

Migration, seasonal and spatial distribution of Manx Shearwater, *Puffinus puffinus* in the Black Sea basin

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1. Introduction

The Black Sea and the connected by the Kerchenski Strait Sea of Azov are considered as part of the Mediterranean Sea. It is connected with the Sea of Marmora by Bosphorus. Its area is 413,5 thousands sq.km., and its coastline is 4094 km. (Michev et.al. 1980). Manx Shearwaters are the most numerous representatives of the Order Procellariiformes in the Black Sea basin. This striped people, living along the seashores even in the past and they called them with names different from the present official ones. They are known as "yelkovans" near Bosphorus, but during the 18th century the Europeans living in Istanbul called them "Ames damnees" (damned souls) (Kumerloeve, 1975). The name "beton" is used among the Crimean fishermen (Salnikov, 1957).

Manx Shearwater is the most numerous representative of the Order Procellariiformes in the Black Sea basin. It is established (Nankinov, in press) that 3 subspecies of Manx Shearwater penetrate into the Black Sea. Beside the numerous Yelkouan (Manx) Shearwater (*Puffinus puffinus yelkouan* or *P. yelkouan yelkouan*) there rarely come the Balearic (Manx) Shearwater (*P. puffinus mauretanicus*) and the Atlantic (Manx) Shearwater (*P. puffinus puffinus*). Information about Manx Shearwaters recorded in the Black Sea basin can be found in many literary sources: Nordman, 1840; Bianki, 1913; Frank, 1950, 1952; Kostjuchenko, 1952; Salnikov, 1957; Horvath, 1959; Kostin et. al. 1963; Kostin, 1983; Donchev, 1964, 1974; Vader, 1965; Kumerloeve, 1967, 1975; Ogulchanskii, 1967; The

OST Bird Report 1969, 1972, 1975, 1978; Van Impe, 1969, 1975; Kiss, 1973; Robel, 1973, 1974; Robel, Königstedt, 1976; Strokov, 1974; Hubner, 1975; Nankinov, 1978; Smogorjevskii, 1979; Müller, Königstedt, 1983; Tombeur, 1985; Uhlig, 1991 and others. Its movements along the West Black Sea coast were also observed (Robel, Königstedt, 1976). However complete studies of the migration, the seasonal and the spatial distribution of this species lack until now.

2. Materials and methods

All literary data of observations of Manx Shearwaters in the Black and the Sea of Azov were used in this article, together with information of the author, collected from July 1971 till now, along the Black Sea coast and during voyages. The movements of the fish shoals, who are its food, were taken also under consideration (Marti, 1980; Svetovidov, 1980). All this information was generalised in regions, years, seasons and months, and on this base we try to show the migration, the seasonal and the spatial distribution of Manx Shearwater in the studied region.

3. Results

Probably first Manx Shearwater penetrated in the Black Sea during the tertiary. Then the ancestors of the Black Sea anchovy and the Azov anchovy – *Engraulis encrasicolus ponticus* and *E.e. maoticus* - the main food of the Manx Shearwaters, came from the Mediterranean Sea (Alexandrov, 1927). In the past century Manx Shearwater was a common bird in the Mediterranean and the Black Sea, and

numerous along the Dardanelles and Bosphorus (Simpson, 1861; Elwes, Buckley, 1870), where its flocks could hardly be counted. They were flying to and away through the whole day and in all seasons. A. Nordmann (1840) wrote that it was especially numerous near Constantinopol, and in big flocks flying one after another between Odessa and Crimean Peninsula. It has been observed in the sea near Akmechet, adult birds were shot in August 1878 and July 1903 near Sevastopol (Nikolskii, 1891; Molchanov, 1906), on 1.VIII.1903 by the lighthouse of town Herson, and also near Kerch and on the Caucasian shore by the town Horst on 19.VIII.1901 (Bianki, 1913). It has been nesting on the Prince Island, located to the south of Bosphorus. One of the earliest observations of this bird along the Bulgarian coast is on 28.IX.1924, when Klein (1931) "to the south of Evksinograd, observed the Levantic Shearwater *P.p.yelkouan* (Acerbi) from a ship". The Bulgarian tsar Boris III recorded it near Sozopol, and F. Steinbacher announced that it is observed frequently in the Black Sea (Jordan, 1940) etc. Later the observations of Manx Shearwater in the Black Sea become more frequent and after the 70s the flocks passing along the west Black Sea coast were of thousands individuals and numbered up to 20 000 birds (Van Impe, 1969). It was considered that they appear in the Black Sea in July-August and leave in the end of April (Kozlova, Tugarinov, 1947; Sudolovskaya, 1951) and that in spring and summer they are more along the western coast and in autumn and winter - along the north-east coast (Shuntov, 1982).

The main fish-prey species, who the Manx Shearwater forages in the Black Sea basin are mainly the Anchovy, European sprat (*Sprattus sprattus*), Silverside (*Atherina mochon ponticus*) and to a smaller extend the Common kilka (*Clupeonella cultriventris*), Black Sea scad (*Trachurus mediterraneus pontiffs*), Bluefish (*Pomatomus saltatrix*), and also the Pilchard sardine (*Sardine pilchardus*), Smooth sand lance (*Gymnammodytes cicerellus*), Whiting (*Merlangus merlangus*) and even the Short-nosed seahorse (*Hippocampus hippocampus*). The number of most of these fish species vary during the

years (and seasons) (Martí, 1980; Svetovidov, 1964), which influence the number and distribution of Manx Shearwaters over the aquatory of the Black and the Sea of Azov.

3.1. Spring migration

Manx Shearwaters, penetrating into the Black Sea in spring, head for the north-west, north and east aquatory of the Black Sea for foraging (Fig. 1). The spring concentrations of the Black Sea anchovy are in this region. Manx Shearwaters stay between the Danube Delta and the Island Diarulgach, in the Karkinitiski Bay, near Sevastopol, Alushta and along the Caucasian coast between Sochi and the Turkish boundary. During the spring migration of the Anchovy (March-May), Manx Shearwaters move along the Caucasian and the south Crimean coast and stay in the Kerchenski Strait for a month, where they form big concentrations, feeding on the coming from the Black into the Azov Sea shoals of Azov anchovy and Silverside. Frank (1952) recorded big flocks of Manx Shearwater, flying over the Kerchenski Strait on 15.V.1943. During April and May Manx Shearwater migrates on two routes together with the Black Sea anchovy, who winters along the Turkish coast: first one to the Crimean Peninsula and the second one towards the Bulgarian and Romanian seashore. Its number is big in spring along the south Crimean shores, when it flies eastward in flocks of hundreds up to several thousands individuals. On 3.III.1961 about 2 000 Manx Shearwaters passed near Alushta, towards Sudan for 6 minutes (Kostin et. al. 1963; Kostin, 1983). It follows the migrating Black Sea scads in the coastal area of the eastern part of the Black Sea (Sinop, Trabzon, Batumi, Poti) to the breeding place between Sochi and Simferopol and also during their migration to north along the western Black Sea seashore. It feeds in the small concentrations of the Pilchard sardine by the shores of Georgia. In some years Manx Shearwater follows the shoals of the Black Sea anchovy, Common kilka and Bluefish even in the Sea of Marmora and Bosphorus, where they winter and migrate to north along the Bulgarian and Romanian coast. Part of the birds divert to right along the Turkish, Georgian and Russian coasts and from Sinop they migrate to north as they cross the Central parts of the Black Sea towards Crimean. At

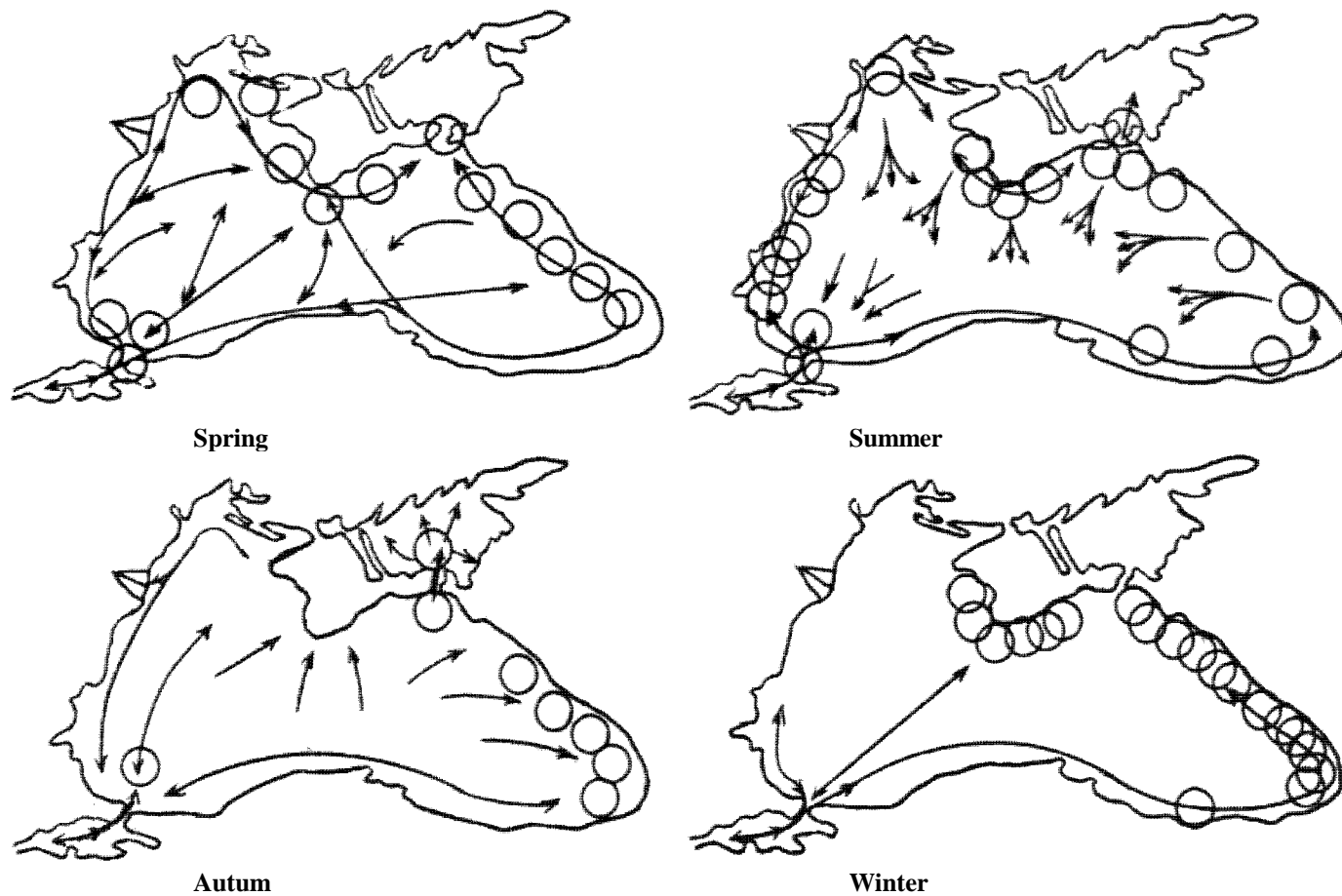


Fig. 1. Migrations, seasonal and spatial distribution of Manx Shearwater (*Puffinus puffinus*) in the Black Sea basin
 → - migration directions; ○ - concentrations in regions rich in fish

the same time (March and April 1959) thousands of Manx Shearwater, in long lineal formations, were flying low over the water of Bosphorus both towards the Sea of Azov and the Black Sea (V a d e r, 1965). To the north of Bosphorus 700 individuals were recorded on 28.IV.1970, 2 500 birds on 20.IV.1971, 3-4 thousands on 20.V.1974, 100 individuals on 21.IV.1970 near Sinop and 3000 individuals were observed on 22.IV.1973 along the European Black Sea coast of Turkey etc. (The OST Bird Report, 1975, 1978). Some Manx Shearwater penetrate upstream of some of the big river, falling into the Black Sea as they follow the Common kilka. Small flocks and single bird visit the inland reservoirs in the end of the winter and in spring: 28.II.1971 3 birds near the village Ravno Pole (Sofia) and a bird on the Aldmirovsko marsh on 10.V.1981 (S. Vamporov - per. com.). Probably these observations concern birds from the Aegean Sea, penetrated to north along the valley of river Struma. There is a change in the behaviour of Manx Shearwater in March and the beginning of April, when the huge winter concentrations of the Anchovy tear to many small shoals (with length of 100 - 200 m.). Manx Shearwater also starts feeding in small groups (S a l n i k o v, 1957). In spring Manx Shearwater may form concentrations everywhere in the Black Sea basin, around the concentrations of the European sprat. Most often such concentrations are observed at 30-40 miles from the Caucasian coast, between Tuapse and Novorosiisk in March-May and to the south of Crimean in May. During spring, summer and winter some Manx Shearwaters stay in separate places along the eastern, northern and western Black Sea seashore and feed on Short-nosed seahorse, who may be up to 3% of their food (S m o r o j e v s k i i, 1979).

3.2. Summer migration

In August 1982 Manx Shearwaters flying from the Sea of Marmora towards the Black Sea were passing near the eastern coast of Bosphorus and those flying in the opposite direction - near the west coast. As a whole 3-4 thousands Manx Shearwaters pass the strait per one day. Several thousands were recorded on 22-26.VI.1959, and 4-5.VI.1975. Manx Shearwater was observed in moderate numbers along the whole Turkish Black Sea seashore from Bosphorus to the east to

Ardesen: 1000 individuals on 25.VIII.1970 near Rize; 700 birds on 11.VIII.1972 to the north of Bosphorus etc. (Vader, 1965; The OST Bird Report, 1975, 1978; Tombeur, 1985). Many Manx Shearwaters concentrated on the northern and eastern shores of the Black Sea, move away from the shores with the outset of warm weather. They migrate out into the open sea and scatter because in the summer the Black Sea anchovy and the European sprat inhabit vast areas and live in the upper layers of the water. They gather in the summer concentrations of European sprat along the seashores of Bulgaria and Romania, at 20 - 30 miles to the south from the Crimean coast between Sarach and Megan, in the concentrations of European Sprat and Silverside to the Turkish shore. It stay in the breeding place of the Black Sea scad along the whole Black Sea coast, at 10 - 100 miles from the shores, especially between Sevastopol and Sochi (in the Kerchenski Strait and even in the Sea of Azov), and in the summer concentrations of the Black Sea scad - to the south of Sochi to Trabzon. Sometimes they concentrate by the south-west and west shores of the Black Sea and at the end of the Kerchenski Strait (near Feogosya, Anap and Novorosiisk), where the shoals of the Common kilka gather. In July-August Manx Shearwaters enter into Tendrovski Bay of the Black Sea Reserve, together with the shoals of Anchovy and Mackerel (Scomber scomber) (K l i m e n k o, 1950). Thousands Manx Shearwaters moving to east in the morning and to west at dusk, were recorded in July 1976 and 1977 in the region to the south of Odessa (S m i g o r j e v s k i i, 1979). It feeds singly or in small flocks of 30-40 individuals from the end of June to September in the Karkinitski Bay (K o s t i n, 1983). When following the Common kilka, Azov anchovy and the Silverside it penetrates into the Sea of Azov more and more often. In some years, during the warm months Manx Shearwaters are attracted by the shoals of the Smooth sand lances, who in daylight feed in the upper layers of water, along the whole Black Sea coast. Sometimes the Smooth sand lance is up to 12% of Manx Shearwater's summer food around Crimean Peninsula (S m o g o r j e v s k i i, 1979). K o s t i n (1983) wrote about mass migration to east and of a top number of Manx Shearwater in

July and August, along the south coast of the Crimean Peninsula. V a n I m p e (1975) recorded such fast movements of big flocks along the Romanian coast and he supposed that they were connected with the migrations of the fish-prey shoals. There were mass summer migration along the Bulgarian coast on 14-20.VII.1971 between town Nesebar and Cape Kaliakra - about 37 000 Manx Shearwaters were recorded, as some of the flocks were up to 13 500 individuals (R o b e l, 1974); on 11.VII.1972 near Cape Emine - about 5 000 birds, flying to north (D o n c h e v, 1974); in July 1973 - thousands, flying to south, near town Kavarna (H ü b n e r, 1975) etc.

3.3 Autumn migration

In autumn Manx Shearwater foraging in the vast aquatory of the Black Sea start following the shoals of the Black Sea anchovy, who migrate from the open sea mainly to north, towards Crimean Peninsula and to east towards Caucasus and in some years to south along the west Black Sea coast. They feed on European sprat in the whole aquatory of the Black Sea and mainly in its concentrations by the Caucasian seashore, together with shoals of Bluefish, migrating to Bosphorus through the open sea, far from the west coast. They visit the autumn concentrations of the Pilchard sardine (between Pitsunda and Batuli) and the Black Sea scad (between Sochi and Trabzon). They follow the shoals of the Black Sea scad between Trabzon and Bosphorus and also the migrating shoals (not every year) from north to south, far away from the Bulgarian seashore, who pass Bosphorus from September to November. Hundreds Manx Shearwaters, flying from east, were recorded on 3rd and 4.IX.1971 near Trabzon, 226 individuals flying to west on 5.IX.1971 near Andersen and 100 birds, flying to west by the river Kizilirmak Delta on 7.IX.1973 (The OST Bird Report, 1975). Thousands Manx Shearwaters, flying to north, in flocks of 2 - 100 individuals, were recorded on 20.VIII.1957 from 4 to 7 o'clock p.m., in the south aquatory of the Black Sea, before Bosphorus (H o r v a t h, 1959). Especially large concentrations of Manx Shearwater can be formed in the outlet of Kerchenski Strait, where the shoals of the Silverside and Azov anchovy come out from the end of August to November. Manx Shearwaters hunt on the

arrived for additional feeding small Black Sea scads and Mackerels. According to K o s t j u c h e n k o (1952) the big autumn concentrations of Manx Shearwaters are located at 50-60km. from the south seashores of Kerchenski Peninsula and from North Caucasus. They penetrate also in the south part of the Sea of Azov, where the autumn shoals of the Azov anchovy cover an area of up to 100 km². and are estimated at dozens of thousand tons (G o l e n c h e n k o, 1956). They visit the concentrations of the Common kilka and the Silverside, to the north of the Kerchenski Strait, in the Temrjukski Bay and also near Genechinsk and Obitochenska Kosa. Therefor Manx Shearwater is a common bird and even numerous during the autumn months in the Sea of Azov (especially after 1964), near the Berdyanska and Obitochenska Kosa (O g u l c h a n s k i i, 1967). Feeding on the Common kilka in the west and south-west parts of the Black Sea, some Manx Shearwaters penetrate upstream the big rivers, such as Danube, in the end of summer and during the autumn. They were found near Ruse on 23.VIII.1963 (O u n d z h i a n, 1969) and even by the Viense Prater - in the middle of the past century (R o k i t a n s k y, 1964).

3.4. Winter migration

With the outset of cold weather Manx Shearwaters in the north part of the Black Sea concentrate along the south shores of Crimean and Caucasus (and by the Turkish coast in some years), where are the main wintering areas of the Black Sea anchovy and the Azov anchovy in the Balaklavka and Kopselska Buhta, near Yalta, Ajudag, Sudak in the region of Novorosiisk, Anapa, Sochi, Adler, Gagra, Pitsunda, Suhumi, Kadorsk Cape, Rioni, Anakri, Chorochi, Kobuleta, Batumi, Geresun and in other places. They visit the wintering Black Sea scads by the Turkish and Caucasian seashores (between Sinop and Poti). It stay there and sometime in the concentrations of the European sprat. Manx Shearwaters can be observed around such temporary concentrations of European sprat everywhere in the open sea. According to the fishermen Manx Shearwaters are common and numerous along the Crimean seashore, during the appearance of the Anchovy, but also of the Whiting (K o s t i n et.al. 1963), who appears along the whole Black Sea coast, as coming close to the

shores in the cold months of the year and going away in the warm months (Svetovidov, 1964).

According to the observations of Salnikov (1957) the wintering conditions for the Manx Shearwater in Black Sea are better in especially severe winters (for example 1953-1954 when the Kerchenski Strait and the Bay near Feodosya frozen and the ice coastal area near Odessa reached 120 km), but with big concentrations of the Anchovy, than the conditions in warm winters. There were big concentrations of Manx Shearwater from December to April 1953-1954 along the south shores of Crimean (from Yalta to Balaklava, where about 40 000 tons Anchovy wintered) and near the coast of north Caucasus (from Anapa to Novorosiisk). The bigger the concentrations of the Anchovy

are, the numerous is the Manx Shearwater. Although they keep a certain stability, however the winter concentrations of the Anchovy and the Manx Shearwater change sometimes. So the Anchovy did not winter along the Crimean seashore in 1952 - 1953 and it was absent along the Georgian seashore in the next winter. Manx Shearwater was absent on these places in the same winters. Manx Shearwaters appear along the Caucasian coast in big number before winter, but without forming flocks (rarely they are in flocks of 5-10 birds far away from the shore) and stay till April (Strokov, 1974). Although it is common along the Turkish coast through the year, but is rarer in winter, hundreds Manx Shearwaters foraged between Trabzon and Tirebolu on 14.II.1974 (The OST Bird Report, 1978).

3.5. Dynamic of the number

All existing studies and generalised information of observations of Manx Shearwater in the Black Sea basin ($n=665\ 611$) do not show exactly the number of the species by months, but they show the general trends of its dynamic through the year (Fig. 2). It is numerous in the Black Sea in the first two months of the year. A several times increasing of its number is observed in March, but it is most numerous in April, when 32.74% of the total number Manx Shearwaters observed in the Black Sea in the course of the year have been recorded. The top number of Manx Shearwater in April is due to the penetration in the Black Sea of individuals who will breed as well as of immature birds. They become sexual mature in their 5-6 year (Perrins et al. 1973). Probably the reduction of the number in May is connected with the beginning of the laying of eggs and with the brooding in which participate both birds and continues 50 days. Then they feed close to the nests. However there are evidences (Lockley, 1971) that one of the parents may roam (to a distance of 1000 km.) while the other bird broods. A new increase in its number is recorded in June (27,06%), with gradual decline in July (17,56%) and August (9,11%). Mainly immature individuals and those who had lost their broods participate in the migration during the period June-July-August. The generalised information shows that Manx Shearwater is numerous in the Black Sea basin in summer (53,73%) and spring

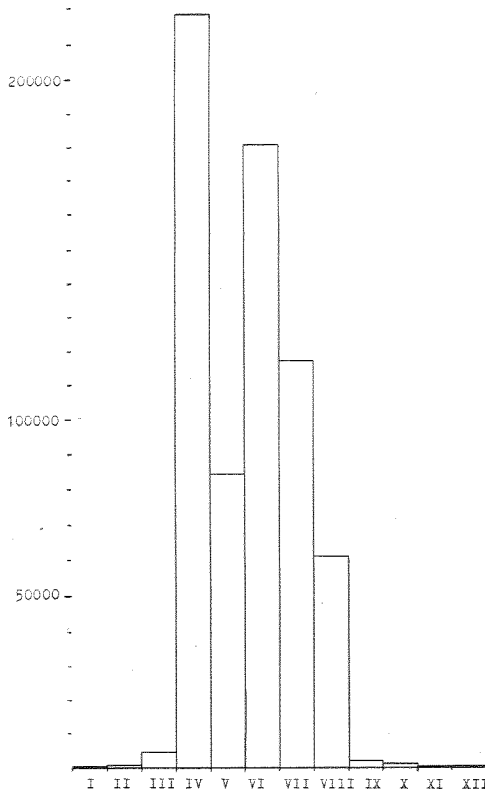


Fig. 2. Dynamics of numbers of Manx Shearwater (*Puffinus puffinus*) in the Black Sea basin ($n=665611$)

(46,01%) and with low number in autumn (0,18%) and winter (0,08%).

The view of the dynamic of the migrations of Manx Shearwater from the Sea of Marmora through Bosphorus in the Black Sea is rather complex. In some days (especially in spring and summer) all birds fly in only one direction, in other days - they fly in both directions (to north and south), forming two separate flows (V a d e r, 1965). But as a whole its migration has the following seasonal sequence. Small flocks pass from January to the beginning of April, as they gradually increase their number and frequency. The migration reaches its maximum at noon in April and May, when 5 000 - 6 000 individuals fly to north and about 800 - 1000 birds to south per hour. In June the top number was 5000 birds to north and 1800 birds to south per hour, recorded on 17th, 20th and 28.VI.1973. A large movement to south is supposed in the night hours. In July and August about 4 000 individuals fly to south per hour and about 700 - 1000 - to north. The young birds penetrate through Bosphorus and appear in the Black Sea in the end of summer and during the autumn. At first they have large fat reserves, which helps them to overcome great distances, even without feeding (P e r r i n s et.al. 1973). Adult and immature birds roam in the Black Sea together with the young ones in the end of summer and in autumn. There is an obvious hush in the migration through Bosphorus in September, probably in the time of the moulting. The flying continues to the end of the year, as gradually diminishes in October and November, reaching 100 individuals per day in December (The OST Bird Report, 1969, 1972)

4. Discussion

The existing visual observations, performed mainly in the litoral area do not give the real picture of the migration, the seasonal and spatial distribution of Manx Shearwater, which are rather complex, especially in the open areas of the Black and the Sea of Azov. R o b e l, K ö n i g s t e d t (1976) stated that this species flies clockwise in the Black Sea, i.e. from Bosphorus along the west and north Black Sea coast to the Sea of Azov and after that to south-east and south towards Turkey. Such statement is a result of short observations in a limited area. During the summer large flocks of Manx Shearwaters

fly to north as well as to south along the west Black Sea shore, where these authors had performed observations. Therefore it is hard to draw in details and with exactness the migratory routes only by observations from the shore and to make prognoses of the future changes in the seasonal and annual number of this species. The reason is that its penetration through Bosphorus and its routes in the Black Sea have feeding character and depend on the life cycle, the characteristic of its biology, migrations and changes in the number of the fish-prey species. The reserves and the distribution of these fishes in the sea influenced by the hydrometeorological and other changes and are distinguished with great variability through the seasons and years. Therefore the penetrating Manx Shearwaters through Bosphorus into the Black Sea migrate in different directions, depending mainly on the fish shoals, who they follow. The picture of the migrations and the spatial distribution of Manx Shearwater in the Black Sea basin is different through the seasons. In spring the birds head mainly for the north-west, north and east parts of the Black Sea, where the Black Sea anchovy concentrate. They remain in the Kerchenski Strait and feed on the coming from the Black into the Sea of Azov shoals of the Azov anchovy and Silverside. Sometime they follow the shoals even from the Sea of Marmora to the north along the Bulgarian and Romanian seashores or visit the concentrations of the Pilchard sardine near Georgia.

With the outset of warm weather Manx Shearwaters migrate in small groups to the open sea and together with the Anchovy and the European sprat cover vast areas. They gather in the summer coastal concentrations of the Smooth sand lance and European sprat. They penetrate from the Black into the Sea of Azov most often from the end of summer and in autumn, following the Common kilka, the Azov anchovy and the Silverside. In spring as well as in autumn single bird goes upstream the big rivers, when foraging the Common kilka. The dispersed on the whole aquatory of the Black Sea Manx Shearwaters head for the shores of Crimean and Caucasus in autumn, i.e. towards the future wintering areas of the Black Sea anchovy and Azov anchovy. Manx Shearwaters visit the Black Sea basin in large numbers in summer and in spring, where

respectively 53.73% and 46.01% of the individuals observed over the course of the year have been recorded. Numbers are highest in April (32.74%) and June (27.06%), and then gradually diminish in number until winter when number of the Manx Shearwaters in the Black Sea are lowest. The winter density of Manx Shearwater population in the Black Sea does not depend on the weather conditions, but is connected with the number of the Anchovy. The bigger its concentrations are, numerous the Manx Shearwaters are.

The scale of the migrations and number of Manx Shearwater in the Black Sea basin will be specify probably after the performance of several precise annual reports on Bosphorus, as both the birds flying from south to north and opposite are counted. The existing incidental observations on Bosphorus show that sometimes thousands birds fly to north and south per hour.

The penetration of Manx Shearwater from the Aegean Sea and the Sea of Marmora through Bosphorus into the Black Sea and back is performed annually and its intensity and mass scale depend on the food supplies. However there is a cyclic recurrence, i.e. periods when the species is especially numerous and periods, when it is in low number. For example these birds appeared en mass in the aquatory of the Black Sea during the period 1792-1796 – “remarkable amounts of birds through Bosphorus” (K u m e r l o e v e, 1975), about 1936-1943, 1957-1962, 1966-1979, 1982-1989. The periods of mass invasions of Manx Shearwater from the Mediterranean into the Black Sea seemed to be connected with the increase of population density, after the flying away of the young and lack of sufficient food supplies near the nesting areas and in the last decades probably it is in connection with some local pollution of the Mediterranean Basin.

REFERENCES

- A l e x a n d r o v, A., 1927. Anchausa Azovskaga-Chernomorskogo baseina, ix proizxojdenie I taksonomicheskie oboznachenia. “Truda Kerchenskoj ruboxoz. stancii”, 1,2-3: 39 - 92.
- B i a n k i, V., 1913. Fauna Rosii I sopredelnax stran. Ptica (Aves) tom 1. Columbiformes I Procellariiformes. Polutom 2. S.-Peterburg: 385-979.
- D o n c h e v, S., 1964. Warxu razprostranieneto na niakoi novi I redki ptici v Bulgaria. “Izv. na Zool. in-t s musei pri BAN”, 16: 23 - 28.
- D o n c h e v, S., 1974. Ptice na Sredna I Iztochna Stara planina. “Izv. na Zool. in-t s musei pri BAN”, 41: 33 - 63.
- E l w e s, H., T. B u c k l e y, 1870. A List of the Birds of Turkei. “Ibis”, 2-6: 59 - 77; 188 - 201; 327 - 341.
- F r a n k, F., 1950. Die Vögel von Opuk (Schwarzmeer - Gebiet). “Bonn. Zool. Beitr”, 1: 144 - 214.
- F r a n k, F., 1952. Massenzug von Sturmtauchern über dem Schwarzen Meer. “J.Orn.”, 93: 142 - 143.
- H o r v a t h, L., 1959. Observations on the potamic and pelagic migrations of birds along the Danube and in the Levant. “Acta zool. Acad. sc.hung.”, 5,3-4:353 - 367.
- H u b n e r, G., 1975. In den Felsen des Tschirakman (VRBulgarien). “Der Falke”, 22,5: 158 - 161.
- J o r d a n s, A. von, 1940. Ein Beitrag zur Kenntnis der Vogelwelt Bulgariens. “Mitt.Kgl.naturw.Inst.Sofia”, 13: 49 - 152.
- K i s s, J., 1973. Date preliminare asupra ornitofaunei insulei Sahalin si rolul ei in migratie (II). “Peuce”, 3: 539 - 567.
- K l e i n, E., 1931. Burenosci. “Lovec”, 31,5: 76-77.
- K l i m e n k o, M., 1950. Materiala po faune ptic raiona Chernomorskogo gosudarstvenogo zapovednika. “Truda Chernom. zap.”, 1: 3 - 52.
- K o s t i n, J., 1983. Ptica Krimea. Izd. “Nauka”, Moskva: 1-241.
- K o s t i n, J., E. S p a n g e r b e r g, A. T k a c h e n k o, 1963. Zametki po ornitofaune gorno-lesnogo Krimea. “Sb.

- rabot po lesovodstvu I oxotovedeniu”, 7: 89 - 96.
- K o s t j c h e n k o, R., 1952. Malui burevestnik v Chernom more. “Priroda”, 6: 41 - 42.
- K o z l o v a, E., A. T u g a r i n o v, 1947. Fauna SSSR. Ptica. Tom I, buip. 3. ANSSSR: 1 - 317.
- K u m e r l o e v e, H., 1967. Neue Beiträge zur Kenntnis der Avifauna von Nordost - und Ost - Kleinasien. “Instanb. Univ. Fen. Fak. Mecmuasi”, B, 32: 72 - 213.
- K u m e r l o e v e, H., 1975. The history of ornithology in Turkey. “The OST Bird Report”, 3: 289 - 319.
- L o c k l e y, R., 1971. The life history of *Puffinus puffinus*: a review. “Oiseaux et Rev. franc. orn.”, 41, 2-3: 163 - 175.
- M a r t i, J., 1980. Migracii morskix rab. Izd. “Pishtevaia promishlenost”, Moskva: 1 - 248.
- M i c h e v, T., C. M i h a i l o v, I. V a p c h a r o v, S. K i r a d j i e v, 1980. Geografski rechnik na Bulgaria. Izd. “Nauka I izkustvo”, Sofia: 1 - 561.
- M o l c h a n o v, L., 1906. Spisok ptic Estestvenno-istoricheskogo muzeia Tavrichenckogo gubernskogo zemstva (v g. Simferopole). “Mater. k pozn. fauna I flora Ros. imperii. Otd. zool.”, 7: 248 - 301.
- M ü l l e r, H., D. K ö n i g s t e d t, 1983. Zum Unterart - Zugehörigkeit bulgarischer Schwarzschnabel - Sturmtaucher (*Puffinus puffinus*) (Aves, Procellariidae). “Zool. Abh. Staatl. Mus. Tierk. Dresden”, 39, 4: 62 - 65.
- N a n k i n o v, D., 1978. Ostrov “Sv. Ivan” - interesen punkt za ornitologicheski izsledvania. “Orn. inf. buletin”, 4: 20 - 28.
- N a n k i n o v, D. (in press). Procellariiform seabirds (Order Procellariiformes) in Black Sea and Azov Sea.
- N i k o l s k i i, A., 1891. Pozvonochneue životnue Krima. S.-Peterburg: 1 - 484.
- N o r d m a n n, A., 1840. Observations sur la Faune Pontique (voyage dans la Russie meridionale et la Crimée, excute en 1837 sous la direction de M. Anatole de Demidoff). P.t.3.
- O g u l c h a n s k i i, L., 1967. Malui burevestnik na Azovskom more. “Ornitologia”, MGU, 8: 377 - 378.
- P e r r i n s, C., M. H a r r i s, C. B r i t t o n, 1973. Survival of Manx Shearwaters *Puffinus puffinus*. “Ibis”, 115,4: 535 - 548.
- R o b e l, D., 1973. Zum Nahrungserwerb des Nachtsturmtauchers (*Puffinus puffinus*) an der Schwarzmeerküste Bulgariens. “Beitr. Vogelkunde”, 19: 221 - 222.
- R o b e l, D., 1974. Beobachtungen am Nachtsturmtaucher (*Puffinus puffinus*) an der Schwarzmeerküste Bulgariens. “Beitr. Vogelkunde”, 20,3: 173 - 175.
- R o b e l, D., D. K ö n i g s t e d t, 1976. Das Vorkommen des Schwarzschnabel - Sturmtauchers (*Puffinus puffinus*) an der Westküste des Schwarzen Meers (Aves, Procellariidae). “Faun. Abh. Staatl. Mus. Tierk. Dresden”, 6,1: 1 - 15.
- R o k i t a n s k y, G., 1964. Catalogus Faunae Austriae. Teil XXI b. Aves. Wien: 1 - 63.
- S a l n i k o v, N., 1957. Zimovki sredizemnomorskogo mologo burevestnika (*Puffinus puffinus yelkouan Acerbi*) v Chernom more I sviaz ix s rasprostraneniem xamsiu. “Voprosa ihtologii”, 8: 188 - 190.
- S h u n t o v, V., 1982. Otriad trubkonosue Procellariiformes. “Ptic SSSR”, Moskva, “Nauka”: 352 - 427.
- S i m p s o n, W., 1861. Fortnight in the Dobrudscha. “Ibis”, 3: 361-374.
- S m o g o r j e v s k i i, L., 1979. Fauna Ukraini. Tom 5. Ptixi, vup. 2 Kuib. “Naukova dumka”: 1 - 188.
- S t r o k o v, V., 1974. Zimovki vodoplavaiushtix ptic u Chernomorskix beregov Kavkaza. “Ornitologia”, MGU, 11: 274 - 278.
- S u d i l o v s k a y a, A., 1951. Otriad trubkonosue ili burevestniki Tubinares ili Procellariiformes. “Ptic Sovetskogo Soiuza”, 2: 287 - 340.
- S v e t o v i d o v, A., 1964. Riubiu Chernogo moria. “Nauka”, M.-L.: 1 - 551.
- The Ornithological Society of Turkey. Bord Report, 1969, 1: 1-169; 1972, 3: 1-208; 1975, 3: 1-319; 1978, 4: 1-216.
- T o m b e u r, F., 1985. Aantallen noorse Pijlstormvogel (*Puffinus puffinus yelkouan*) in de Bosphorus. “Veldornitol. tijdschr.”, 8, 1: 17 - 20.
- V a d e r, W., 1965. Bird observations by the “Dutch Biological Expedition Turkey 1959”, “Ardea”, 53: 172 - 204.
- V a n I m p e, J., 1969. Passage regulier de *Puffinus p. yelkouan* (Acerbi) et de

- Stercorarius pomarinus (Temm) le long de la côte roumaine. "Alauda", 37,2: 163 - 164.
- V a n I m p e, J., 1975. Sur les mouvements du Puffinus yelkouan Puffinus p. yelkouan en Mer Noire. "Alauda", 43: 185 - 187.
- U h l i g, R., 1991. Vogelbeobachtungen in Bulgarien 1976-1989. "Ornithol. Mitt.", 43: 252 - 258.
- O u n d z h i a n, E., 1969. Malak sredizemnomorski burevestnik - Puffinus puffinus yelkouan (Acerbi) p. yelkouan (Acerbi) p. yelkouan. "Izv. na narodnia muzei - Ruse", 2: 224 - 225.

Миграции, сезонно и пространствено разпределение на обикновения буревестник (*Puffinus puffinus* Brünich, 1763) в Черноморския басейн

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(Резюме)

Миграциите, сезонното и пространственото разпределение на обикновения буревестник в Черноморския басейн са доста сложни, имат хранителен характер и зависят от годишния жизнен цикъл, от особеностите в биологията, миграциите и промените в числеността на видовете риби, с които той се храни. Основна храна на обикновения буревестник тук са черномоската и азовската хамсия (*Engraulis encrasicolus ponticus* и *E. e. maeoticus*), шпротът (*Sprattus sprattus*) и атерината (*Atherina mochan pontica*). През пролетта обикновеният буревестник се насочва най-вече към северозападната, северната и източната част на Черно море, задържа се дълго в Керченския пролив, понякога следи рибните стада край западния морски бряг. Със затоплянето на времето мигрира към вътрешността на морето и обитава огромни пространства. В края на лятото и есента прониква все по-често в Азовско море. През есента разпръснатите по цялата морска акватория обикновени буревестници мигрират към бреговете на полуостров Крим и Кавказ, където се формират зимовищата на черноморската и азовската хамсия. Обикновеният буревестник посещава Черноморския басейн масово през лятото и пролетта, когато са регистрирани съответно 53.73 % и 46.01 % от срещаните през годината индивиди. Най-много са птиците през април (32.74 %) и юни (27.06 %). След това те постепенно намаляват, като през зимата в Черно море има най-малко обикновени буревестници.

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