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WATERFOWL OF LUTSK DISTRICT

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The waterfowl of the Lutsk district was studied by the author during 1981–2018. 39 species of the waterfowl are registered in the Lutsk district, 13 among them are confirmed on breeding (some of them in some years only), 16 – on passage (1 species – the Greylag Goose *Anser anser* (L.) nested only once) and 10 – vagrants. Besides, 18 species are wintering. The nest group of the waterfowl is between 327 and 637 breeding pairs. The most numerous breeding species are the Coot *Fulica atra* L. (25–52 % of the total number of waterfowl) and the Mallard *Anas platyrhynchos* L. (19–35 %). Both species comprise up to 52–71 % of the waterfowl. The biggest part of the local population of those birds is nesting on large complexes of ponds. We found certain trends in waterfowl numbers the 38-year period of research. The number is stable in case of the Little Grebe *Podiceps ruficollis* (Pall.) and the Great Crested Grebe *P. cristatus* (L.), and relative stability with annual fluctuations is observed in the Mallard and the Coot. A noticeable decrease in population size is observed in the Pochard and for some species critical decrease and tendency to disappear was detected: the Black-necked Grebe *Podiceps nigricollis* C. L. Brehm, the Red-necked Grebe *P. grisegena* (Bodd.) and the Tufted Duck *Aythya fuligula* (L.). An increase in number is observed in the Mute Swan *Cygnus olor* (Gm.) and the Garganey *Anas querquedula* L. only. Other species of the waterfowl nest with average number of 1–2 pairs and only in some years. During the post-breeding period (the beginning of August), 13 species of the waterfowl were registered (9–10 species yearly) in Lutsk district in 2013–2018. Among them few species of the waterfowl not detected during the breeding season (the Cormorant *Phalacrocorax carbo* (L.) and the Teal *Anas crecca* L.), were observed. The Mallard and the Mute Swan *Cygnus olor* (Gm.) are the most frequently wintering species of the waterfowl. There are between 35–4000 wintering birds yearly. The vast majority of the waterfowl wintered on the unfrozen parts of Styr and Chornoguzka rivers, rarely on ponds and channels. Reasons for changings their numbers are determined for breeding and wintering species of waterfowl. The water bodies occupy 16.5 km² or 1.6 % of the district

territory. For protection of the waterfowl, as well as for other groups of animals, in the Lutsk district, 4 nature protection territories were created (2 zoological and 2 ornithological reserves).

Keywords: waterfowl, censuses, trends, Lutsk district, Ukraine

INTRODUCTION

The Lutsk district is located in the north-western part of Ukraine, within the Volyn region (see Fig.). It has the total square of 1027.8 km² and lies between 50° 32' and 50° 51' of northern latitude and 24° 52' and 25° 39' of eastern longitude. The area of the district lies at the border between the Volyn Highland and the Western Polissia according to the physical-geographical zoning and within the western part of the Right-bank Polissia according to ornitho-geographical zoning [2]. There are 19 rivers, 3 small lakes, several dozens of ponds, channels and ditches that occupy 16.5 km² or 1.6 % of the district territory. The surveyed territory is considered to be a model plot in the study of main aspects of the waterfowl life [18].



Lutsk district on the map of Volyn region
Луцький район на карті Волинської області

MATERIALS AND METHODS

The waterfowl of the Lutsk district was studied by the author during 1981–2018, and part of the collected material was already published [8–10, 12–17].

The main methods of the waterfowl research were censuses on routes [2]. The censuses were carried out by passing ponds on boats and by foot along the bank of reservoirs. Counting of the bird numbers was performed using binoculars. Sometimes birds were photographed for counting and identification. In breeding period, the status of each species was determined according to the international criteria [7]. The method of finding nests on separated ponds was used for clarification of number of secretive species of the waterfowl [15].

Wintering birds are those species that were observed during January-February. Birds, registered at the beginning of winter period (end of December) were at the last stages of migration.

The accounts covered the most of the reservoirs in the breeding period and all potential wintering places, that are similar to the recommendations for estimating the number of waterfowl [19].

The number of each species was estimated on the basis of generalization of censuses: in pairs – for the breeding period and in individuals – for the nonbreeding season.

The number of waterfowl during 38-years research was analysed for establishing trends for each species. Such species trends as large decrease (more than 30 % decline of numbers), moderate decrease (10–29 % decline), stable (less 10 % decline and less 10 % increase), moderate increase (10–29 % increase) and large increase (more than 30 % increase) were used [3].

The reasons for changing number of waterfowl were found.

RESULT AND DISCUSSION

There are 39 species of the waterfowl registered in the Lutsk district in 1981–2018. 13 of them are confirmed breeding (some of them in some years only), 16 – occur on the passage (one of them – the Greylag Goose *Anser anser* (L.) was breeding in 2001) and 10 species are vagrants (Table 1). Besides, 18 species of the waterfowl are wintering.

In different periods of the research different number of species (from 24 in 1981–1990 to 34 in 2001–2010) were recorded mostly due to vagrants and transmigrating species (see Table 1). Among 39 species of the waterfowl, 20 occur regularly (but may have a different status of stay) and others – irregular (vagrants and part of the passages species).

Generalized data on the number of breeding waterfowl in Lutsk region for 1988–2018 is shown in Table 2.

The number of breeding waterfowl is different in different years in the Lutsk district (see Table 2). The lowest numbers of breeding waterfowl were observed in 2005, 2008, 2014, and the highest – in 1988, 1989, 2015 and 2017. The most numerous species were the Coot *Fulica atra* L. (between 25 % of all breeding waterfowl in 1995 and 52 % in 2015) and the Mallard *Anas platyrhynchos* L. (between 19 % in 1989 and 35 % in 1998). Both those species accounted for more than 50 % of total number of the waterfowl (between 52 % in 1993, 1995 and 71 % in 2015, 2017) and somewhat less numerous – the Great Crested Grebe *Podiceps cristatus* (L.) and the Pochard *Aythya ferina* (L.). Other species were less numerous.

During extremely dry years (2015–2017), the number of breeding waterfowl was significantly higher than in less dry years.

The largest breeding groups of the waterfowl were found on complexes of ponds near the villages: Charukiv and Nesvich, Sadiiv and Gorzvyin, Shepel and Usychi.

The numbers of breeding waterfowl for the 38-years of research has been analysed to establish of long-term trends for each species. For a more detailed analysis, the period of our research was divided into the 4 parts of 10 years, beginning in 1981 (Table 3).

In the first research period (1981–1990), a trend of number was established as the stable (0), and for the Mute Swan *Cygnus olor* (Gm.), as a new breeding species (N). The Mute Swan began breeding in Lutsk district from 1988. In the second period (1991–2000), there is a relative stability for some breeding (Mute Swan and Garganey *Anas*

Table 1. Generalized data on status of the waterfowl in Lutsk district in 1981–2018

Таблиця 1. Узагальнені дані про статус перебування водоплавних птахів у Луцькому районі у 1981–2018 рр.

No	Species	Years			
		1981–1990	1991–2000	2001–2010	2011–2018
1	<i>Gavia stellata</i>	–	P	P	P
2	<i>Gavia arctica</i>	P	P	P	P
3	<i>Podiceps ruficollis</i>	BC, W	BC, W	BC, W	BC, W
4	<i>Podiceps nugricollis</i>	BC	BC	BC	BB
5	<i>Podiceps griseigena</i>	BC	BC	BB	BA
6	<i>Podiceps cristatus</i>	BC	BC	BC	BC
7	<i>Pelecanus onocrotalus</i>	–	–	V	V
8	<i>Phalacrocorax carbo</i>	–	P, W	P, W	P
9	<i>Branta canadensis</i>	–	–	–	V, W
10	<i>Rufibrenta ruficollis</i>	–	V	V	–
11	<i>Anser anser</i>	P	P	BC, W	P, W
12	<i>Anser albifrons</i>	P	P	P	P
13	<i>Anser erythropus</i>	–	P	P	–
14	<i>Anser fabalis</i>	P	P	P	–
15	<i>Chen caeruleus</i>	–	V	–	–
16	<i>Cygnus olor</i>	BC, W	BC, W	BC, W	BC, W
17	<i>Cygnus cygnus</i>	–	P	–	P
18	<i>Cygnus bewickii</i>	–	–	V, W	–
19	<i>Tadorna ferruginea</i>	V	–	–	–
20	<i>Tadorna tadorna</i>	–	–	V	–
21	<i>Anas platyrhynchos</i>	BC, W	BC, W	BC, W	BC, W
22	<i>Anas crecca</i>	P	P, W	P, W	P
23	<i>Anas strepera</i>	BB	BC	P	BC
24	<i>Anas penelope</i>	P, W	P, W	P	P
25	<i>Anas acuta</i>	P	P	P	P
26	<i>Anas querquedula</i>	BC, W	BC, W	BC	BC
27	<i>Anas clypeata</i>	BB	BC	BC	BB
28	<i>Netta rufina</i>	–	–	V	–
29	<i>Aythya ferina</i>	BC, W	BC, W	BC, W	BC, W
30	<i>Aythya nyroca</i>	BC	BA	BA	–
31	<i>Aythya fuligula</i>	BC, W	BC, W	BC, W	BC, W
32	<i>Aythya marila</i>	P	–	P, W	P
33	<i>Bucephala clangula</i>	P	P, W	P, W	P, W
34	<i>Melanitta fusca</i>	P, W	P, W	P, W	P
35	<i>Melanitta nigra</i>	–	V	–	–
36	<i>Mergus albellus</i>	–	P	P, W	P
37	<i>Mergus serrator</i>	–	–	V	–
38	<i>Mergus merganser</i>	–	P, W	P, W	P, W
39	<i>Fulica atra</i>	BC	BC, W	BC, W	BC
Total species		24	31	34	28

Conditional marking: BA, BB, BC – possible, probable, confirmed breeding species; P – species on passage; V – vagrant species; W – wintering species (registered in January and February)

Умовні позначення: BA, BB, BC – можливо, ймовірно, достовірно гніздовий вид; P – пролітний вид; V – залітний вид; W – зимуючий вид (zareєстрований у січні–лютому)

Table 2. Dynamics of number of breeding waterfowl (pairs) in Lutsk region in 1988–2018
Таблиця 2. Динаміка чисельності гніздових водоплавних птахів (пар) у Луцькому районі за 1988–2018 рр.

Species	Years																							
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2004	2005	2008	2013	2014	2015	2016	2017	2018
<i>Podiceps ruficollis</i>	25-30	25-30	22-25	20-22	22-25	20-25	20-25	25-28	30-35	30-35	16-20	30-35	25-30	20-22	24-26	26-30	24-27	22-25	20-25	20-25	28-30	22-25	22-23	28-30
<i>Podiceps nigricollis</i>	25-30	45-55	22-24	25-30	18-20	25-30	25-28	45-50	20-25	10-12	18-20	30-35	40-45	18-25	30-35	15-20	12-15	15-18	-	-	10-12	-	-	4-5
<i>Podiceps grisegena</i>	7-8	10-12	3-4	1-2	-	3-4	5-6	9-10	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1
<i>Podiceps cristatus</i>	50-70	70-90	50-60	40-45	40-50	40-50	40-50	40-45	40-45	40-45	40-45	40-45	45-50	45-50	40-45	30-40	45-55	40-50	45-55	50-60	45-50	60-70	65-75	60-70
<i>Anser anser</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Cygnus olor</i>	1	1	1	1	1	3	4	5	5	5	5	6	4	6	4	4	4	3	5	3	4	4	6	5
<i>Anas platyrhynchos</i>	150-180	100-120	120-140	100-120	120-130	100-120	90-100	120-140	130-150	100-120	180-200	130-150	160-180	120-140	100-120	90-100	80-90	90-100	120-130	70-80	100-120	100-120	130-150	100-120
<i>Anas strepera</i>	1	2-3	-	-	-	2	1	1-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Anas querquedula</i>	15-20	14-16	10-12	20-24	17-20	28-32	9-10	30-35	28-32	18-20	30-35	25-30	18-20	18-20	23-25	22-25	18-20	14-16	30-35	14-16	30-40	30-35	35-45	30-40
<i>Anas clypeata</i>	-	-	2-3	-	-	1-2	-	-	3-4	-	-	1-2	1-2	-	-	-	-	-	-	-	-	-	-	-
<i>Aythya ferina</i>	50-60	40-50	35-40	40-50	40-50	45-55	30-35	40-50	50-60	35-40	30-35	30-35	35-40	40-50	30-35	40-50	30-35	30-35	30-35	20-25	30-35	40-50	25-30	20-25
<i>Aythya nyroca</i>	1-2	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Aythya fuligula</i>	20-30	15-20	12-15	20-30	15-20	12-15	12-15	20-25	15-20	12-15	12-15	15-20	12-15	10-12	15-20	25-30	15-20	12-15	5-6	3-4	3-4	2-3	1-2	1-2
<i>Fulica atra</i>	160-180	200-240	200-240	100-120	130-150	100-120	110-130	110-130	140-160	150-170	180-200	130-150	150-170	120-140	100-120	120-140	100-120	100-120	170-190	150-160	280-310	180-200	250-270	120-130
Total of pairs	505-612	477-637	368-564	368-445	403-466	379-458	346-404	445-520	461-536	390-452	512-576	437-508	491-557	398-466	366-430	372-439	328-386	425-481	330-373	425-481	530-605	438-507	535-602	369-428
Total of species	12	11	11	10	9	12	11	11	11	9	10	10	11	10	9	9	9	10	8	8	9	8	9	10

querquedula L.). However, from this period there is a trend towards a decline in the number of about half of the species (3 species of Grebes, Gadwall *Anas strepera* L. Ferruginous duck *Aythya nyroca* (Güld.) and Coot). The most species have trends for decreasing of their numbers, and some – to disappearing (*Gadwall Anas strepera* L., Shoveler *Anas clypeata* L., Ferruginous Duck) in 2001–2010. And in our last period of research (2011–2018) most species had trends to increase or stable of numbers, less – trends to decline, and two species – to disappearance (Shoveler and Ferruginous Duck).

Table 3. Trends in number of breeding waterfowl in Lutsk district in 1981–2018

Таблиця 3. Тенденції у чисельності гніздових водоплавних птахів у Луцькому районі у 1981–2018 рр.

Species	Years				Total in 1981–2018
	1981–1990	1991–2000	2001–2010	2011–2018	
<i>Podiceps ruficollis</i>	0	0	0	0	0 (-4,6 %)
<i>Podiceps nigricollis</i>	0	-1	-1	-2	-2/D (in 10 times less)
<i>Podiceps grisegena</i>	0	-2	-2	-2	-2/D (in 10 times less)
<i>Podiceps cristatus</i>	0	-2	0	+2	0 (-9,0 %)
<i>Cygnus olor</i>	N	+2	0	0	+2 (in 5 times more)
<i>Anas platyrhynchos</i>	0	0	-2	+1	-1 (-21,0 %)
<i>Anas strepera</i>	0	-2	D	+1	-2 (in 2 times less)
<i>Anas querquedula</i>	0	+2	-1	+2	+2 (in 2 times more)
<i>Anas clypeata</i>	0	0	D	D	-2/D (in 3 time less)
<i>Aythya ferina</i>	0	0	-1	-2	-2 (-66,3 %)
<i>Aythya nyroca</i>	0	-2	D	D	-2/D (-100 %)
<i>Aythya fuligula</i>	0	0	0	-2	-2/D (in 6 times less)
<i>Fulica atra</i>	0	-1	-1	+2	0 (-3,7 %)

Conditional marking: 0 – stable; -1 – moderate decrease; -2 – large decrease; +1 – moderate increase; +2 – large increase; N – new breeder; D – disappearing

Умовні позначення: 0 – стабільність; -1 – незначне зменшення; -2 – сильне зменшення; +1 – незначне збільшення; +2 – сильне збільшення; N – новий гніздовий вид; D – зникнення

Stable numbers are observed in the Little Grebe *Podiceps ruficollis* (Pall.) and the Great Crested Grebe and the Coot, and moderate decrease in number is in the Mallard (21.0 %) in long-term population trends during 1981–2018 (Table 3). A large decrease in numbers is observed in the Pochard and for some species critically decrease and a tendency to disappear was found: the Black-necked Grebe *Podiceps nigricollis* C. L. Brehm, the Red-necked Grebe *Podiceps grisegena* (Bodd.), the Tufted Duck *Aythya fuligula* (L.). An increase in numbers is observed only in the Mute Swan and the Garganey. Other species of waterfowl nest with average numbers of 1–2 pairs were found.

For find the character of trends of the breeding waterfowl, we compared the trends in Ukraine, the adjacent country and Europe in general. In particular, for the Little grebe and the Great Crested Grebe in surveyed territory the breeding trends of the number are stability, but in Europe in the first species it is a moderate increasing and in second – decline [3, 4]. The Black-necked Grebe and the Red-necked Grebe, as species with a large decline of numbers in Lutsk district have similar trends as the Red-necked Grebe in Eastern Poland and some other European countries [1] and as the Black-necked Grebe – in Europe generally [3, 4]. The Mute Swan has a similar trend as well as on

surveyed territory as adjacent countries with Ukraine and Europe [3, 4]. Similar trend has the Mallard in most of European countries and in Europe [4], but on the territory of Lutsk district in last 10-years only. The Pochard has similar trend as well as on surveyed territory (decline on 66.3 %) as in Ukraine (fluctuating of 10–30 %), adjacent countries (decline on 30–80 % in Poland, decline on 50 % in Belorussia) and Europe in general [3, 4, 5]. The Ferruginous Duck demonstrates a large decline in Lutsk district as well as in Belorussia (0–67 %), but in Ukraine this species is fluctuating (25–30 %) and in Poland it has a large increase (220–230 %). Finally, the Coot on surveyed territory has stable trend (-3.7 %), as well in Belorussia, Germany, but in Ukraine it is fluctuating (25–30 %) and in Poland – decreasing (30–60 %) [4].

On a surveyed territory, there are waterfowl species that have local (situated) trends (different in comparison to an adjacent territory, country or Europe in general – 3 species of Grebe, Ferruginous Duck, Coot and some others) and general, similar trends in all or most territory of Europe (Red-necked Grebe, Mute Swan, Mallard, Pochard).

The reasons that have influenced an decreasing waterfowl populations in Lutsk district are as following:

- 1) Change of land and fish used:
 - a) stop of fishing activities at certain ponds and the beginning of non-control fishing on them (all waterfowl species), that began after a destroy of USSR in 1991;
 - b) the non-use of part agricultural land by purpose near the reservoirs leads to a transformation of vegetation and the reduction of typical breeding sites for some species (Gadwall, Garganey, Shoveler and partly Mallard), that began after 1991–1995;
- 2) Strong overgrowth of some fishponds with vegetation:
 - a) declining the area of typical habitats on the islands and at the bank of ponds (all Grebes, Mute Swan, Mallard, Shoveler, Pochard, Ferruginous Duck, Tufted Duck, Coot);
 - b) reduction or disappearance of the Black-headed Gull *Larus ridibundus* L. colonies, where nest the Black-necked Grebe, the Red-necked Grebe, the Pochard, the Tufted Duck and the Ferruginous Duck sometimes (since 1995);
- 3) Untimely filling with water by fish farmers in the spring and descent of water by poachers on some ponds (all species) since 1995–1996;
- 4) Burning of vegetation by fish farmers and others people in some water bodies (all species);
- 5) Large eutrophication of small reservoirs (Pochard, Ferruginous Duck, Tufted Duck and partly others diving waterfowl);
- 6) Criticale small number of some breeding waterfowl (1–4 pairs), that leads to a disappearance of their micro-populations (Gadwall, Shoveler, Ferruginous Duck).

The reasons that have influenced an increasing of waterfowl populations in Lutsk district are as following:

- 1) Creation of new ponds and other reservoirs during 1993–2000 (all waterfowl species);
- 2) Created of the nature protection territories and limitation in the fishery and others activity in 1992–2009 (all waterfowl species);
- 3) Increasing of sedges area among the river valleys and at ponds (Mallard, Garganey).

The August censuses of birds were carried out on fishponds in Lutsk town, near settlement Rokyni and villages: Bogoliuby, Buiany, Charukiv, Gorzvyyn, Korshiv, Krupa,

Lyshche, Nesvich, Sadiv, Shepel, Usychi, Voiutyn, Voroyniv, Zaborol (covering more than 80 % squares of total water bodies reservoirs in Lutsk district) in post post-breeding period before opening of the hunt. Generalized data on a number of waterfowl in post-breeding season in Lutsk region for 2013–2018 are presented in Table 4.

Table 4. Results of August censuses of the waterfowl (individuals) in Lutsk district in 2013–2018

Таблиця 4. Результати серпневих обліків водоплавних птахів (особин) у Луцькому районі у 2013–2018 рр.

Species	Years					
	2013	2014	2015	2016	2017	2018
<i>Podiceps ruficollis</i>	26	38	92	62	60	93
<i>Podiceps nigricollis</i>	–	–	2	–	–	–
<i>Podiceps cristatus</i>	138	146	142	155	264	198
<i>Palacrocorax carbo</i>	–	–	–	1	–	–
<i>Cygnus olor</i>	8	17	37	37	38	35
<i>Anas platyrhynchos</i>	575	302	499	484	602	370
<i>Anas crecca</i>	2	1	–	2	13	3
<i>Anas strepera</i>	–	–	–	–	3	–
<i>Anas querquedula</i>	54	5	52	34	101	11
<i>Anas clypeata</i>	–	–	–	–	1	–
<i>Aythya ferina</i>	180	39	65	204	70	45
<i>Aythya fuligula</i>	11	1	1	–	–	4
<i>Fulica atra</i>	1390	900	2256	1622	1835	925
Total birds	2384	1449	3146	2601	2987	1584
Total species	9	9	9	9	10	9

In post-breeding season (beginning of August), 13 species of the waterfowl are registered (9–10 species yearly) in Lutsk district during 2013–2018 (Table 4). The vast majority of species recorded in this period are breeding, but some species (the Cormorant *Phalacrocorax carbo* (L.) and the Teal *Anas crecca* L.) also come from adjacent northern areas. 7 species of birds are recorded in this period annually, and others only in some years. A number of waterfowl varies annually from 1500 to 3150 individuals (see Table 4).

The censuses of birds in winter were carried out along the Styr and Chornoguzka rivers mainly and on non-freezing sections of some fishponds, channels and ditches. Generalized data on the number of wintering waterfowl in Lutsk region in 1988–2018 are shown in Table 5.

Winter abundance of 18 waterfowl species has been analysed. The Mallard is the most numerous and regular wintering species. The Swan is observed almost every winter and it is a second most numerous species among wintering waterfowl. The Little Grebe and the Goldeneye *Bucephala clangula* (L.) were observed during a majority of winters. Others species were wintering in some years (Table 4). The wintering waterfowl aggregations have ranges between 35 and 4000 individuals in different years, depending on weather conditions and freezing of the reservoirs. There are no other reasons that would affect the number of wintering waterfowl in addition to weather. Over the last 30 years, the number of wintering species birds of this group has increased, that was not observed in winter earlier.

Table 5. Dynamics of number of the wintering waterfowl (individuals) in Lutsk district during winters 1988/89–2017/18

Таблиця 5. Динаміка чисельності зимуючих водоплавних птахів (особини) у Луцькому районі у зими 1988/89–2017/18 рр.

Winters	Species														Total birds				
	<i>Podiceps ruficollis</i>	<i>Phalacrocorax carbo</i>	<i>Branta canadensis</i>	<i>Anser anser</i>	<i>Cygnus olor</i>	<i>Cygnus bewickii</i>	<i>Anas platyrhynchos</i>	<i>Anas crecca</i>	<i>Anas penelope</i>	<i>Anas querquedula</i>	<i>Aythya ferina</i>	<i>Aythya fuligula</i>	<i>Aythya marila</i>	<i>Bucephala clangula</i>		<i>Melanitta fusca</i>	<i>Mergus albellus</i>	<i>Mergus merganser</i>	<i>Fulica atra</i>
1988/89	-	-	-	-	5	-	419	-	-	-	-	-	-	-	-	-	-	-	424
1989/90	-	-	-	-	30	-	725	-	-	-	-	-	-	-	-	-	-	-	755
1990/91	-	-	-	-	11	-	388	-	7	4	-	-	-	-	-	-	-	-	410
1991/92	1	-	-	-	18	-	167	-	-	-	-	-	-	-	-	-	-	-	186
1992/93	1	-	-	-	32	-	1002	-	2	-	-	-	-	-	-	-	-	-	1037
1993/94	-	-	-	-	19	-	319	-	-	-	-	-	-	-	-	-	-	-	338
1994/95	-	-	-	-	5	-	90	-	-	-	-	-	-	-	-	-	-	-	95
1995/96	3	-	-	-	14	-	4015	-	-	-	-	1	-	-	-	-	-	-	4033
1996/97	9	-	-	-	12	-	745	-	2	1	-	-	-	1	-	-	-	-	770
1997/98	1	-	-	-	2	-	320	-	-	-	-	-	-	-	-	-	-	-	323
1998/99	-	-	-	-	17	-	77	-	-	-	-	-	-	8	-	-	-	-	102
1999/00	-	-	-	-	9	-	247	-	-	-	-	-	-	-	-	-	-	-	256
2000/01	6	1	-	-	218	-	484	1	-	1	1	1	-	6	1	-	-	11	731
2001/02	5	-	-	-	6	-	803	2	-	-	1	1	-	2	-	-	-	1	821
2002/03	2	-	-	-	3	1	479	1	-	-	-	-	-	2	-	-	-	-	488
2003/04	1	-	-	-	31	-	249	-	-	-	-	-	-	4	-	2	-	-	287
2004/05	1	-	-	3	12	-	247	-	-	-	1	-	-	3	-	-	1	11	279
2005/06	2	-	-	-	7	-	207	-	-	-	-	-	-	-	-	-	5	-	221
2006/07	2	-	-	-	15	-	610	-	-	-	-	-	1	4	-	-	-	-	632
2007/08	10	-	-	-	8	-	916	-	-	-	-	-	-	1	-	-	-	-	935
2008/09	-	-	-	-	-	-	197	-	-	-	-	-	-	1	-	-	1	-	199
2009/10	-	-	-	-	-	-	62	-	-	-	-	-	-	-	-	-	-	-	62
2010/11	-	-	-	-	18	-	16	-	-	-	-	-	-	1	-	-	-	-	35
2011/12	2	-	-	-	12	-	541	-	-	-	-	-	-	2	-	-	1	-	558
2012/13	2	-	-	-	5	-	53	-	-	-	-	-	-	2	-	-	-	-	62
2013/14	-	-	-	-	4	-	245	-	-	-	-	-	-	-	-	-	-	-	249
2014/15	10	-	-	-	7	-	394	-	-	-	-	-	-	1	-	-	-	-	412
2015/16	4	-	-	-	23	-	436	-	-	-	-	-	-	2	-	-	-	-	465
2016/17	3	-	-	-	16	-	222	-	-	-	-	-	-	-	-	-	-	-	241
2017/18	2	-	1	1	139	-	203	-	-	-	-	-	-	1	-	-	-	10	357

The numbers of wintering waterfowl for 38-years study has been analysed to establish trends for main species and group of those birds together. For more detailed analysis, the period of our research was divided in 4 parts of 10 winters, beginning from 1980/1981 (Table 6).

During the first period of our study (winters 1981/1982–1989/1990), the Mallard was observed every winter and Mute Swan only in some winters. In a second period (winters 1990/1991–1999/2000) the number of wintering species of waterfowl, and the number of

the Mallard increased. In these winters, in addition to the Mallard, the Mute Swan was wintered annually, and the Little Grebe, the Wigeon *Anas penelope* L., the Garganey, the Tufted Duck and the Goldeneye start to be observed. At increase in number and species abundance of wintering waterfowl is due to general warming of the winters and an increase in areas of non-freezing areas reservoirs. In the subsequent period (winters 2000/2001–2009/2010), there is a large decline in number of the Mallard. At that time, other species of waterfowl not observed in previous winters, were registered (Cormorant, Greylag Goose, Bewick's Swan *Cygnus bewickii* Yarrell, Teal *Anas crecca* L., Pochard, Scaup *Aythya marila* (L.), Velvet Scoter *Melanitta fusca* (L.), Smew *Mergus albellus* L., Coot). In the last period of our research (winters 2010/2011–2017/2018), there is a large decline in the number of wintering waterfowl (Mallard). For all wintering waterfowl there was a significant annual fluctuation in numbers.

Table 6. Trends in number of wintering waterfowl and its species abundance in Lutsk district in 1980/1981–2017/2018

Таблиця 6. Тенденції у чисельності зимуючих водоплавних птахів і їхнього видового багатства у Луцькому районі у 1980/1981–2017/2018 рр.

Species	Winters				Total in 1981–2018
	1980/1981– 1989/1990	1990/1991– 1999/2000	2000/2001– 2009/2010	2010/2011– 2017/2018	
<i>Podiceps ruficollis</i>	-	0	+2	+2	+2 (in 1,5 times more)
<i>Cygnus olor</i>	0	0	+2	0	+2 (in 2 times more)
<i>Anas platyrhynchos</i>	0	+1	-2	-2	-2 (in 2 times less)
<i>Bucephala clangula</i>	-	0	+2	-2	0 (-9,0 %)
Total numbers of waterfowl	0	+1	-2	-2	-2 (in 2 times less)
Total species	2	7	16	8	-

Conditional marking: 0 – stable; -1 – moderate decrease; -2 – large decrease; +1 – moderate increase; +2 – large increase

Умовні позначення: 0 – стабільність; -1 – незначне зменшення; -2 – сильне зменшення; +1 – незначне збільшення; +2 – сильне збільшення

Large increase in numbers were observed in the Little Grebe *Podiceps ruficollis* (Pall.) and the Mute Swan, stable – in the Goldeneye, and a large decline was in the Mallard during winters 1980/1981–2017/2018 (Table 6). One can assume that a decrease in wintering Mallard due to warmer winters appeared other non-freezing reservoirs outside the Lutsk region. Other species of waterfowl winter were observed in some years and in small quantities, often lonely individuals. For a protection of waterfowl, as well as other groups of animals in the Lutsk district, several nature protection territories were created: 2 zoological (Gnidavske mire and Shepel) and 2 ornithological reserves (Charukiv and Lobanykha) of local importance according to the author's materials [11].

CONCLUSIONS

The species composition and statuses of waterfowl were described on the territory of Lutsk district as a result our research in 1981–2018. In total, 39 species of the waterfowl were registered. 13 among them are confirmed on breeding (some of them in some years only), 16 – on passage (1 species – the Greylag Goose nested only once), 10–species are vagrants. Besides, 18 species are wintering. The numbers of birds were determined by the results of censuses in different seasons in the period 1988–2018. A size of nesting

group of waterfowl ranges between 327 and 637 breeding pairs and size of wintering group between 35–4000 individuals in different years. The most numerous species in the breeding and post-breeding seasons are the Mallard and the Coot, and in winter period – the Mallard and the Swan. The long-term trends and reasons for changing their numbers are determined for breeding and wintering species of the waterfowl. On the most valuable for waterfowl areas, nature protection territories were created (4 reserves) and hunting is prohibited there.

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ВОДОПЛАВНІ ПТАХИ ЛУЦЬКОГО РАЙОНУ

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Водоплавні птахи Луцького району вивчалися автором протягом 1981–2018 рр. За цей час зареєстровано 39 видів, 13 із них гніздових (деякі з них лише в окремі роки), 16 на прольоті (1 вид – гуска сіра *Anser anser* (L.) гніздилася лише один раз) і 10 залітних. Крім того, 18 видів птахів тут зимує. Гніздове угруповання водоплавних птахів у різні роки налічує від 327 до 647 гніздових пар. Найчисленнішими гніздовими видами є лиска *Fulica atra* L. (25–52 % від загальної кількості гніздового комплексу водоплавних птахів) і крижень *Anas platyrhynchos* L. (19–35 %), а разом їхня чисельність у різні роки становить 52–71 %. Основна кількість цих птахів гніздиться на великих комплексах ставів. За результатами 38-річних досліджень водоплавних птахів з'ясовано тенденції гніздової чисельності. Так, зокрема, стабільність чисельності спостерігається у пірникози малої *Podiceps ruficollis* (Pall.) та великої *P. cristatus* (L.) і відносна стабільність зі щорічними коливаннями для крижня й лиски. Значне зменшення чисельності спостерігається у попелюха *Aythya ferina* (L.), а для деяких видів, таких як пірникоза чорношия *Podiceps nigricollis* C. L. Brehm та *P. grisegena* (Bodd.), чернь чубата *Aythya fuligula* (L.) – катастрофічне зменшення чисельності й тенденція до зникнення. Збільшення чисельності спостерігали лише у лебедя-шипуну *Cygnus olor* (Gm.) та чирянки великої *Anas querquedula* L. Чисельність інших видів водоплавних птахів незначна, переважно по 1–2 пари, і гніздяться вони лише в деякі роки. У післягніздовий період (на початку серпня) 2012–2018 рр. зареєстровано 13 видів (по 9–10 видів щорічно) водоплавних птахів у Луцькому районі. Серед них спостерігали також інших водоплавних птахів (баклан великий *Phalacrocorax carbo* (L.) і чирянка мала *Anas crecca* L.), які не реєстрували в період розмноження. Серед водоплавних птахів найчастіше зимує крижень і лебідь-шипун *Cygnus olor* (Gm.). Щорічно зимує 35–4000 водоплавних птахів, головним чином на незамерзаючих ділянках річок (переважно на Стиру та Черногузці), рідше на ставах і каналах. Для гніздових і зимуючих видів цієї групи птахів з'ясовано причини зміни чисельності. Водойми займають 16,5 км², або 1,6 % площі району. Для збереження основних місць перебування водоплавних птахів, як і інших груп тварин, у Луцькому районі за матеріалами автора цієї статті створено 4 заказники місцевого значення (2 загальнозоологічних і 2 орнітологічних).

Ключові слова: водоплавні птахи, обліки, тенденції, Луцький район

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