

Birds of Open Waters off the Bulgarian Black Sea Coast

Boyan T. Michev, Strahil G. Peev, Tanyo M. Michev

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Street, 1113 Sofia, Bulgaria; E-mails: michevboyan@gmail.com, straho.peev@gmail.com, tanyo@abv.bg

Abstract: Data were collected during three voyages of Research Vessel *Akademik* in summer of 2009 and in spring and autumn of 2011. The area of ornithological observations included the shoreline of the Black Sea coast, the territorial waters and the Exclusive Economic Zone of Bulgaria. During the voyages, general observations at certain places (totally 21 days) and vessel-based transects with total length of 910.5 km were performed. During the three observation periods, 74 bird species of 16 orders were recorded. The most numerous species was Yelkouan Shearwater (*Puffinus yelkouan*), followed by Yellow-legged / Caspian Gull (*Larus michahellis / cachinnans*) and Sandwich Tern (*Sterna sandvicensis*). Seventeen species were observed in the most distant band of sea, i.e. between 100 to 150 nautical miles from the shore. The species richness was greatest during the spring within the band of sea between 50 to 100 nautical miles from the shore while the total bird abundance was highest during summer within the band of sea between 12 to 50 nautical miles from the shore. The bird density was highest in spring and summer (5.78 and 5.62 ind./km², respectively) and was decreasing in autumn to 1.62 ind./km².

Keywords: Exclusive Economic Zone of Bulgaria, sea birds, species density, species richness, Black Sea, Territorial Waters of Bulgaria

Introduction

The Black Sea is a key area in relation to the distribution and movements of many bird species in the Western Palaearctic. Despite of this, the Black Sea avian diversity is not well studied. Data about the bird fauna of the western part of the sea were reported by several authors (NANKINOV 1996, SEREBRYAKOV 2001, KIRWAN *et al.* 2008, CIACH 2011, MUNTEANU 2012).

The Bulgarian part of the Black Sea is crossed by a number of sea- and air- transportation corridors. Lately, the construction of gas-mains as well as a number of installations for exploration and production of oil and gas is also envisaged. All this could cause significant negative effect on the Black Sea biodiversity, the migratory ways and places of concentration of fishes, birds and sea mammals (Black Sea Red-Data Book <http://www.grid.unep.ch/bsein/redbook/index.htm>). The marine waters off the Bulgarian shore include:

1. The coastal zone in front of the Bulgarian Black Sea shoreline, which is a band of the sea-surface within 200 m from the proper shoreline. Usually this area is called the “Bulgarian Black Sea coast”, which includes also the adjacent lake complexes, marshes, river mouths and other types of wetlands along the coast. Its bird fauna has been relatively well studied (JORDANS 1940, PATEV 1950, GEORGIEV 1976, DONCHEV 1980, 1984, BOTEV, PESHEV 1985, SIMEONOV *et al.* 1990, NANKINOV *et al.* 1997, CHERNICHKO, KOSTYUSHIN 2003, MICHEV, PROFIROV 2003, DIMITROV *et al.* 2005, MICHEV, STOYNEVA 2007, IANKOV 2007, Red-Data Book of Bulgaria 2011).

2. The territorial waters of Bulgaria, which encompass a band of the coastal waters from the proper shoreline to 12 nautical miles far out at sea. The western part of this area is used by migrating soaring birds and by wintering waterbirds. Valuable data

about the avian fauna of this area are provided by KUMERLOEVE (1957), LAINE (1978), DONCHEV (1980, 1984), MICHEV (1984), SIMEONOV *et al.* (1990), MILCHEV (1994), ZEHTINDJIEV (2001), MICHEV, PROFIROV (2003) and MICHEV *et al.* (2011, 2012). The remaining, and actually the larger eastern part of Bulgaria's territorial waters, has almost not been studied yet with regard to birds occurring there.

3. The Exclusive Economic Zone of Bulgaria, which covers an area of the sea to about 120 nautical miles east of Cape Shabla. The zone lies to the east of Bulgaria's territorial waters, has a triangular shape and is of relatively small surface area (Fig. 1). There is a rather small number of publications concerning this zone, the most significant being the article by NANKINOV (2001) dedicated to the distribution of Yelkouan Shearwater (*Puffinus yelkouan*) in the Black Sea.

The aim of this paper is to present information on little known species composition and abundance of birds in the western part of the Black Sea in front of the Bulgarian coast.

Material and Methods

The time spent in making ornithological observations during the three voyages with the Research Vessel (RV) *Akademik* amounts to a total of 21 days, as follows:

Summer (5 days): 8-12 June 2009; 59 hours (T. Michev);

Spring (8 days): 30 April – 7 May 2011; 52 hours (B. Michev and S. Peev);

Autumn (8 days): 8-15 September 2011; 58 hours (T. Michev and B. Michev).

The ornithological observations were carried out from the upper deck (at 7 m height above sea level) of the RV *Akademik* with the aid of binoculars and, when possible, of telescope. The observations

were subordinated to the programme, routes, stations (points), time and needs of hydrological and hydrobiological research work.

Two types of ornithological observations were carried out:

General observations, performed only during the vessel's moorage at a given station (Fig. 2); during these observations, data on species richness and total bird numbers were gathered;

Vessel-based strip observation transects examined during the ship movements between two stations. These strip transects helped to determine the species density of birds (as ind./km²) after the methods of GOULD, FORSELL (1989). The total length of all strip transects studied was 910.5 km (91.2 km in summer, 454.7 km in spring and 364.6 km in autumn).

Data on species richness and total bird numbers were collected both at the stations and during sailing along the strip transects. In interpreting the results, only data on the species numbers of birds collected during the ship's moorage at stations were taken into account. This approach allowed eliminating possible double counts. However, in cases when certain species were observed only while sailing along the strip transects, these data have been used to supplement the overall picture.

The species identification of the observed Yellow-legged Gull (*Larus michahellis*) and Caspian Gull (*Larus cachinnans*) was not done precisely because of a number of difficulties. In the text, they are marked as *Larus michahellis* / *cachinnans*. Also, because of taxonomic problems, all the observations of Atlantic Manx Shearwater (*Puffinus puffinus*) and Yelkouan Shearwater (*Puffinus yelkouan*) are marked as Yelkouan Shearwater.

In order to detect roosting migrants that had spent the night on the vessel, a monitoring of the decks was carried out each morning.

Table 1. Species richness and total bird numbers in different bands of the western part of the Black Sea recorded during three voyages of the RV *Akademik*

| Bands (in nautical miles) | Summer | | | Spring | | | Autumn | | |
|------------------------------------|----------------------|---------------------|---------------------------------|----------------------|---------------------|---------------------------------|----------------------|---------------------|---------------------------------|
| | Observation hours | Species richness | Total bird numbers (ind.) | Observation hours | Species richness | Total bird numbers (ind.) | Observation hours | Species richness | Total bird numbers (ind.) |
| 0-12 | 10 | 8 | 487 | 32 | 38 | 649 | 15 | 5 | 54 |
| 12-50 | 28 | 5 | 1588 | 11 | 29 | 176 | 19 | 9 | 71 |
| 50-100 | 21 | 2 | 116 | 10 | 39 | 244 | 14 | 8 | 28 |
| 100-150 | | | | 9 | 14 | 38 | 10 | 8 | 77 |
| Total | 59 | 11 | 2191 | 52 | 74 | 1107 | 58 | 15 | 230 |

Table 2. Species and their numbers (in ind.) observed in bands at different distance from the shoreline during the three voyages with the RV *Akademik* across the western part of the Black Sea (abbreviations: Sp – spring, Su – summer, Au – autumn)

| No | Species | Bands (in nautical miles) | | | | Total |
|----|-------------------------------------|---------------------------|-------------------|----------------|-----------|-------|
| | | 0-12 | 12-50 | 50-100 | 100-150 | |
| 1 | <i>Cygnus olor</i> | | 2Su, 4Au | | 2Au | 6 |
| 2 | <i>Coturnix coturnix</i> | | 1Sp | | | 1 |
| 3 | <i>Gavia arctica</i> | 1Sp | | | | 1 |
| | <i>Gavia/Podiceps</i> | | 2Sp | | | 2 |
| | <i>Gavia</i> sp. | | 5Sp | | | 5 |
| 4 | <i>Puffinus yelkouan</i> | 223Sp | 1515Su, 95Sp, 1Au | 109Su, 29Sp | 3Sp, 31Au | 2006 |
| 5 | <i>Phalacrocorax aristotelis</i> | 1Su | | | | 1 |
| 6 | <i>Phalacrocorax carbo</i> | 1Su, 50Sp | 1Sp, 5Au | 6Sp | | 63 |
| 7 | <i>Phalacrocorax pygmeus</i> | | | 1Sp | | 1 |
| 8 | <i>Ixobrychus minutus</i> | 2Sp | 6Sp | | | 8 |
| 9 | <i>Nycticorax nycticorax</i> | | | 3Sp | | 3 |
| 10 | <i>Ardeola ralloides</i> | 2Sp | | 2Sp | | 4 |
| 11 | <i>Egretta garzetta</i> | 21Sp | | 4Sp | 1Sp | 26 |
| 12 | <i>Ardea cinerea</i> | | 1Sp | | 1Au | 2 |
| 13 | <i>Ardea purpurea</i> | | | 8Sp | 1Sp | 9 |
| 14 | <i>Ciconia ciconia</i> | 12Au | | | | 12 |
| 15 | <i>Plegadis falcinellus</i> | | | 3Sp | 8Sp | 11 |
| 16 | <i>Pernis apivorus</i> | 1Sp | | | | 1 |
| 17 | <i>Circus aeruginosus</i> | 1Au | | | | 1 |
| | <i>Circus</i> sp. | | | 1Sp | 1Sp | 2 |
| | <i>Accipiter</i> sp. | | 1Sp | | | 1 |
| 18 | <i>Buteo lagopus</i> | | 1Au | | | 1 |
| 19 | <i>Falco subbuteo</i> | | 1Sp | | | 1 |
| 20 | <i>Falco tinnunculus</i> | 1Sp | | 3Sp | 1Sp | 5 |
| 21 | <i>Falco vespertinus</i> | 2Sp | | 3Sp | 5 | 5 |
| | <i>Falco</i> sp. | 1Sp | 1Sp | | | 2 |
| 22 | <i>Porzana parva</i> | | | 1Sp | | 1 |
| 23 | <i>Himantopus himantopus</i> | | | 1Sp | | 1 |
| | <i>Charadrius</i> sp. | 2Sp | | | | 2 |
| 24 | <i>Glareola pratincola</i> | 1Sp | | | | 1 |
| 24 | <i>Tringa glareola</i> | | | 2Sp | | 2 |
| 26 | <i>Stercorarius parasiticus</i> | 5Sp | | | 1Au | 6 |
| 27 | <i>Stercorarius pomarinus</i> | | 1Au | | | 1 |
| 28 | <i>Hydrocoloeus minutus</i> | 1Sp, 1Au | 2Au | 2Sp, 3Au | | 9 |
| 29 | <i>Chroicocephalus ridibundus</i> | 5Sp | 1Sp | 1Sp | | 7 |
| 30 | <i>Larus michahellis/cachinnans</i> | 457Su, 79Sp, 34Au | 59Su, 15Sp, 38Au | 9Su, 11Sp, 9Au | 2Sp, 16Au | 729 |
| 31 | <i>Larus fuscus</i> | 1Au | 9Au | 10Au | 21Au | 41 |
| 32 | <i>Larus melanocephalus</i> | 7Su, 24Sp | 3Sp | 5Sp | | 39 |
| 33 | <i>Sterna sandvicensis</i> | 18Su, 93Sp, 4Au | 6Su, 4Sp | 5Sp | | 130 |
| 34 | <i>Sterna hirundo</i> | 16Sp | | | | 16 |
| | <i>Sterna</i> sp. | 24Sp | 2Sp | 5Sp | | 31 |
| 35 | <i>Chlidonias hybrida</i> | 14Sp | | | | 14 |
| 36 | <i>Chlidonias niger</i> | 48Ap | | 32Sp | | 80 |
| 37 | <i>Chlidonias leucopterus</i> | 1Sp | | | | 1 |
| 38 | <i>Columba livia</i> | 1Su, 2Sp | | | | 3 |
| 39 | <i>Columba palumbus</i> | | | 2Sp | | 2 |
| 40 | <i>Streptopelia turtur</i> | | | 14Sp | 1Sp | 15 |

Table 2. Continued

| No | Species | Bands (in nautical miles) | | | | Total |
|----|-----------------------------------|---------------------------|-------------|------------|------------|-------------|
| | | 0-12 | 12-50 | 50-100 | 100-150 | |
| 41 | <i>Streptopelia decaocto</i> | 1Sp | | | 1Sp | 2 |
| 42 | <i>Otus scops</i> | | | 1Sp | 1Sp | 2 |
| 43 | <i>Asio flammeus</i> | | | 1Sp | | 1 |
| 44 | <i>Apus apus</i> | | 6Su | | | 6 |
| 45 | <i>Cuculus canorus</i> | 1Sp | | | | 1 |
| 46 | <i>Upupa epops</i> | 1Sp | 2Sp | | | 3 |
| 47 | <i>Alcedo atthis</i> | | | 1Sp | | 1 |
| 48 | <i>Melanocorypha calandra</i> | 2Sp | | | | 2 |
| 49 | <i>Hirundo rustica</i> | 1Su, 9Sp | 14Sp | 61Sp | 15Sp | 100 |
| 50 | <i>Cecropis daurica</i> | | | 3Sp | 1Sp | 4 |
| 51 | <i>Delichon urbica</i> | 1Su, 1Sp | | 2Sp | | 4 |
| 52 | <i>Riparia riparia</i> | | | 2Sp | | 2 |
| | <i>Anthus sp.</i> | | | 3Sp | | 3 |
| 53 | <i>Motacilla flava</i> | 0 | 3Sp, 3Au | 5Sp, 1Au | 1Sp, 3Au | 16 |
| 54 | <i>Motacilla alba</i> | 1Au | | 3Sp | | 4 |
| 55 | <i>Troglodytes troglodytes</i> | | | 1Sp | | 1 |
| 56 | <i>Erithacus rubecula</i> | | 2Sp | 1Sp | | 3 |
| 57 | <i>Saxicola rubetra</i> | 2Sp | 1Sp | | | 3 |
| 58 | <i>Oenanthe oenanthe</i> | | | 1Sp | | 1 |
| 59 | <i>Turdus philomelos</i> | | 1Sp | | | 1 |
| 60 | <i>Acrocephalus schoenobaenus</i> | 1Sp | | | | 1 |
| 61 | <i>Sylvia atricapilla</i> | 3Sp | | 1Sp | | 4 |
| 62 | <i>Sylvia nisoria</i> | | 1Sp | | | 1 |
| 63 | <i>Sylvia curruca</i> | | 2Sp | | | 2 |
| 64 | <i>Phoenicurus ochrurus</i> | | 1Sp | | | 1 |
| 65 | <i>Phylloscopus collybita</i> | | 2Sp | 1Au | 1Au | 4 |
| 66 | <i>Phylloscopus trochilus</i> | | | 2Sp | | 2 |
| 67 | <i>Phylloscopus sibilatrix</i> | | 1Sp | 1Sp | | 2 |
| | <i>Phylloscopus sp.</i> | 4Sp | | 4Sp | 1Au | 9 |
| 68 | <i>Ficedula hypoleuca</i> | 1Sp | | 2Sp | | 3 |
| 69 | <i>Ficedula parva</i> | 1Sp | 2Sp, 5Au | 4Au | | 12 |
| 70 | <i>Ficedula albicollis</i> | 1Sp | | 1Sp | 1Sp | 3 |
| 71 | <i>Ficedula semitorquata</i> | | 1Sp | | | 1 |
| | <i>Ficedula sp.</i> | 1Sp | | 2Sp | | 3 |
| 72 | <i>Muscicapa striata</i> | 1Sp | 1Sp | | | 2 |
| 73 | <i>Fringilla montifringilla</i> | | | 1Sp | | 1 |
| 74 | <i>Emberiza calandra</i> | | 3Sp | 1Sp | | 4 |
| | Unidentified birds | | 2Au | | | 2 |
| | Total | 1190 | 1835 | 388 | 115 | 3528 |

During the moorage and sailing of the vessel at night, the general observations and the strip transects were discontinued. The stations where the general observations were carried out, as well as the strip transects, were recorded with their geographic co-ordinates (degrees, minutes, seconds) in the projection WGS84. All distances are presented in nautical miles.

The weather conditions during the three voy-

ages were predominately suitable for ornithological observations, i.e. without mist, heavy rains or poor visibility.

Results and Discussion

Depending on the distance from the shore, the species richness and the total bird numbers in the differ-

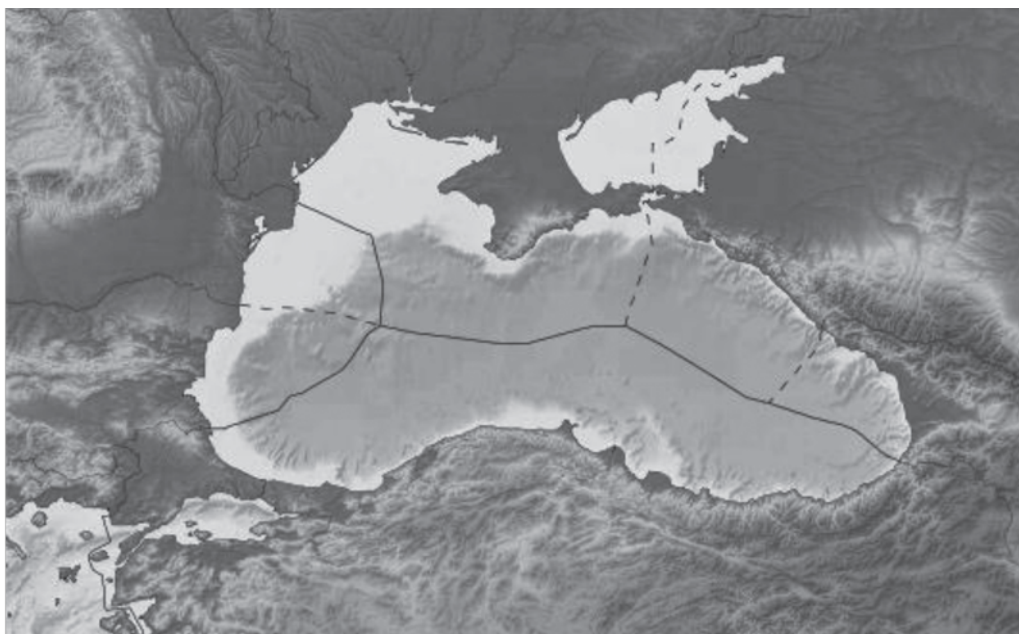


Fig. 1. Division of the Black Sea area into exclusive economic zones http://upload.wikimedia.org/wikipedia/commons/a/a6/Black_Sea_relief_location_map_with_exclusive_economic_zones.svg

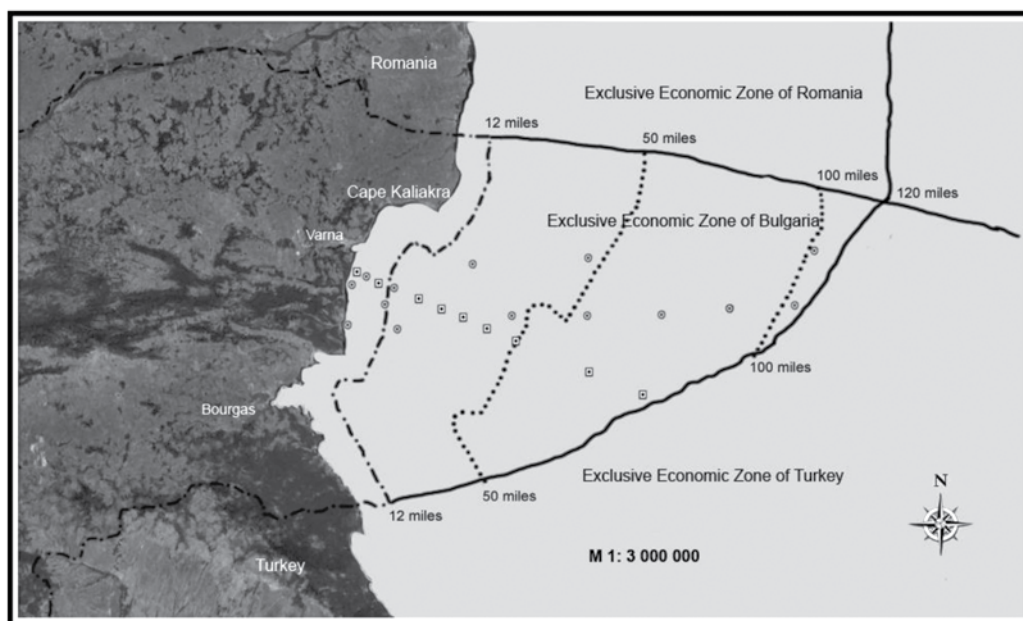


Fig 2. An outline of the studied stations in 2009 and 2011 in the territorial waters and Exclusive Economic Zone of Bulgaria; squares are stations in 2008 and circles are stations in 2011

ent bands of the western part of the Black Sea coast range within relatively broad limits (Table 1).

Based on the relatively similar amount of time for observation, the greatest species richness (74 species) was proved to be in spring, while the highest total bird numbers (2191 ind.) were in summer. The greatest species richness and total bird numbers were not recorded in the coastal zone as it might be expected. The species richness was the greatest within

the band of 50 to 100 nautical miles from the shore while the total bird numbers were the highest within the band of 12 to 50 nautical miles from the shore.

The species recorded during the voyages with the RV *Akademik* (Table 2) during the three periods were 74. They belonged to 16 orders. On the basis of the relatively great number of species of the order Passeriformes (most of which found in the morning on the deck of the RV *Akademik* in spring), one can

Table 3. Bird density (ind./km²) in different seasons during three voyages of the RV *Akademik*

| Season | Total length of transects (km) | Area (km ²) | Bird numbers | Ind./km ² | Number of transects |
|----------------|--------------------------------|-------------------------|--------------|----------------------|---------------------|
| Summer | 91.9 | 55.1 | 155 | 5.62 | 8 |
| Spring | 454.7 | 136.4 | 790 | 5.78 | 11 |
| Autumn | 364.6 | 109.4 | 178 | 1.62 | 12 |
| Average | 303.7 | 100.3 | 374.3 | 4.30 | 10.3 |

assume that there was a night migration of songbirds.

The most numerous species in the surveyed area of the western part of the Black Sea was the Yelkouan Shearwater (*Puffinus yelkouan*), followed by the Yellow-legged Gull / Caspian Gull (*Larus michahellis / cachinnans*) and Sandwich Tern (*Sterna sandvicensis*). These typical sea species of birds, together with the Great Cormorant (*Phalacrocorax carbo*), were the most numerous and were recorded during all the three voyages.

Farthest out from the shore (within the band of 100 to 120 nautical miles), 17 species of birds were observed. Among them, there were both typical sea birds and species, which are usual for forest, mountain and other types of habitats, such as the Turtle Dove (*Streptopelia turtur*), Collared Dove (*Streptopelia decaocto*), Barn Swallow (*Hirundo rustica*), Wood Warbler (*Phylloscopus sibilatrix*), etc. Obviously, the species of the second group are migrants crossing the Black Sea on their way between the breeding and wintering grounds.

Among all the recorded species, the Yelkouan Shearwater (*Puffinus yelkouan*) is of greatest interest. It is a marine species, which breeds in the eastern part of the Mediterranean (HANDRINOS, ACRIOTIS 1997). It enters periodically the Black Sea but its breeding has not yet been proven for certain, although some data exist for the southern Bulgarian Black Sea Coast from the middle of the 20th century (SIMEONOV *et al.* 1990, IANKOV 2007, KIRWAN *et al.* 2008, MUNTEANU 2012). According to NANKINOV (1999), “the Yelkouan Shearwater visits the Black Sea basin en masse in summer and spring when 53.73% and 46.01% of the individuals occurring during a given year have correspondingly been recorded. The birds reach their greatest number in April (32.74%) and June (27.06%)”. Our results from the three voyages showed that the greatest numbers of the Yelkouan Shearwater were recorded in summer within the band of 12 to 50 nautical miles (1515 ind.); lesser numbers were found during spring within the band of 0 to 12 nautical miles (223 ind.) and the smallest numbers were during summer within the band of 50 to 100 nautical miles (109 ind.). On 19.10.2012 at Cape Maslen Nos (N42 20.309; E27 47.340), there

was an observation by Dimitur Popov (in litt.) of 31 Yelkouan Shearwaters.

The recorded flocks are rather small compared with the data about flocks numbering up to 20 000 ind. (SIMEONOV *et al.* 1990) and 12 000 ind. at Cape Kaliakra on May 19 and 20, 2003 (NIKOLOV *et al.* 2006).

Of definite interest is the Lesser Black-backed Gull (*Larus fuscus*), which is known as a rare passing and wintering species along the Bulgarian Black Sea coast (MICHEV, PROFIROV 2003). During the autumn observations, this species was recorded in relatively large numbers in the open sea.

In the course of the study carried out in autumn, special attention was paid to migrating flocks of soaring birds. The observations took place in the sea to the east of the town of Balchik, approximately at one mile from Albena Resort where LAINE (1978) recorded intensive migration of soaring birds. Also, during the autumn voyage, on-line information on migrating large flocks of White Storks, Pelicans and birds of prey along the *Via Pontica* Flyway was obtained. In spite of the considerable efforts, such concentrations were not found in the area of the shelf in the territorial waters of Bulgaria in front of the coast between Cape Kaliakra and the town of Obzor. The exceptions were a small flock of 12 white storks observed crossing the Varna Bay from north to south on the 8th September 2011 as well as single birds of prey (hawks and buzzards).

The bird density (Table 3) was the highest in spring and summer (5.78 and 5.62 ind./km², respectively) and was decreasing in autumn (1.62 ind./km²). The average bird density for the whole researched area was 4.3 ind./km² (n=10).

Conclusions

During the three periods of observations from RV *Akademik*, a total of 74 bird species of 16 orders were recorded. The most species-rich were the orders Passeriformes (27 species) and Charadriiformes (15 species). Based on the relatively great number of birds of the order Passeriformes (most of them found in the morning hours on the deck of the RV

Akademik in spring), it could be assumed that there were night migrations of songbirds in the studied area of the sea.

Given the relatively equal number of hours of observations, the species richness was the highest in spring (74 species observed) while the highest total bird numbers were in summer (2191 ind.).

The species richness was the greatest within the band of sea 50 to 100 nautical miles from the shore, while the total bird numbers was the highest within the band of 12 to 50 nautical miles from the shore. Seventeen species of birds were found at the farthest distance from the shore (within the band of 100 to 150 nautical miles).

During the research period, the most numerous species was the Yelkouan Shearwater *Puffinus yelkouan* with 1515 ind., which were observed during

summer within the band of 12 to 50 nautical miles from the shore (in the same period, the total numbers of this species within all bands were 1624 ind.). Other species with relatively high numbers were the Yellow-legged / Caspian Gull *Larus michahellis* / *cachinnans* and Sandwich Tern *Sterna sandvicensis*.

The bird density was the highest during spring and summer (5.78 and 5.62 ind./km², respectively) and was decreasing during autumn to 1.62 ind./km². The average bird density for the whole research area was 4.3 ind./km² (n=10).

Acknowledgments: We are grateful to the colleagues of the Institute of Oceanology (Bulgarian Academy of Sciences) in Varna and of the Institute of Biodiversity and Ecosystem Research in Sofia for the fruitful co-operation and support. We also thank to the crew of the RV *Akademik* and the Petergas Company for their support.

References

- Black Sea Red Data Book (<http://www.grid.unep.ch/bsein/red-book/index.htm>).
- BOTEV B. TS. PESHEV (Eds.). 1985. The Red Data Book of People's Republic of Bulgaria, Vol. 2 Animals. Publishing House of Bulgarian Academy of Sciences, Sofia, 183 pp. (In Bulgarian).
- CHERNICHKO I., V. KOSTYUSHIN (Eds.). 2003. Strategy for Waterbird Monitoring in the Black Sea Region. Wetlands International, Kyiv, 23 pp.
- CIACH M. 2011. Waterbirds wintering on the Crimean Peninsula coast of the Black Sea. – *Waterbirds*, **34** (3): 376-380.
- DIMITROV M., T. MICHEV, L. PROFIROV, K. NYAGOLOV. 2005. Waterbirds of Bourgas Wetlands. Results and Evaluation of the Monthly Waterbirds Monitoring 1996-2002. Bulgarian Biodiversity Foundation & Pensoft Publishers, Sofia-Moscow, 160 pp.
- DONCHEV S. 1980. Bird migrations along Bulgarian Black Sea coast. – *Ecology, Sofia*, **7**: 68-84. (In Bulgarian).
- DONCHEV S. 1984. Migration of the birds of the orders Charadriiformes and Passeriformes along Bulgarian Black Sea coast. – *Acta Zool. Bulgarica*, **24**: 45-60 (In Bulgarian).
- GEORGIEV ZH. 1976. The Birds of the Black Sea coastal zone between Bourgas and Varna. – In: Terrestrial Fauna of Bulgaria. Materials, Bulgarian Academy of Sciences, Sofia, 261-286. (In Bulgarian).
- GOULD P. J, D. J. FORSELL 1989. Techniques for Shipboard Surveys of Marine Birds. United States Department of the Interior Fish and Wildlife Service, Fish and Wildlife Technical Report 25, 24 pp.
- HANDRINOS G., T. AKRIOTIS 1997. The Birds of Greece. Christopher Helm, London, 336 pp.
- IANKOV P. (ed.) 2007. Atlas of breeding birds in Bulgaria. BSPB. Nature Conservation series, book 10, Sofia, 679 pp.. (In Bulgarian and English).
- JORDANS A. VON. 1940. Ein Beitrag zur Kenntnis der Vogelwelt Bulgariens. – *Mitt. Kgl. naturw. Inst. Sofia*, **13**: 49-152.
- KIRWAN G. M., K. BOYLA, P. CASTELL, B. DEMIRCI, M. OZEN, H. WELCH, T. MARLOW 2008. The Birds of Turkey. Christopher Helm, London, 512 pp.
- KUMERLOEVE H. 1957. Ornithologische Beobachtungen im "Zubringerraum" (Bulgarisch-rumänische Schwarzmeerküste) des Bosphoruszuges. – *Bonn. Zool. Beitr.*, **8**: 248-274.
- LAINÉ L. 1978. Mumtonhavinnorntia Mustanmern Jansiran-nikola. – *Lintumies*, **13**: 68-73 (In Finish with English summary).
- MICHEV T., D. SIMEONOV, L. PROFIROV 2012. The Birds of Balkan Peninsula, a Field Guide. Ecotan LTD, Sofia, 300 pp. + CD supplement (In Bulgarian with English summary).
- MICHEV T., L. PROFIROV, K. NYAGOLOV, M. DIMITROV 2011. Autumn Migration of Soaring Birds at Bourgas Bay, Bulgaria 1979-2003. – *British Birds*, **1**: 16-37.
- MICHEV T., L. PROFIROV, N. KARAIVANOV, B. MICHEV 2012. Autumn Migration of Soaring Birds over Bulgaria. – *Acta zoologica bulgarica*, **64**: 33-41.
- MICHEV T., L. PROFIROV 2003. Midwinter Numbers of Waterbirds in Bulgaria (1977-2001). Results from 25 years of mid-winter count carried out at the most important Bulgarian Wetlands. Publ. House Pensoft, Sofia, 160 pp.
- MICHEV T., M. STOYNEVA (eds.) 2007. Inventory of Bulgarian Wetlands and their Biodiversity. Publ. House Elsi-M, Sofia, 364 pp. + CD supplement.
- MILCHEV B. 1994. Study of the wintering waterbirds in Strandzha Mountain and the adjacent Black Sea coastal zone. – Annual of Sofia University, School of Biology, **1** – *Zoology*, **85**: 277-290.
- MUNTEANU D. 2012. Conspectul systematic al avifaunei clociotare din Romania. Editura Alma Mater, Cluj-Napoca, 262 pp.
- NANKINOV D. 1996. Coastal parks and reserves along the Black Sea and their importance for seabirds. – *Marine Ornithology*, **24**: 29-34.
- NANKINOV D. 1999. Migration, seasonal and spatial distribution of Manx Shearwater, *Puffinus puffinus* in the Black Sea basin. – *Works of the Institute of Oceanology*, **3**: 170-177. (In Bulgarian).

- NANKINOV D., S. SIMEONOV, T. MICHEV, B. IVANOV 1997. Fauna of Bulgaria, Aves, Part 2, vol. 26, Academic Publishing House 'Prof. Marin Drinov' and Publishing House 'Pensoft', Sofia, 427 pp.
- NIKOLOV S., D. GEORGIEV, B. IVANOV, P. IANKOV 2006. A recent evidence of the spring migration of Mediterranean Shearwater *Puffinus yelkouan* along the Bulgarian Black Sea coast. – *Acrocephalus*, **27** (128-129): 83-93.
- PATEV P. 1950. Birds in Bulgaria. Bulgarian Academy of Sciences, Sofia, 364 pp. (in Bulgarian).
- PESHEV Ts., N. BOEV 1962. Fauna of Bulgaria: Vertebrates. A brief field guide. State Publishing House "Narodna Prosveta", Sofia, 520 pp. (In Bulgarian).
- Red-Data Book of Bulgaria. 2011. <http://e-ecodb.bas.bg/download/rdbpdf.zip>
- SEREBRYAKOV V. 2001. New important wintering areas of waterfowl in Ukraine. – *Acta Zoologica Lituanica*, **11**: 266-272.
- SIMEONOV C., T. MICHEV, D. NANKINOV 1990. Fauna of Bulgaria, Aves, vol. 20, Part I, Sofia, Bulgarian Academy of Sciences' Publishing House, 350 pp. (In Bulgarian).
- ZEHTINDZHIEV P. 2001. Night migration of birds in Bulgaria. Specialised Research Council of Zoology and Ecology of Higher Certifying Commission, Author's summary of PhD Thesis, Sofia, 1-44.

Received: 10.02.2014

Accepted: 08.10.2014