scope of this article.

The general conclusion that can be drawn is that the wetlands of the Azov-Black Sea coast of Ukraine retain their importance for the support of protected waterbirds, but the decline in the abundance of a number of RDB bird species in the Azov-Black Sea region of Ukraine is quite alarming.

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All information gathered by the above listed persons during the counts are publishes in ROM Bulletins 2018 and 2021 years, that are collection of small papers, each of which is devoted to count results on particular wetlands. Thus detailed information on who carried out surveys on which wetlands you can find in these publications.

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