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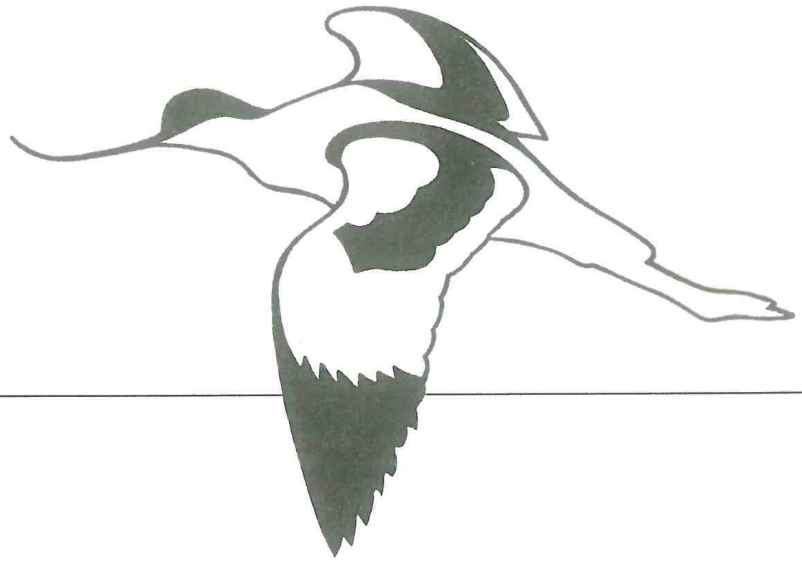

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Visual bird migration at the northwestern coast of the Black Sea, Ukraine

IGOR SCHOGOLEV

The Goulandris Natural History Museum, 13 Levidou St., 14562 Kifissia, Greece

Abstract - In this paper are presented the results of a study of the diurnal bird migration in relation to weather conditions at Budaki salt lake, Dniestr estuary, Ukraine, during 1978-1990. Migration was studied for 240 days each year. From 100.000 to 270.000 migrant birds, belonging to 50 different species, were counted every year.

Introduction

Bird migration has not been systematically studied on the North coast of the Black Sea apart from R. Drost's observations on Zmeinnii island 70 years ago (Drost 1930). Generally, it is known that visual bird migration at Budaki salt lake, Ukraine (northwest coasts of Black Sea) takes place in three periods: spring (March-April, 40 days), summer (June-August, 100 days) and autumn (August-November, 100 days).
Migrant birds fly mainly parallel to the sea coast in SSW-NNE direction. Passerines fly in narrow formation. Each flock had an extent of about 200 m. Peaks had been recorded during the first four hours after dawn, provided the winds were not strong.
The aim of this work was to ascertain the rate of migration in the different seasons of the year.

Methods

The study area was Budaki lagoon at the NW edge ot the Dniestr delta (46° 01´ N, 30° 24´ E). The area has a temperate climate. The average monthly temperatures for the last hundred years in Odessa were: March 2°C; April 8°C; September 16.7°C; October 11.5°C and November 4,9°C.
Budaki is a large coastal lagoon separated from the sea by a 30 km long and about 100 metres wide sand bar. As the bulk of diurnal bird migration occurred along this sandy beach, observations were made from a standard point approximately in the middle of the sand belt using 12x40 binoculars. The study period was from 1978 to 1990 and I covered spring, summer and autumn migration. Observations were made for four hours after sunrise and two hours before sunset every day. With this method 50% of the migrant birds are estimated to be counted (Lulleva *et al.* 1981).
For the most abundant species results are shown on figures or tables, whilst for scarce species the peak of the observed migration period is reported in the Appendix.

Results

Table 1 shows, for 20 species, the variability of bird numbers which migrate at each time. I suggest that it occurs because of daily rates. During the spring of 1980 and autumn of 1981 strong migration had been observed because birds passed during early morning from Budaki salt lake. The migration of Rook *Corvus frugilegus*, Reed Bunting *Emberiza schoeniclus ukrainae* and Swallow *Hirundo rustica* occurs during daytime.

Spring migration

The first waves of migrant birds appeared in early March. In this period many migrants pass during daytime. In April, despite the expected increase in numbers and species involved, almost all of migration takes place during the night so I could not observe important numbers. My observations concern the diurnal migration in March (Fig. 1, 2, 3, 4). March is the spring month with more unstable weather conditions, so a large range of temperature has been recorded. The monthly average temperature was from -2.8°C to +5.4°C. These fluctuations affect the main flow and

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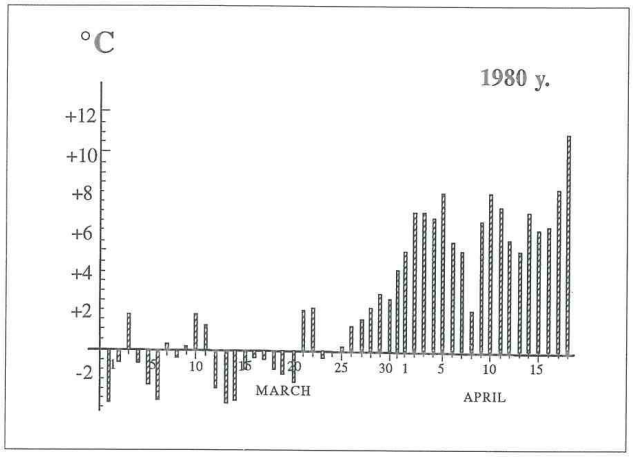
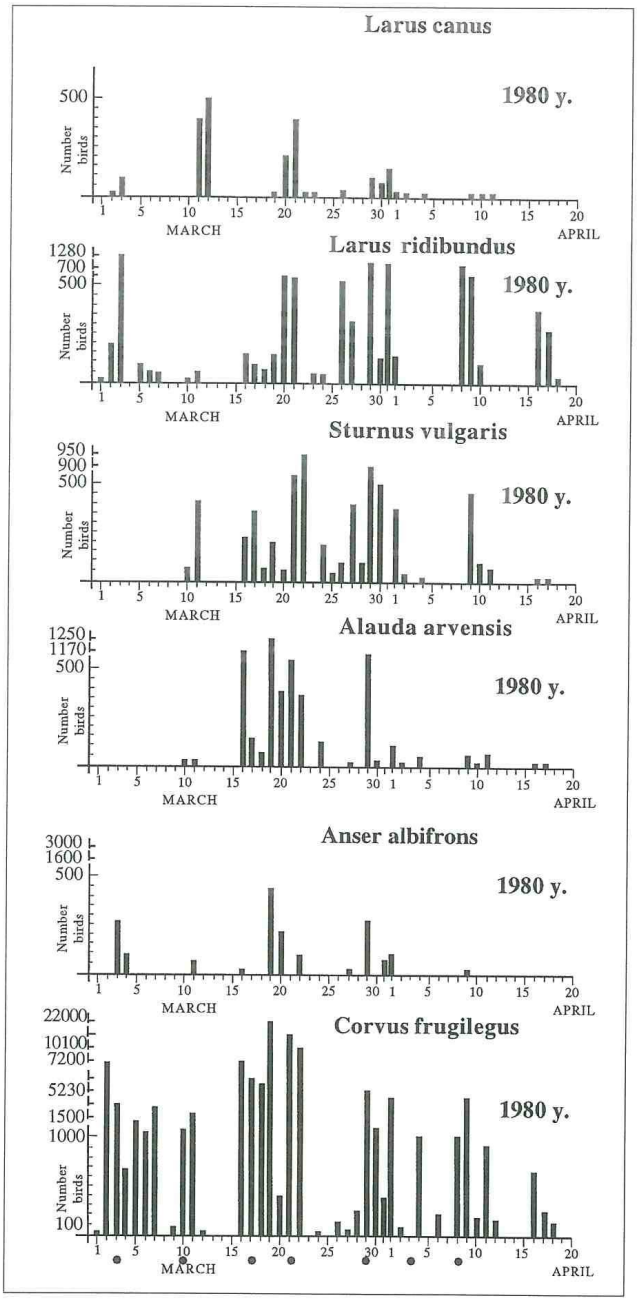




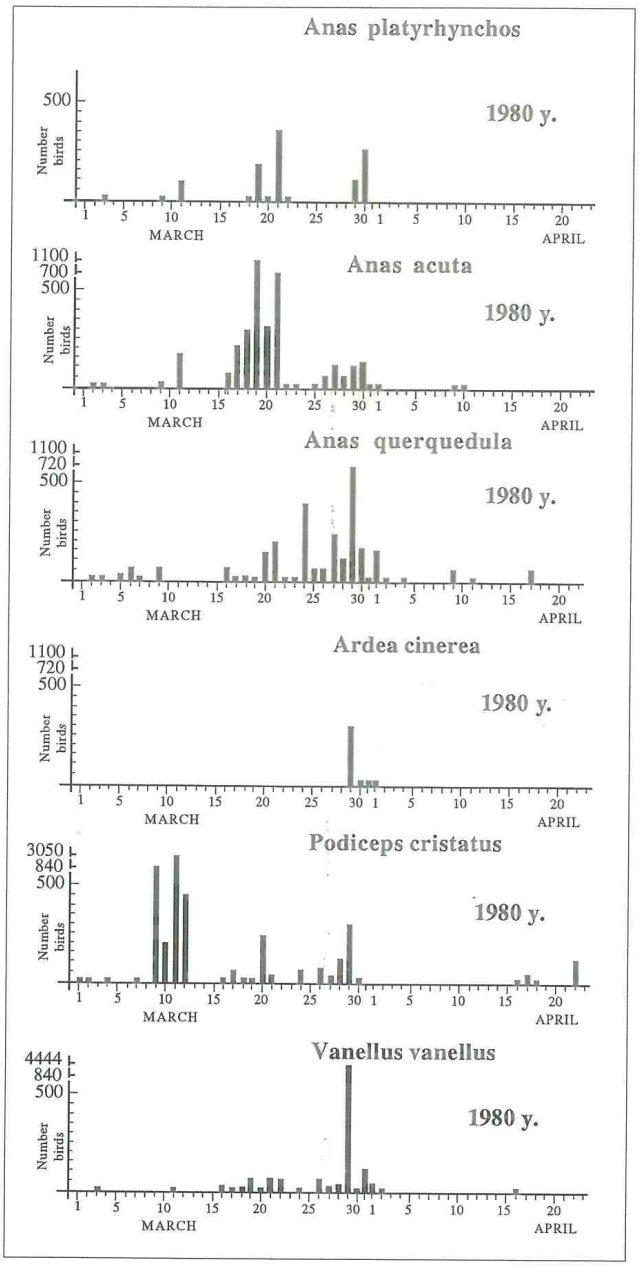
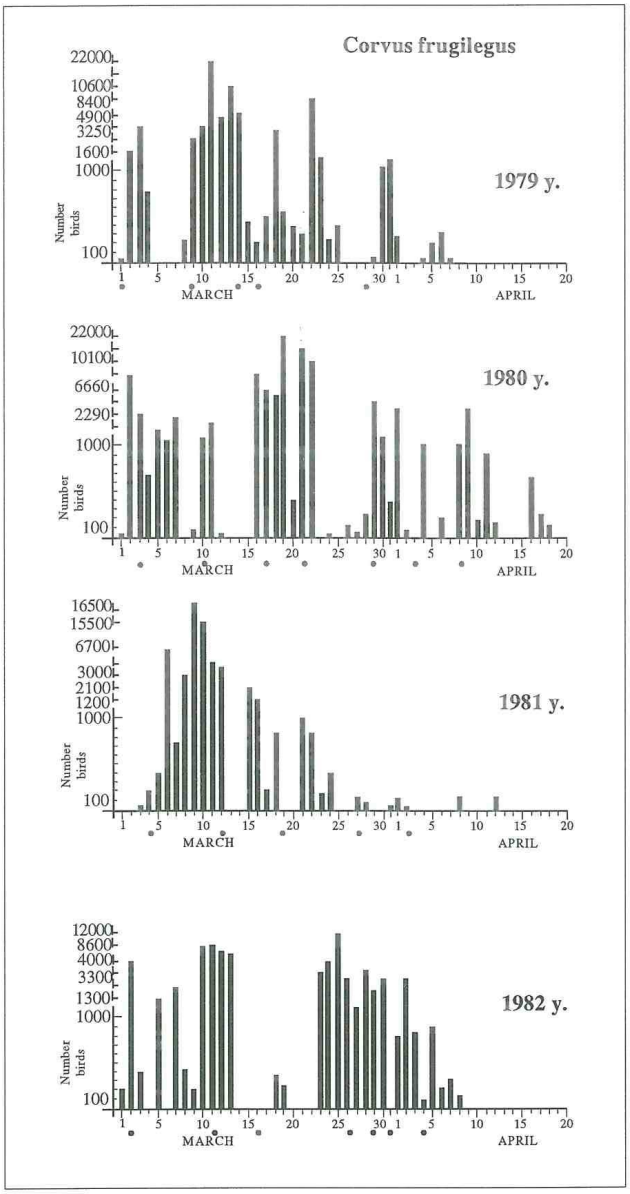
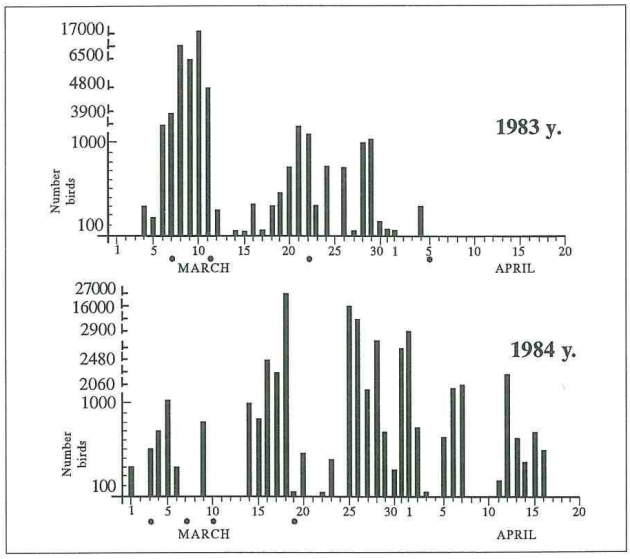
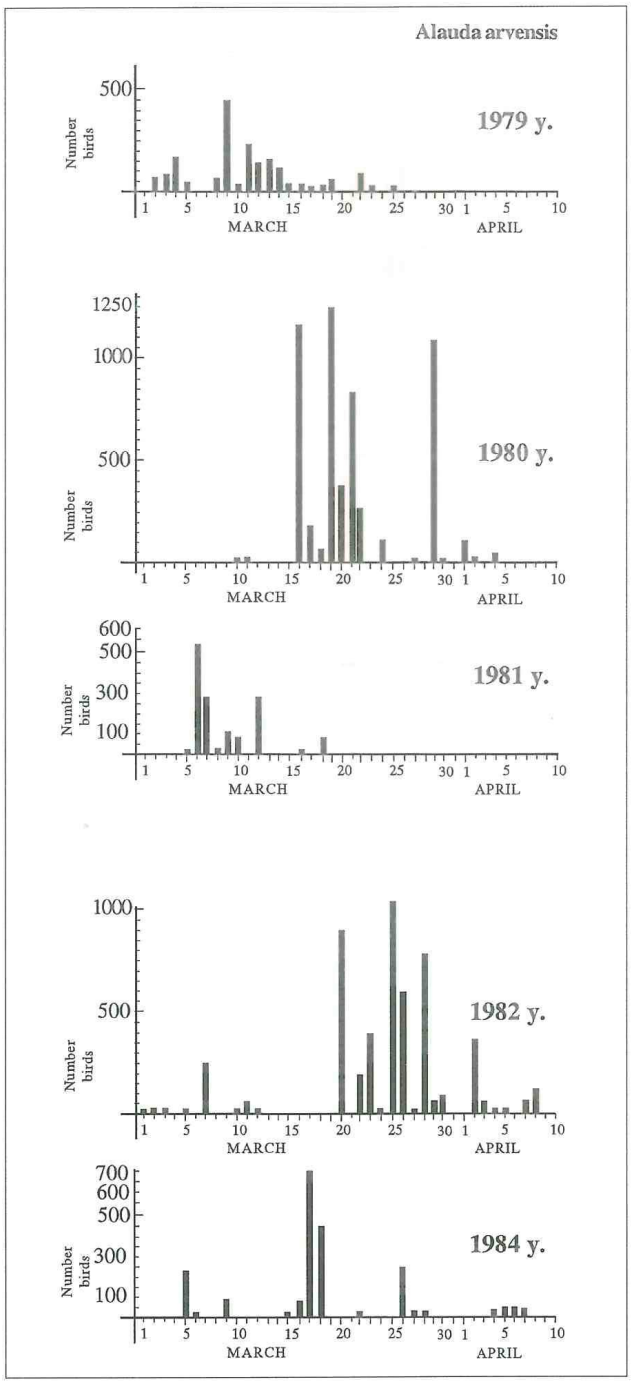


Fig. 1. Bird migration at the Northwest coasts of the Black Sea in March 1980.





← Fig. 2. Spring migration of Rook.



↑ Fig. 3. Spring migration of Skylark.

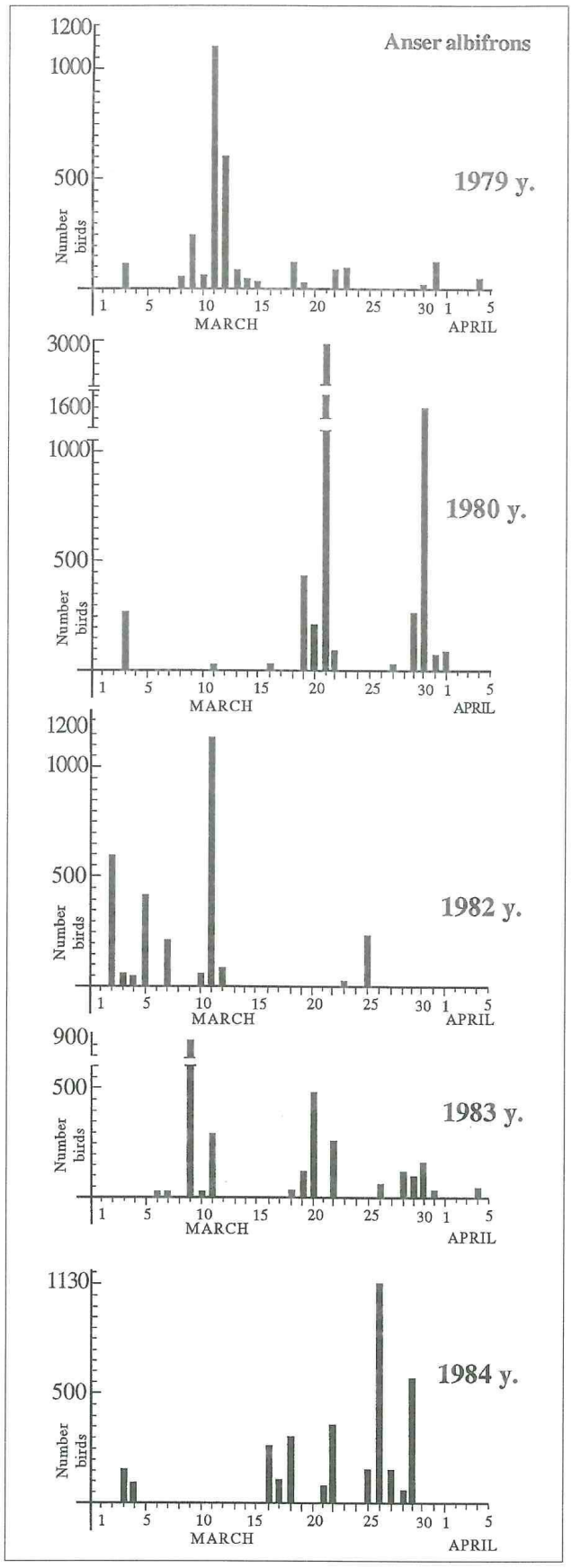


Fig. 4. Spring migration of White-fronted Goose.

migration rate (Fig. 1, 2, 3, 4). The last 60 years a balance was recorded between cold and warm periods during March (50%).

When March is comparatively warm, like in 1979, 1981 and 1983, all bird species migrate at the same time and a maximum is observed from 9 to 13 of March. Later on, small passages or waves are noticed from 19 to 22 and from 29 to 31 of March. When March was particularly cold, as in the case of 1980, 1984 and 1985, the maximum of migration was recorded 10 days later, from 19 to 22 of March (Fig. 1, 2, 3, 4, 5). During the blowing of strong eastern winds, i.e. in 1982 and 1984, the migration is interrupted (Fig. 2, 3). The most abundant species is the Rook, thus I utilize its migration as an indicator of the general migration movements (Fig. 2). Rook's migration lasts about 40 days. When the average temperature in March is +3°C to +4°C, this species passes on 9-11 March, on the contrary when the temperature is -2°C to -3°C or reaches +1°C birds passes on 18-21 March. The migration peak is observed 1-3 days before the arrival of low pressure front when the atmospheric pressure decreases.

Generally I observed that the migration peak during March happened just before the average daily temperature increases considerably (Fig. 1). The migration rate of the Rook during a day (24 h) increases from 19:00 to 21:00, from 22:00 to 23:30 and from 12:00 to 14:00. Night movements have been rarely observed from 19:00 to 20:00. Usually the migration is completed until 16:00. When there are strong north winds birds fly at a height of 5-6 meters. When there are no strong winds, these species fly at a height of 700-900 meters. The migration is interrupted on foggy days, and in March the average of these days are 9 days per month.

For species like the Garganey *Anas querquedula*, which migrates later when weather conditions are more stable and generally favourable, passage occurs on more standard periods which do not vary much from year to year (for example peaks noted on 2 April 1979, 29 March 1980, 3 April 1982 and 27 March 1983 when up to 3.000 birds passed).

I noticed the following series in bird migration: the spring migration starts with Rook, White-fronted Geese *Anser albifrons,* Pintail *Anas acuta*, Skylark *Alauda arvensis* and follows with Starling *Sturnus vulgaris*, Black-headed Gull *Larus ridibundus,* Lapwing *Vanellus vanellus,* Grey Heron *Ardea cinerea* and Garganey (Fig. 1).

The second ten days of April the Black-throated Diver *Gavia arctica* begins its migration (e.g. 18-22 April 1979, up to 200 birds per day). The weather condition is probably an important factor for bird migration,

Tab. 1. Thousands of birds observed during migration in the Northwest coast of the Black Sea.

Period	Spring							Summer				Autumn								
Years	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1987**	**1979**	**1980**	**1981**	**1982**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1986**	**1987**
Corvus frugilegus	74.0	100	62.6	71.6	60.0	80.0	30.0					11.5		8.9	7.5	3.0	3.2	1.0	7.0	
Larus ridibunds	12.7	9.7	2.7	2.5	1.0	2.0	1.0													
Anser Albifrons	2.9	6.1	2.1	3.2	3.6	3.4	3.5					2.8		1.4	2.6	0.7	0.7	1.5	0.8	
Accipiter nisus												0.25		0.11	0.07	0.03		0.06		
Anas platyrhynchos	1.8	1.1	0.5	0.5				4.2	5.0	4.1	2.7	0.5		1.1						
Anas querquedula	5.8	2.8	0.6	2.8	7.0		0.4	6.9	12.3	7.4	8.2	1.4	0.9			0.03				
Aythya ferina	0.9				0.3			2.2	3.2	1.5	1.9	8.8	3.0	4.4	1.1			1.3		
Anas acuta	4.0	3.5	0.8	1.0								0.6	0.7	0.7	0.3	0.02				
Parus caeruleus															5.5		4.8	0.5		
Alauda arvensis	1.9	5.9	1.5	5.3	0.8	2.0						0.4				0.1				
Ardea cinerea	0.27	0.4	0.2	0.3	0.07	0.09		1.3	0.6	0.6		1.4	0.6	0.6	0.4	0.3		0.26		
Chlidonias niger								2.0	1.8	1.0	0.2									
Vanellus vanellus	1.0	5.0	0.6	1.0	0.2	1.7						0.08								
Passer domesticus												8.0	5.0	10.3	37.6	7.1	6.3	2.8	16.0	
Sturnus vulgaris	2.3	6.0	2.2	3.6		19.0	0.6					15.0	3.0	12.0	22.6	7.1	22.0	10.0	5.0	
Hirundo rustica	0.5											30.8	16.0	30.0	20.7	10.7	9.1	14.0	14.0	4.0
Motacilla flava												8.0	9.6	9.6	6.6	4.7	4.5	1.1	0.3	1.4
Motacilla alba	0.05											28.0	7.5	17.3	6.3	5.5	5.6	4.1	7.5	0.8
Emberiza schoeniclus												2.0	0.6	14.3	14.7	8.0	10.1	9.8	7.5	0.0
Circus aeruginosus	0.07	0.04		0.02								0.21	0.18	0.09	0.12	0.05	0.04	0.07		
Total	**108.19**	**141**	**73.80**	**91.82**	**73.67**	**108.19**	**35.50**	**16.60**	**22.90**	**14.60**	**13.00**	**119.74**	**47.08**	**110.80**	**126.09**	**47.33**	**66.34**	**46.49**	**58.10**	**6.20**

because very often many different species migrate the same days (Fig. 1).

Summer migration

During summer migration males of Mallard *Anas platyrhynchos*, Garganey and Pochard *Aythya ferina* migrate from their breeding areas in European Russia towards the Danube Delta. There they moult and forage. This migration is best observed during early morning and follows the coastline of Black Sea with a southwest direction (Fig. 5, 6, 7). Before the 1983, all these three species begun their migration from Dniestr Delta where they concentrated. After the construction of Dniestr dam in 1983, this migration was no more recorded, because of the drainage of Dniestr Delta in the summer and probably because of the general decline of these species at European Russia. (Table 1).

The summer migration of waterfowls starts on 18 of May (male Mallards) and finishes during the first days of September, it lasts almost 100 days and has a wavy rate and form. This happens at the same time for each species every year, but also wavy and at the same time during a year (Fig. 5, 6, 7).

The dynamics and periodicity of Black Tern *Chlidonias niger* migration shows more year to year variability (Fig. 8). Mass movements of Black Tern were recorded from 18 of July to the 1st of August 1979, on 15 August 1980 and on 22 and 30 July 1981 (Fig. 8).

Within summer movements in the Black Sea region, the dispersal of Mediterranean Shearwater *Puffinus yelkouan* from the Mediterranean should be included. This species appears in June and July in flocks numbering thousands of individuals (i.e. 25.000 ind. the 6th July 1980, and 3.000 ind. the 6th June 1981). Mediterranean Shearwater flies towards northeast following and foraging on schools of Anchovy *Engraulis encrasiholus*, keeping a distance of about 2 km from the coast. However, in recent years (from 1989 to 1994) this species has been rarely observed in

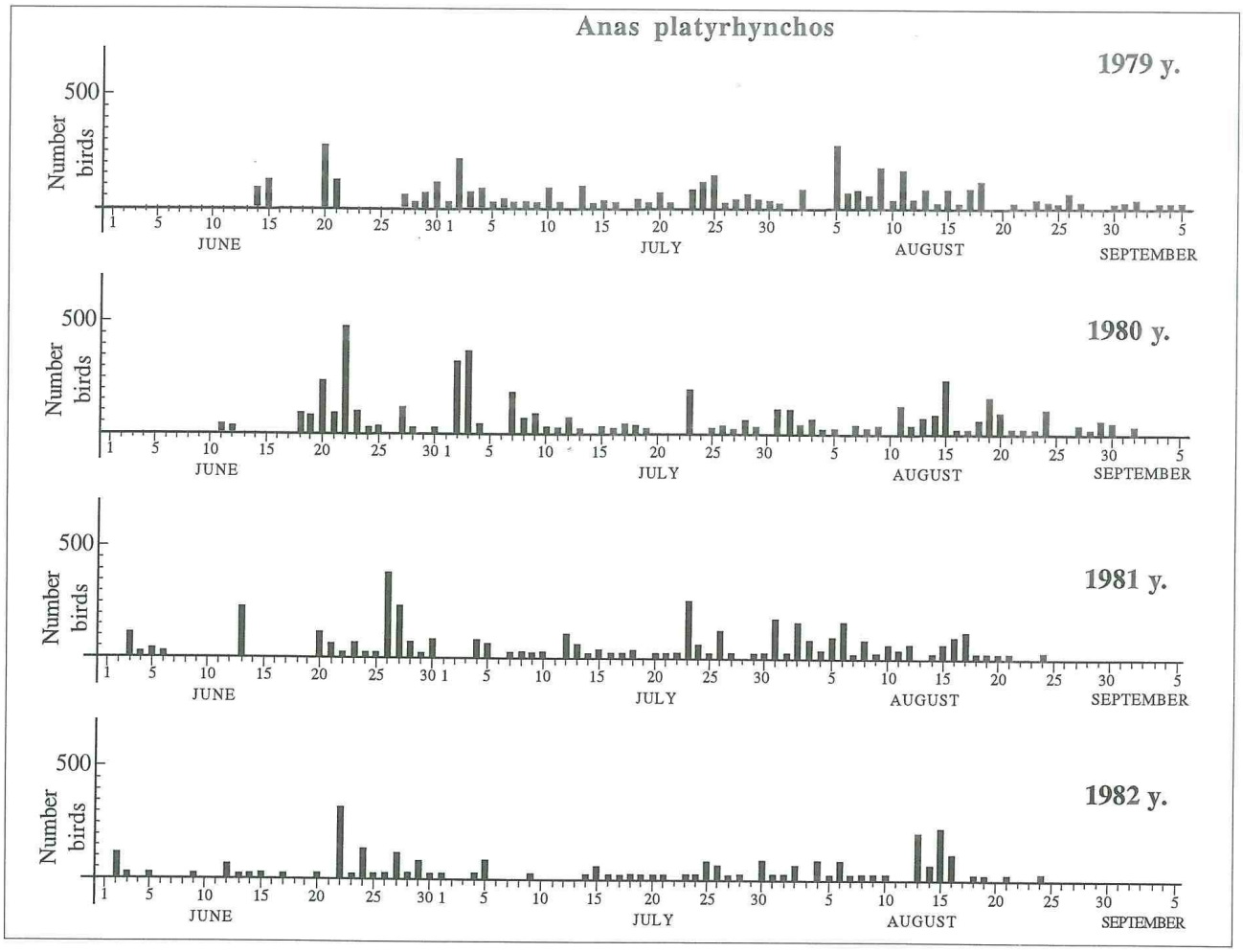


Fig. 5. Summer migration of Mallard.

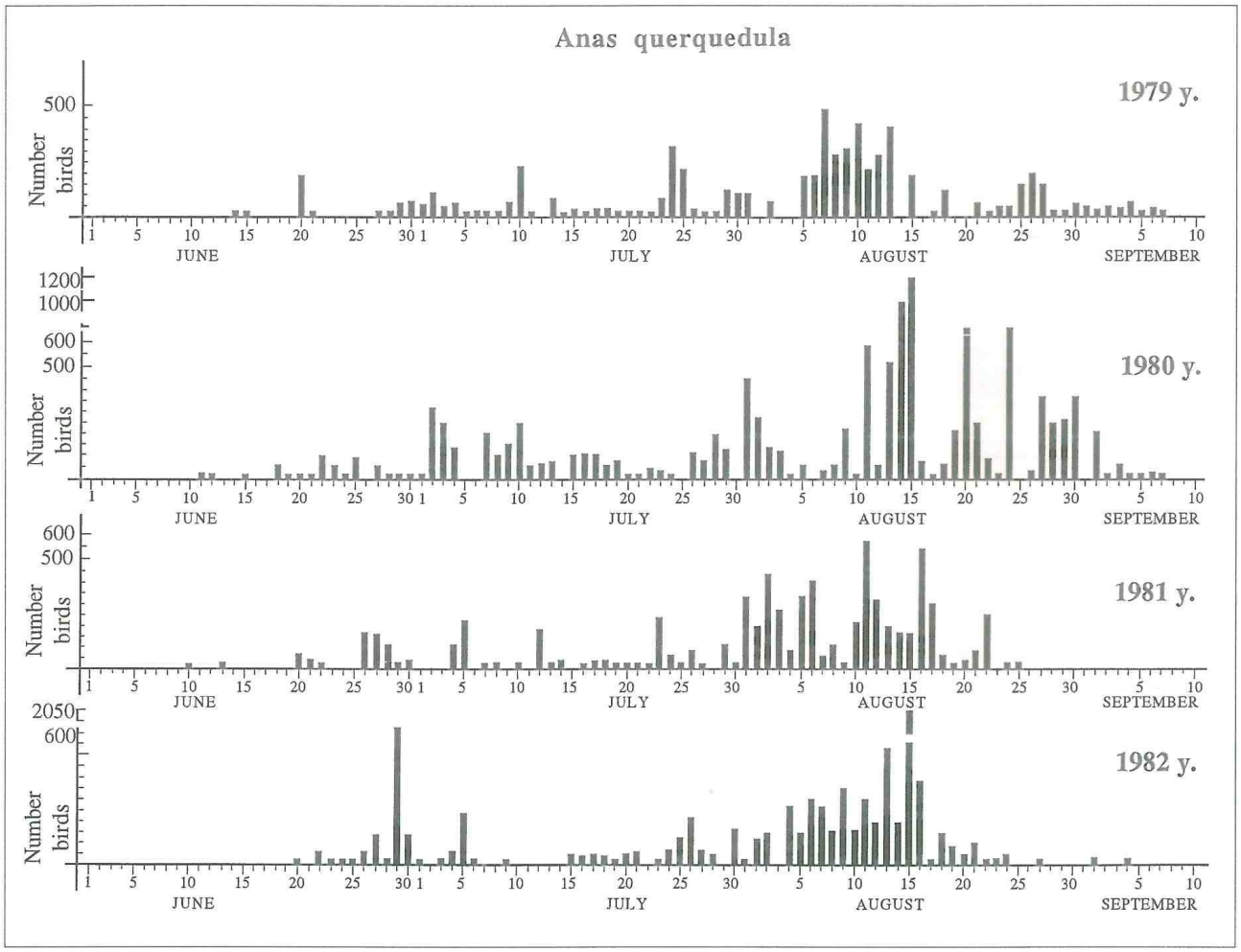


Fig. 6. Summer migration of Garganey.

Black Sea. This strong decline probably reflects the depletion of the Anchovy stocks in the region.

The summer migration of the Charadriiformes (i.e. Laridae, etc.) is typically carried out at night, thus it was not monitored in this study.

Autumn migration

The autumn migration at the Northwestern coast of Black Sea starts with Yellow Wagtail *Motacilla flava* and Swallow, from 5th August to 16th August (13/8/1979, 16/8/1980, 9/8/1981, 10/8/1984) and finishes after 90 days, in the middle of November (Fig. 9, 10; Table 4).

Autumn migration can be divided into two periods. In the first period, before 10th October, species of the *Motacilla* genus and the Swallow migrate. In the second period, which mainly starts during the second 10 days of September (15/9/1979, 20/9/1980, 18/9/1981, 28/9/1983) the species passage concerns mainly the Starling, Reed Bunting, House Sparrow *Passer domesticus*, Blue Tit *Parus caeruleus*, Linnet *Carduelis cannabina* and Rook (Fig. 9-12; Tab. 2-5).

The Autumn migration ends with Pochard, Wigeon *Anas penelope*, Pintail and White-fronted Goose in the last 10 days of October or on the first 10 days of November.

The days with large waves of autumn migration coincide with local decrease of the temperature (Fig. 9). Pressure variations are even larger at northern regions from where the birds come. Generally the peak migration of many species coincided. This probably means that waterfowl together with passerines and other birds were forced to migrate simultaneously by the same climatic factors.

Pied Wagtail *Motacilla alba* and Yellow Wagtail migrated in different periods. Yellow Wagtail migrated until 15-16 September and after one to three days Pied Wagtail started to migrate until 10 October (Fig. 9, 10). These two species flied over different habitats while migrating. Pied Wagtail flied over coast, while Yellow Wagtail flied over the salt lake' s reedbeds.

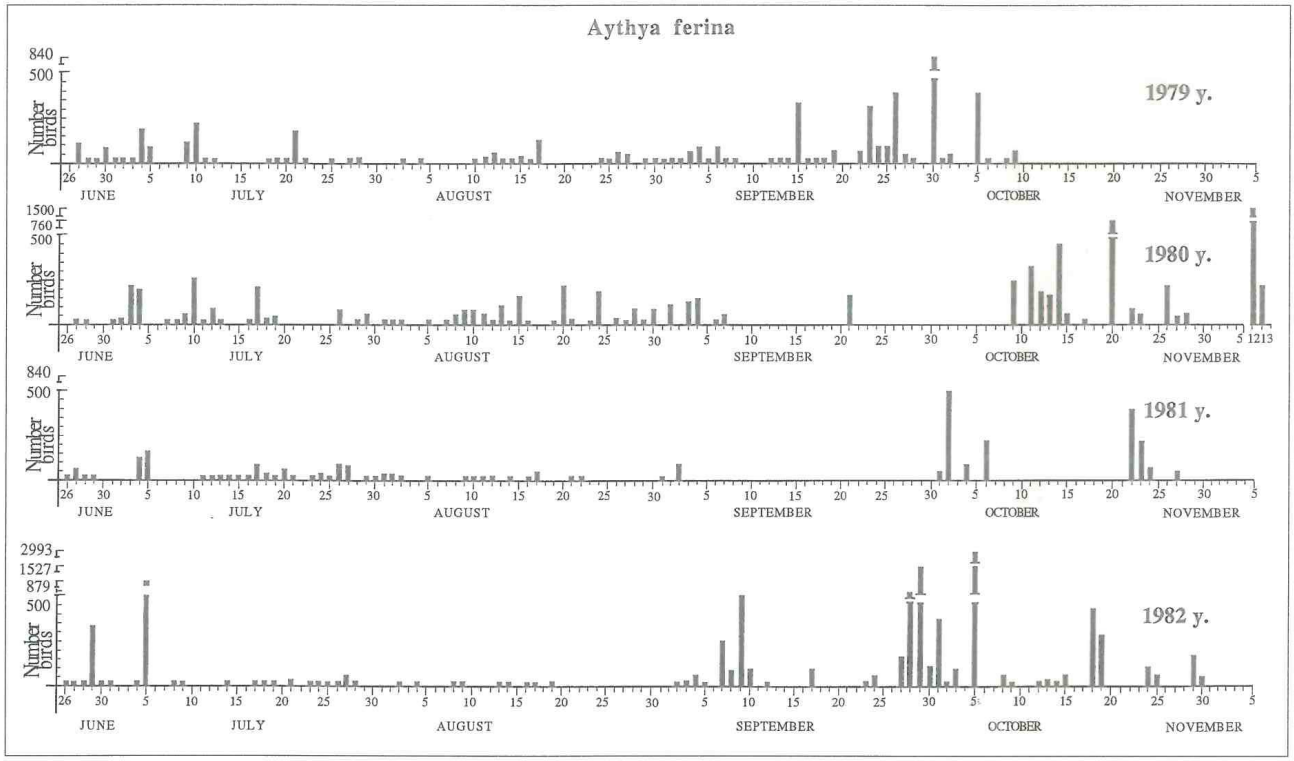


Fig. 7. Migration of Pochard.

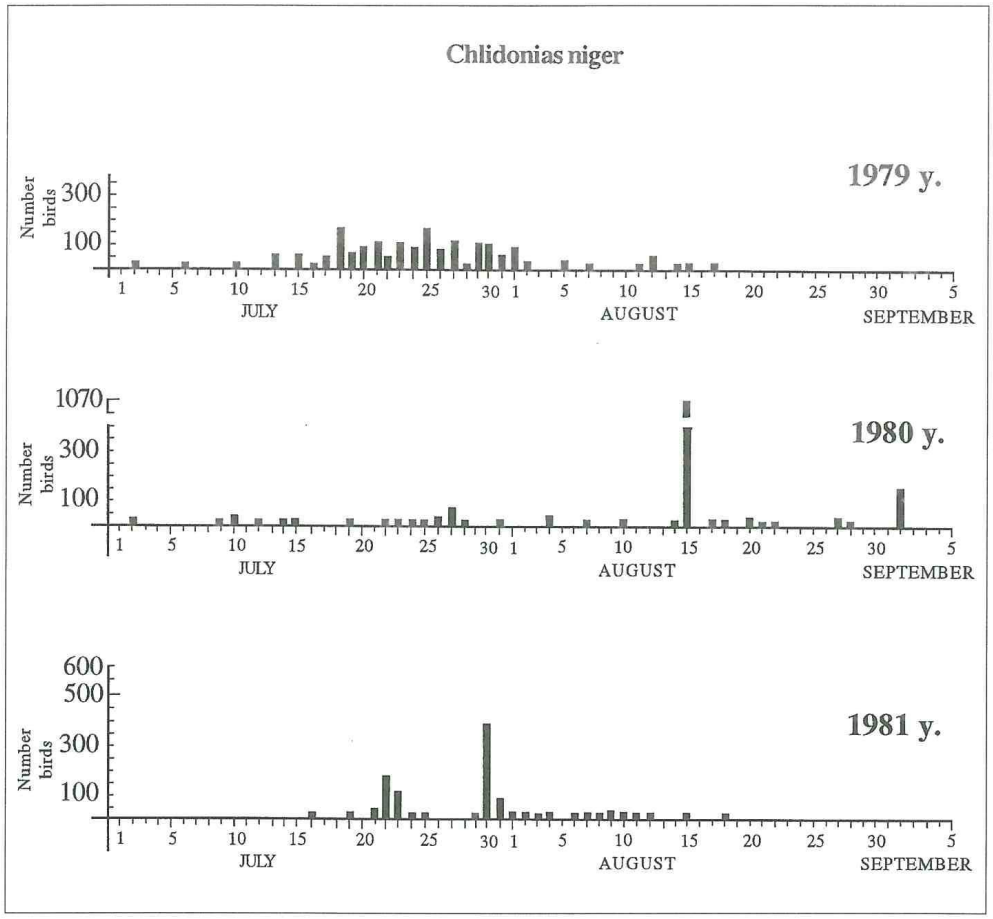


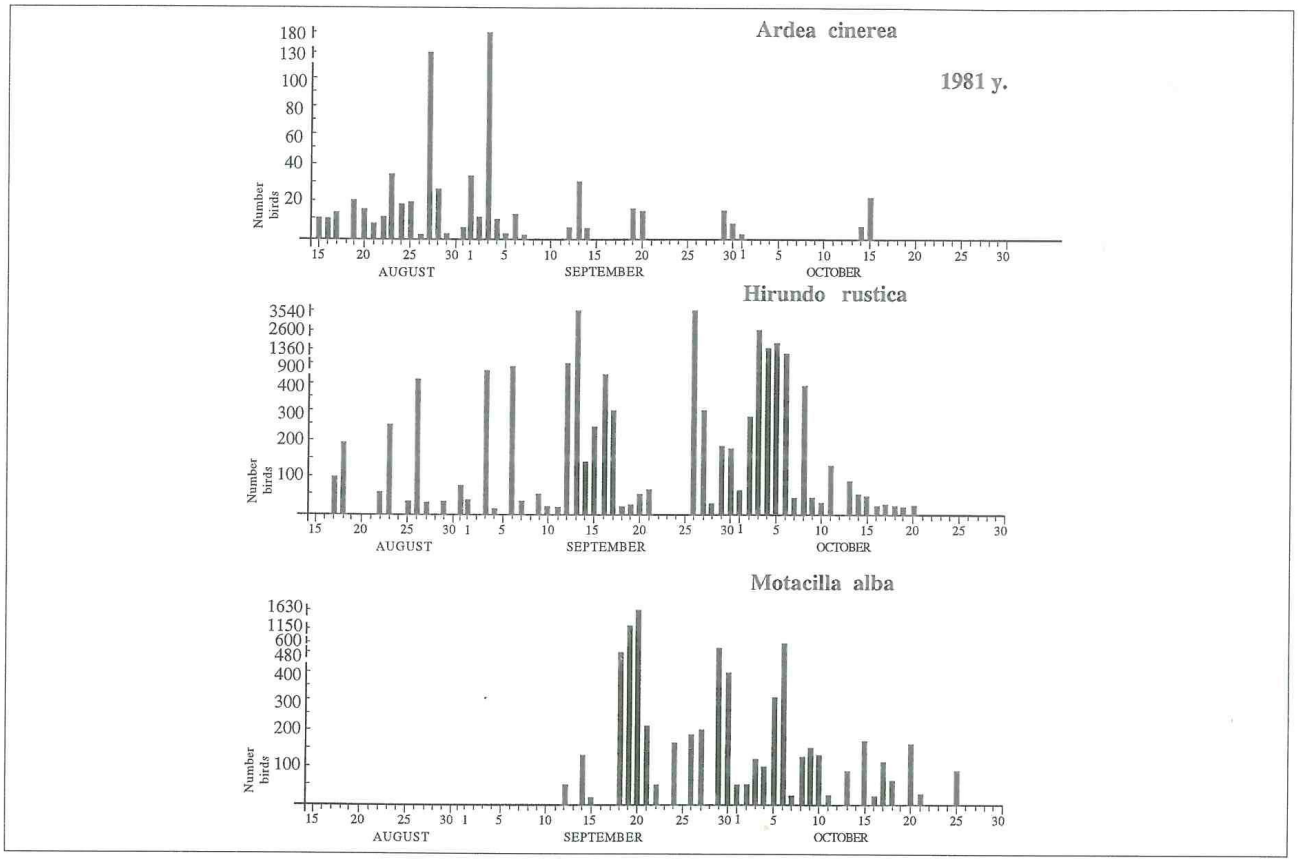
Fig. 8. Summer migration of Black Tern.

Tab. 2. Autumn migration of House Sparrow.

	1980	1981	1982	1983	1984	1986
16 September			50			56
17			80			40
18		220	30			
19	28	720	20			
20	230	400				50
21	190					160
22	132			120		430
23	40			100		
24	250		130			60
25	40		16			50
26		1200				
27	70	700	190			
28	180		230	150		
29	380	680	230	280	40	700
30	50	900		15	35	75
1 October	180	90	120	20	200	
2		100	480		50	25
3		320	110	330	14	2300
4	190	550		30	190	1070
5	250	4000		860	28	1320
6		3650	15	430	15	300
7	140	50	65	350		280
8	20	1600	80	350		1950
9	220	2900	610	30		
10	730	2330	120	70	500	2010
11	280	410	770	400	20	1350
12	1330	100			40	2100
13	170	730				
14		50	900	370	35	
15	1300	3400	14	650	120	100
16	1400			230		20
17	170	1240		220		
18	290	400	650	340		
19		25	260	400	50	
20	37	2800	20	150	130	
21		730			70	140
22	230	1110	390		180	50
23	490		90	110	320	180
24	85	120	350	140	230	320
25	65		370	50	150	
26	60	500				290
27		1250			200	620
28	200		290		340	
29	300	300	110			
30	130	750				
31	80	210		20		
1 November		580				
2				60		
3				50		
4			220			
5		240				
6		180				
7		270				

Tab. 3. Autumn migration of Pied Wagtail.

	1978	1979	1980	1981	1982	1983	1984	1986
12 September				50				
13			250					
14			200	130			28	
15			60	22				180
16			670		78	110		
17	580	790	460		70			
18	1362	770	490	480	34			
19	388	450	920	1150				
20		1340	860	1630			600	300
21	355	165	1250	210	30	150	18	1200
22	2816	350	1130	50		120		625
23	2520	400	1200		50	2100	20	
24	640		1200	160	430	150		320
25	1830	130	760		200	240	50	190
26	722	50	120	180	200	230	175	
27	1123	615	120	200	410	300	100	
28	77	1660	200		160	800	800	
29	82	1020	440	500	330	400	100	300
30	3873	30	1500	400	300	120	70	330
1 October	515	200	960	50	435	100	360	100
2	98			50	670		160	480
3	422	160	20	120	40	290	50	250
4	470		720	100		190	320	560
5	149		400	300	200	225	150	320
6	4704		120	600	50	110	40	140
7	2648	280	185	22		200	120	340
8	518	280	56	130		120	200	420
9	288	310	40	150	120		150	115
10	150		80	130	830		260	360
11	600		400	10	440		140	510
12	398		150		580	70	60	300
13	175		160	95	12			
14	110					50	140	
15	122		220	160		10	60	
16			180	26			50	
17	23		1024	120				
18			600	55	70		35	
19	20		180		120		25	
20	56	22	23	160	75		26	50
21	142		106	35	38			25
22	32		106		45			
23	14		65					32
24	26		31					
25	70		45	80				
26	27							



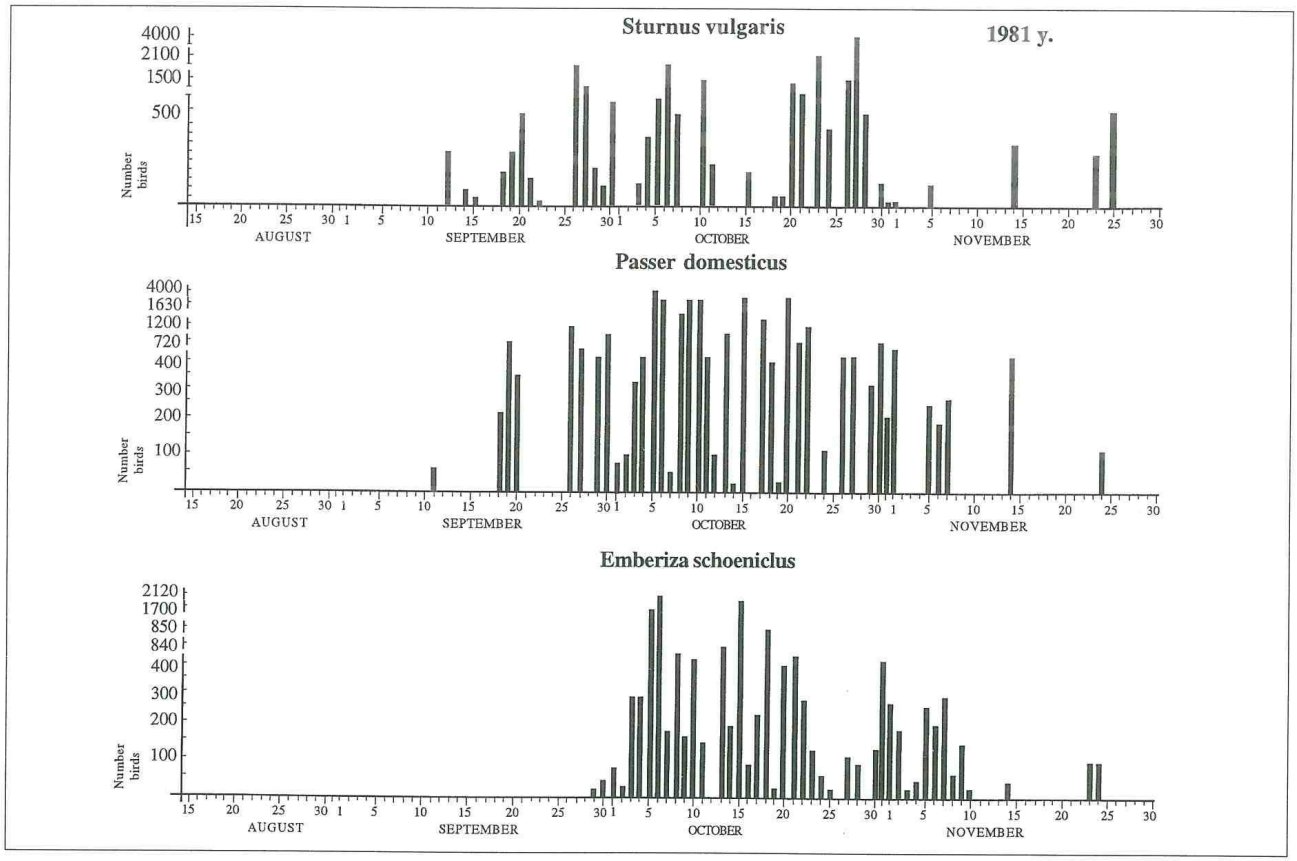
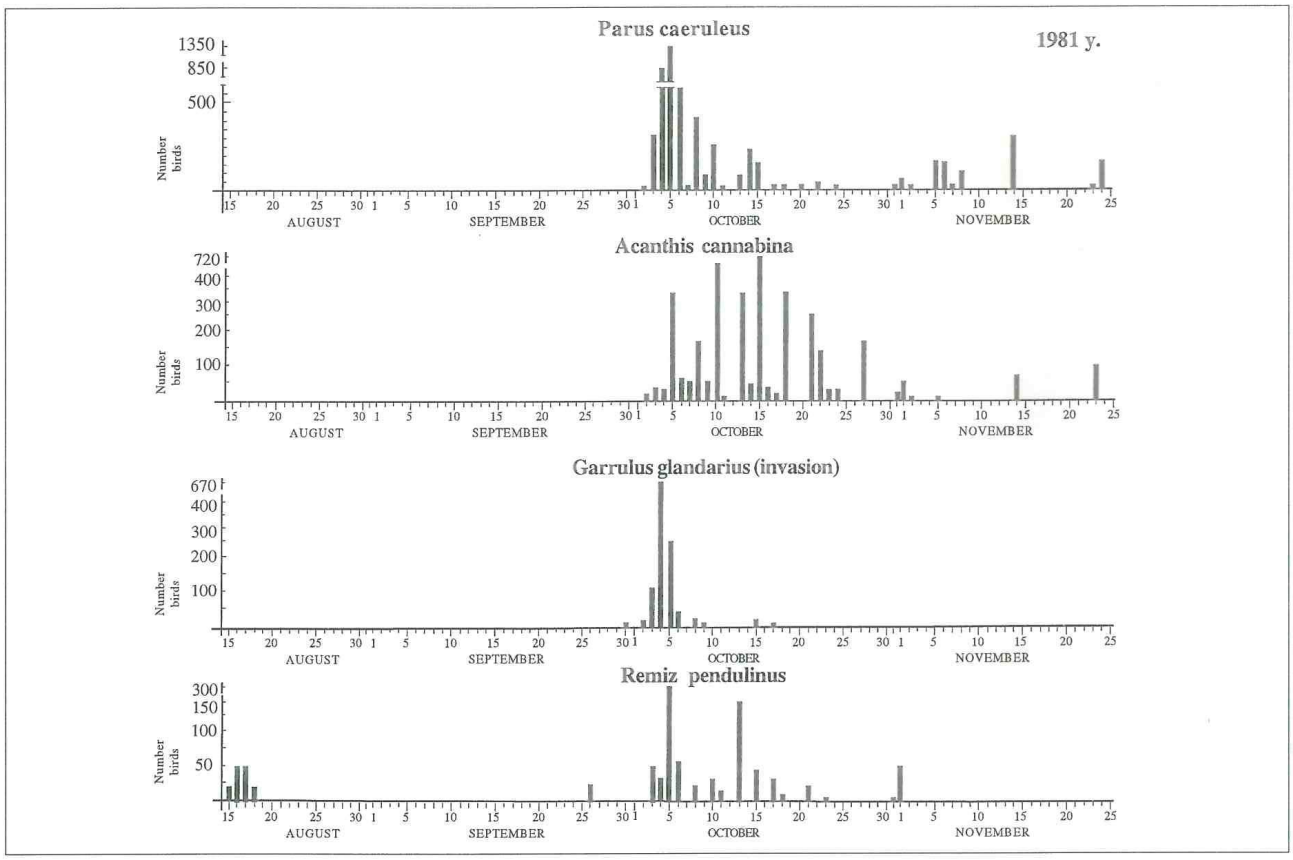


Fig. 9. *Continua*



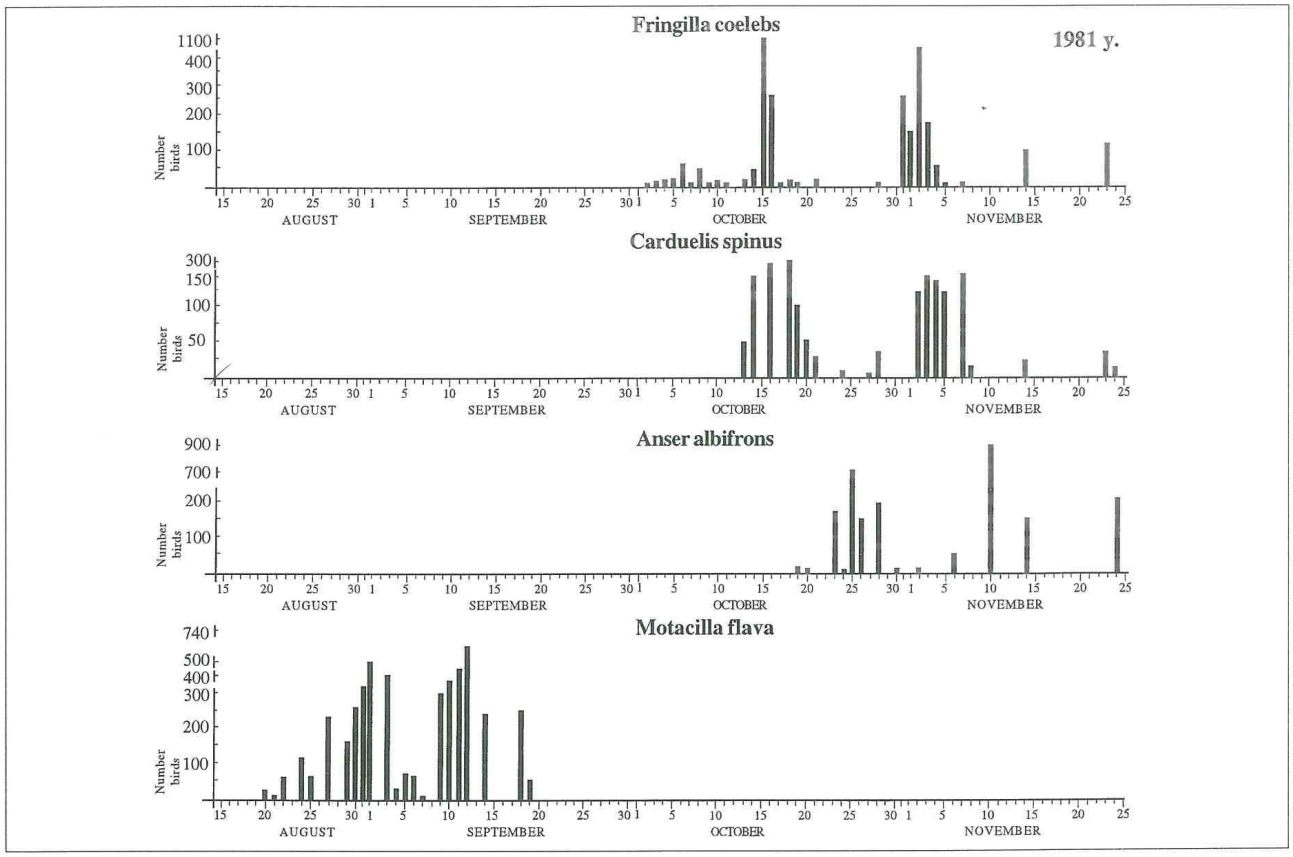


Fig. 9. *Continua*

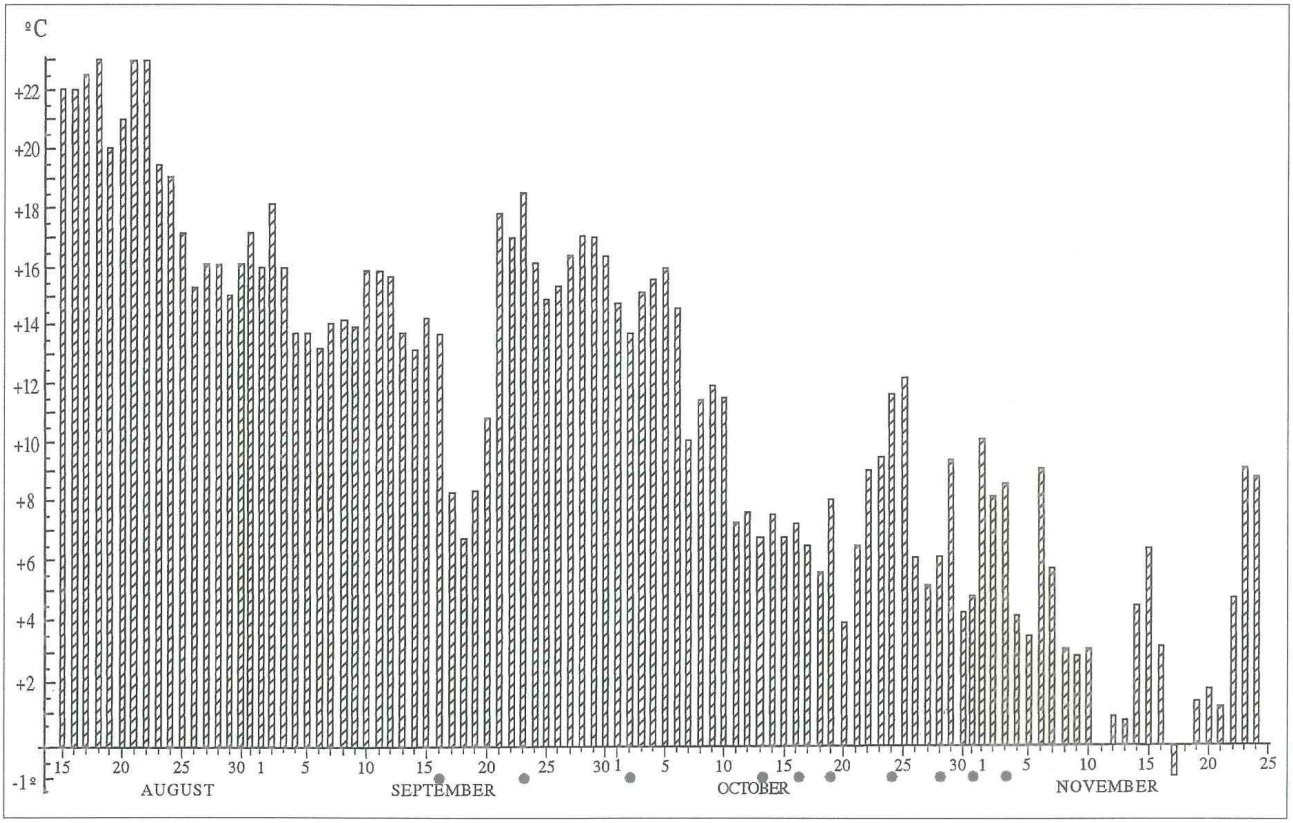


Fig. 9. Autumn migration of 14 bird species in 1981.

The last wave of migrant Swallows (6/10/1978, 1/10/1979, 15/10/1980, 6/10/1981, 10/10/1982, 1/10/1983 and 4/10/1984) fluctuated from year to year in a period of 14 days (Table 4) and probably is related to the observed abrupt decrease of temperature.

The Swallow autumn migration occured in early morning when there were no strong winds or when weak winds blowed in side direction. The migration stopped when the wind had strong intensity.

The dynamic of migration at northwest coast of the Black Sea could be separated into two patterns. The first pattern lasts for long period and is characterized by many peaks. The characteristic species are: *Motacilla* sp., *Hirundo* sp., Starling and House Sparrow (Fig. 10, 11; Tab. 2, 3, 4). In the second pattern the migration is much shorter in duration and peaks are extremely strong with birds passing in one or two waves. Characteristic species are: Rook, Reed Bunting, White-fronted Goose, Lapwing and Blue Tit (Fig. 2, 9, 12; Tab. 5).

Discussion

Counts of the visual migration through a long period generally give a satisfactory picture of the numbers, diversity and dynamics of species involved. However, birds migrating by night or at heights more than 1000 m are largely missed (Casement 1966).

The Black Sea, with 600 km across of open water in its western part, is a serious barrier for migrating birds which have to follow the western shores during their migration journey. For this reason the phenomenon of migration is very intense in the Northwest part of this area.

Weather conditions during spring and autumn in the Black Sea are unstable. In the autumn of 1978, migration was observed in waves coinciding with measured decreases in the average daily temperature. From this study, it was also noted that the various bird species (belonging to different families) pass simultaneously, which suggests that timing of their migration is determined by the same factors namely the weather conditions (temperature, atmospheric pressure, wind). On the other hand, some substantial spring passage of Great Crested Greebe *Podiceps cristatus* and Garganey *Anas querquedula* have been noted under extremely adverse weather conditions which means that in some cases migration patterns is not altered by them. At the same time, favourable weather conditions do not necessarily enhance migration, as no migration in days with good weather was also noted.

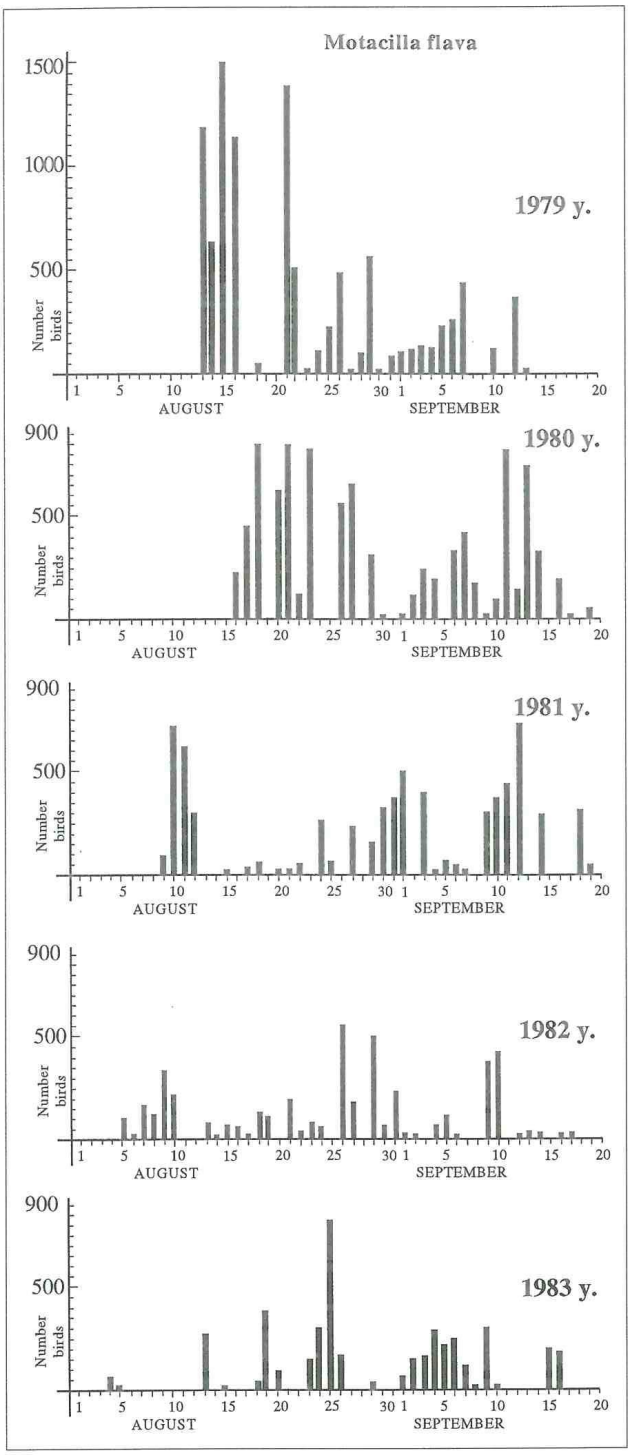


Fig. 10. Autumn migration of Yellow Wagtail.

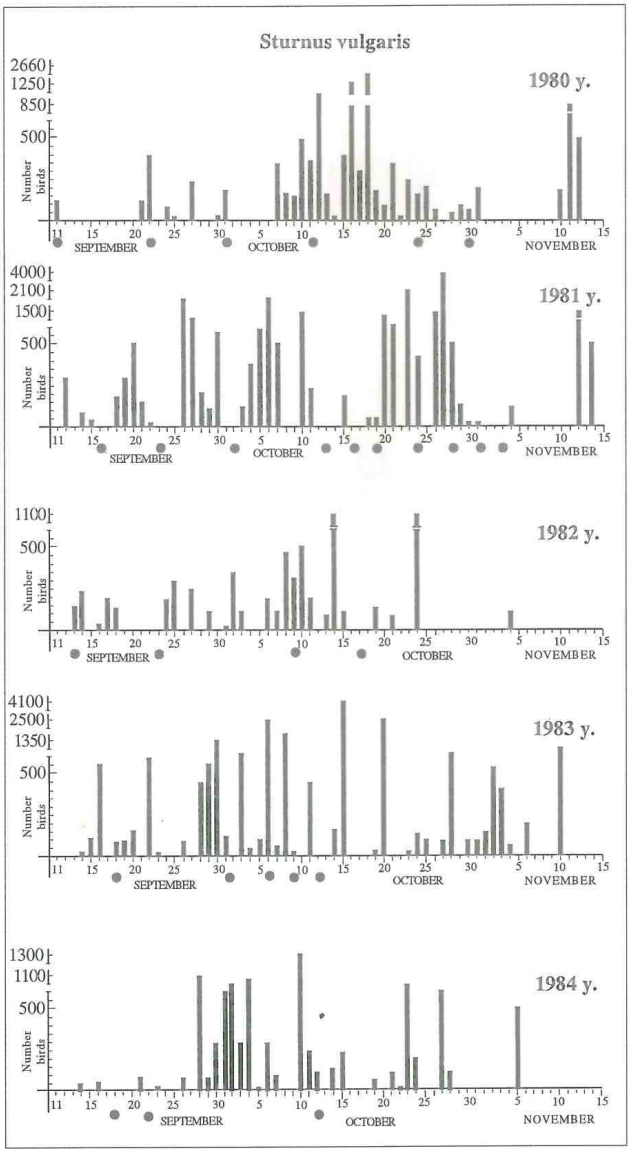


Fig. 11. Autumn migration of Starling.

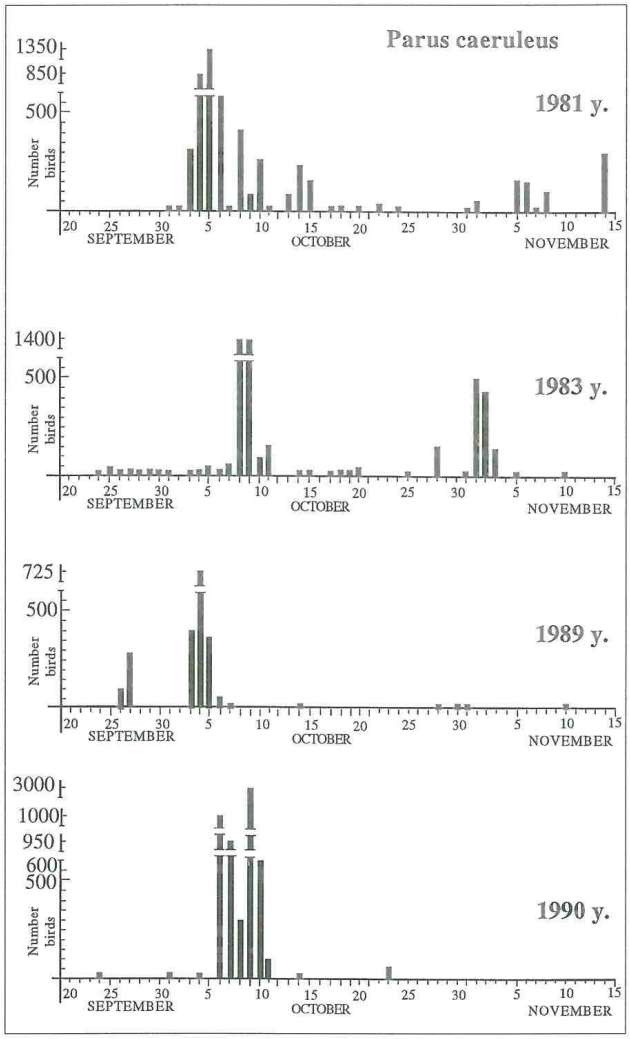


Fig. 12. Autumn migration of Blue Tit.

The long-lasting and intense observations on migration at the Northwestern Black Sea coast resulted in a collection of data on the migratory birds in the areathat could evidenciate important fluctuations in the populations of the observed species. In recent years, important decreases in the observed numbers of some species has been documented. These decreases probably reflect real declines in the populations due to human-induced factors (drainage of wetlands in Europan Russia, intense hunting in Mediterranean basin, intensive use of pesticides in African wintering grounds, etc.).

Unfortunately, it must also be noted that our observations cannot be directly compare to data collected in other areas like mainland Ukraine (200 - 400 km North) and Bosphorus (500 km South) where, for example, many raptors and White Storks *Ciconia ciconia* are observed. The variation in the observation schedule and methods on diurnal migration is a seri-

Tab. 4. Autumn migration of Swallow.

	1978	1979	1980	1981	1982	1983	1984
9 August				50			
10				650	220		
11				330			
12			24	200			
13		774	78		16		
14		664			170		
15		185	24		85		
16			90	30	175		
17		-800	110	95	68		
18		100	180	180	12		
19			16		86		
20			70				
21		680	890		93		
22		8	250	60			
23			132	250	82		
24					30		
25		21		20		110	
26		520	283	420	40	80	45
27		46	190	20	-430		10
28		280					
29		9	750	25		100	35
30			500		96		150
31				75			
1 September			250	30			
2	681						
3	120			800			
4	710				170		
5	1253	960			105		
6	34	660	1240	820	260	300	
7		40	2340			0	
8	356		240			330	
9	860		30		280	8	
10		300	98	15	850	20	
11	2323	350	2600	12	92	1500	
12	130	910	180	900			40
13		360	1300	3540	700	2000	600
14		2500	850	140	190	1500	
15		1700		240		30	
16		1360	340	700	540	1050	
17	3760	260	93	300	1200	200	140
18		240		24	100	1030	
19	52	220	20	29	1100	40	
20		12	113	50	110	40	200
21		32	180	70	110		960
22	500	202	1040				600
23	90	920	4150			115	900
24	754		20		680		500
25	203	160	90		300	11	500
26	458	40	960	2600	40	140	4000
27	840	180	2540	300	390		620
28	290	100	180	40	430	73	34
29	900	200	1240	195	240	26	106
30	5343		25	183	20	120	900
1 October	6540	790	60	60		450	1140
2	360	90	415	280	95		140
3	360		52	2080	400		
4	128		100	1330			1500
5	550	21	125	1360			
6	2828	120	34	920	63	140	
7	170		190	40	90		350
8	46		410	445	130	206	300
9		65	1400	42	250		
10	30	43	2560	35	550		
11		40	1250	130	37		
12	12	12	300	50	71		
13	7		300	98	14		
14			1450	50	26		
15			660	40	60		
16			240				

Tab. 5. Autumn migration of Reed Bunting.

	1980	1981	1982	1983	1984	1986
26 September						
27			10	50		
28			10	250	9	
29	15	10		220	23	5442
30	16	40		230		26
1 October	78	70	9	130	230	
2		28	34	12	98	320
3	15	290	100	365		558
4		280		490	335	385
5	40	1700		152	25	662
6	112	2120	11	950		460
7	300	182	36	700	35	554
8	40	600		280	300	513
9	38	160	380	96	30	86
10	200	620	565	165	590	380
11		140	1000	1666	78	211
12	453		525		580	305
13	350	840				
14		190	200	410	2600	
15	3056	2060		395	1175	
16	2820	91	200	310	1110	
17	1080	234		395	15	
18	250	850	1130	270	1060	
19		14	2960	53	300	
20	93	430	20	310	346	80
21	70	700	60	56	40	730
22	660	260	400		180	280
23	890	135	40	60	300	750
24	295	60	140	70	152	655
25	614	10	18	260	67	
26	98					200
27	170	120		270		90
28	260	86	56	370	54	
29	436		40	100		
30	430	136		50		
31	780	420		92		
1 November	64	260		500		
2		185		198		
3		18		120		
4		42	58	33		
5		250		50		
6		200		25		
7		285		20		
8		60		95		
9						
10	30					
11						
12	240					
13	92					
14						

ous obstacle for a uniform study on the phenomenon of migration in these areas.

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Appendix - Peaks of migration and additional observations of remarkable migration for 24 bird species in NW Black Sea (numbers denote maximum no of birds observed).

Purple Heron *Ardea purpurea*: 9/4/1980, 50 birds.

Garganey *Anas querquedula* which migrates later when weather conditions are more stable and generally favourable, passage occurs on more or less standard periods which do not vary much from year to year (for example peaks noted on 2/4/1979, 29/31980, 3/4/1982 and 27/3/1983 when up to 3.000 birds passed).

Mallard *Anas platyrhynchos* (10/3/1979, 12/3/1981, 2 and 25/3/1982, 9/3/1983, up to 600 per day).

Shoveler *Anas clypeata*: 15/8/1980, 100 individuals.

Great Bustard *Otis tarda* (11, 14 and 15/3/1979, 18 birds in total, 20/3/1980, 6 birds).

Oystercatcher *Haematopus ostralegus*: 27/7/1980, 200 individuals.

Redshand *Tringa totanus*: 21-22/7/1980, 8/7/1980, 22/6/1982, up to 200 birds per day.

Crane *Grus grus* spring (31/3/1984, 28/3/1987, 24/3/1990), autumn 26/9/1978, 7/10/1978, 8/10/1981, 24/9/1983, 29/9/1983, 13/10/1984, 18/10/1985, 26/9/1986, 6/10/1986 and 17/10/1989. This species does not follow the coastline but tears the Black Sea. Since 1988 the numbers of this species has decreased enormously. In every season we could observe from 800 to 1500 individuals only in Autumn.

Ruff *Philomachus pygnax*: 23-24/3/1980, 1000 birds.

Black-tailed Godwit *Limosa limosa*: 22/6/1982, 200 birds.

Mediterranean Gull *Larus melanocephalus*: 29/8/1978, 10/7/1980, 27/7/1980, 23/7/1981, up to 800 birds per day.

Sandwich Tern *Sterna sandvicensis*: 2/9/1978, 1500 birds.

Marsh Harrier *Circus aeruginosus* spring (22/3/1979, 29/3/1980, 29/3/1984, up to 25 bird per day); autumn (9/9/1978, 21/9/1978, 16/9/1979, 4/9/1980, 13/9/1981, 10/9/1982, 16/9/1983, 25/9/1983 and 14/9/1984, with an average of 30-60 individuals per day.

Chaffinch *Fringilla coelebs* spring: 18/3/1979, 31/3/1980, up to 500 birds per day, autumn: 7-8/10/1976, 6-7/10/1978, 21/10/1978, 23/10/1978, 15/10/1981, 14/10/1982 and 14/10/1984, 3/10/1986, 4/10/1989 and 8/10/1990 (1000-3000 individuals).

Sand Martin *Riparia riparia* (9-10/5/1978, 6-21/5/1986, 20/5/1987, up to 1400 per day).

Barn Swallow *Hirundo rustica* (30/4/1981, 16.000 birds, 13/4/1982, 3.000 birds).

Short-toed Lark *Calandrella brachydactyla* (4-7 and 13-14/4/1984 up to 150 per day)

Penduline Tit *Remiz pendulinus*: 28/7/1980, 24/10/1980, 2/8/1981, 12/8/1981, 5/10/1981, 13/10/1981, 27/7/1982, 15/7/1983, 16/9/1983, 25/9/1983, 18/10/1983, 1/10/1984, 4/10/1984, 17/7/1985 and 15/7/1988 (200-400 individuals).

Wood Pigeon *Columba palumbus*: 6-15/10/1978, about 2 000 individuals each day.

Rook *Corvus frugilegus:* 20-22/10/1976, about 15 000 individuals each day.

Sparrowhawk *Accipiter nisus:* 22/10/1978 (90 individuals while migrating in pairs), 24/9/1978 and 14/10/1981.

Pochard *Aythya ferina*: 29/9/1978, 5/10/1978, 20/10/1980, 12/11/1980, 22/10/1981, 4/10/1984 and 5/11/1984 (peaks of 1000-2000 individuals).

White-fronted Goose *Anser albifrons:* 25/10/1978, 11-12/10/1980, 25/10/1981, 10/11/1981, 24/10/1982, 4/11/1983, 25/11/1984, 5-8/11/1985 and 25/10/1986 (peaks of 2000-3000 individuals per day, generally it migrates during the night).

Jay *Garrulus glandarius* we observed invasions by some big flocks of Jay for the first time in 12 years of observations in 1981: 3/10/1981, 110 individuals migrating towards southwest, 4/10/1981, 670 individuals, 5/10/1981, 250 individuals and 6/10/1981, 38 individuals (Fig. 9).