Ichthyofauna of the Bulgarian Natural Lakes

1 author:

Tihomir Stefanov
Bulgarian Academy of Sciences
69 PUBLICATIONS **99** CITATIONS

SEE PROFILE

Ichthyofauna of the Bulgarian Natural Lakes

Tihomir Stefanov
National Museum of Natural History
Sofia, Bulgaria

Abstract

The ichthyofauna of the natural lakes in Bulgaria has been characterized based on both published and original data. The lakes that have been affected by the human activity and have therefore lost their natural features are not subject of the present work. The lakes are divided into six categories according to the origin of their lake kettles – glacial, riverside, coastal, tectonic, carst and landslide. Despite the fact that the total area of the Bulgarian natural lakes is very small – 95 sq. km (0,09% of the country's territory) 67 fish species belonging to 22 families have been reported for them up to date. This is by any measure a high diversity – more than 43% of all 154 freshwater fish species confirmed for Bulgaria. Richest in terms of species diversity are the coastal lakes – 50 species, while the poorest is the glacial lakes group – 5 species. A full faunistic list with notes on the origin and the conservation status of fish species has been given, as well as a short hydrological and biological characteristic of the different lakes.

Keywords: freshwater fishes, natural lakes, Bulgaria, species richness, conservation status

Introduction

Bulgaria is comparatively poor in natural lakes. Bigger groups of them are situated only in the Black Sea coastal area and in the higher parts of the mountains Rila and Pirin. The total area of the Bulgarian natural lakes is 95 sq. km, which is only 0,09% of the country's territory (Ivanov et al., 1964). In the present work the lakes are divided into six categories according to the origin of their lake kettles – glacial, riverside, coastal, tectonic, carst and landslide (Ivanov et al., 1964). The lakes that have been affected by the human activity and have therefore lost their natural features are not subject of the present work.

First information about the ichthyofauna of the natural lakes in Bulgaria was published by Drensky (1922, 1926), Nechaev (1932, 1943, 1944), Nechaev, Chernev (1938) and Valkanov (1935a,b, 1936, 1938a,b, 1941). Data on the fish species diversity in the natural lakes can be also found in the summary works of Kovatchev (1923), Morov (1931), Drensky (1948, 1951), Karapetkova, Zivkov (1995) and Karapetkova et al. (1998). The most complete information about the species composition of fishes in the Bulgarian Black Sea coastal lakes is given by Manolov-Gueorguiev (1967). Many authors investigated the ichthyofauna of different lakes in the country (the references are cited in the discussion).

Although the Bulgarian natural lakes are comparatively well investigated in ichthyological point of view, for many of them there is not actual information about species diversity and the state of the fish fauna nowadays. The goal of the present work is to make a review of the references concerning the ichthyological studies in the natural lakes in Bulgaria and based on them, as well as on original data, to characterize their ichthyofauna in regard to the species composition, origin and conservation status.

Study area

Glacial Lakes

Glacial lakes in the Rila Mountain.

Rila is the highest mountain in the Balkan Peninsula and it is situated in SW part of Bulgaria. The glacial lakes in the mountain are studied in morphological, hydrological, hydrochemical and biological point of view mainly by Ivanov et al. (1964), Valkanov (1966) and Naidenow (1975). A total of 140 permanent lakes and about 30 small and shallow lakes which dry up in the summer are located in the mountain in altitudes between 2100 and 2500 m a. s. l. (Ivanov et al., 1964). Most of the lakes are situated between 2300 and 2350 m a. s. l. – 28 lakes. Some of the glacial lakes are now dammed, such as Gorno Ribno Lake and Karagiolsko Lake and they have lost many of their natural characteristics. The surface area of the lakes varies between 0,1 and 21,2 ha (Smradlivoto Lake), and their depth amounts to values between 0,5 and 37,5 m. The temperature on the surface during the summer varies between 10 and 14°C and can reach 21°C (Granchar Lake). Oxygen content in the water of the lakes is between 7,75 – 9,79 mg/l (Ivanov et al., 1964). Oxidability, total hardness of the

water and mineral content are low. The value of pH varies between 6,7 and 7,2. The lakes have a short vegetation period and comparatively low biological productivity (Kozuharov, Naidenow, 1979).
Glacial lakes in the Pirin Mountain.
Pirin Mountain is situated in SW Bulgaria on the south of the Rila Mountain. The glacial lakes in the mountain were investigated by Ivanov et al. (1964). There are a total of 119 permanent lakes and 45 small lakes, which usually dry up in summer. About 90% of the lakes are located between 2100 and 2450 m a. s. l. The surface area of the lakes varies between 0,1 and 12,4 ha (Popovo Lake) and the area of only 8 lakes is more than 5 ha. The maximum depth of the lakes is between 0,5 and 29,5 m (Popovo Lake). The temperature on the surface during summer varies between 11 and 14°C but it can reach 17°C. Oxygen content on the surface in the middle of the lakes is between 8,64 – 10,8 mg/l (Goliamo Valiavishko Lake). The value of pH varies between 6,5 and 7,4. Oxydability and the total hardness of water are low (Ivanov et al., 1964).

Riverside Lakes
The main region with riverside lakes in Bulgaria was the Danube River area. In the past there were many marshlands and riverside lakes near the Bulgarian sector of the river. Almost all of them are drained up in the period 1930 – 1949 through water pump stations, drainage channels and dykes and now they are mainly agricultural lands. Some of them like Orsoya Marsh, Kalimok, etc. have been changed into fishponds and have completely lost their natural characteristics.
Srebarna Lake.
The only lake, which remains after the drying of the Danube lowlands is Srebarna Lake, situated close to the Danube River between 393rd and 391st river km. It is a freshwater hypereutrophic basin with an area of about 2,5 sq. km. Its depth is quite variable and in the central part of the lake at law water level is about 0,7 m, whereas at high water level it can reach 1,5 m. The great part of the lake is overgrown with macrophytes like *Phragmytes australis*, *Typha spp.*, *Hydrocharis morsus ranae*, *Nymphea alba*, *Potamogeton spp*. Till 1949 Srebarna Lake was directly connected with Danube River, but in 1949 a construction of a dyke separated the lake. This caused a fall in the level of the lake by 1,5 m (Bulgurkov, 1958). After this period the water volume of the lake was supplied only by rainfalls and small underwater carst springs. In 1978 the connection was partially restored through braking of the dyke, but Danubian water penetrated rarely into the lake because of the high level of the channel and the regulations made in the Danube River flow. In the period 1992-1992 the lake almost run dry and after that in 1994 it was reconnected to the Danube river through constructing a new hydraulic system (Pehlivanov, 2000). The temperature of the water varies between 0 and 28°C, and pH between 7,5-9,6. There are also huge variations in the oxygen content in the water. Usually it is between 4 and 10 mg/l but after the algae blossoming during summer it can fall close to 0 mg/l (Ivanov et al., 1964).

Coastal Lakes
There are 18 lakes and marshlands along the Bulgarian Black Sea coast (Ivanov et al., 1964). According to their origin they are divided into two main categories – lagoons and limans. The latter can be open and closed (separated from the sea with sandbank). The most important coastal lakes in ichthyological point of view are Durankulak Lake, Shabla and Ezeretz Lake, Beloslavsko Lake, Varnensko Lake, Pomoriisko Lake, Atanasovsko Lake, Burgasko Lake (Vaia), Mandra and Ropotamo complex. Beloslavsko Lake, Varnensko Lake and Mandra are not subject of the present work because they have been affected by the human activities. Varnensko Lake was connected with the Black Sea through channel for the first time in 1909. After that in 1923 a second channel was dug and this lake was connected with Beloslavsko Lake, which caused increasing of the salinity of the freshwater to this moment Beloslavsko Lake. After 1976 a sailing route was constructed to connect the both lakes with the sea. In the recent days Beloslavsko and Varnensko Lakes have a characteristics of sea bay. Mandra was an open firth lake till 1962, connected with the sea via deep channel. In 1962 the lake was dammed and great part of it was turned into reservoir. Only very small part in the most eastern end of the firth called Uzungeren has remained natural and connected with the sea.
Durankulak Lake.
The Durankulak Lake is the northernmost among the Bulgarian Black Sea coastal lakes and it is situated close to the Romanian border. It is closed liman with low salinity separated from the sea by a sandbank about 100-200 m wide. The total surface area of the lake is 3,4 sq. km. The average depth is about 1,4 m and the maximum – 4 m. The water level of the lake is about 40 cm higher than the sea level. The average pH is about 8,6 and the dissolved oxygen ranges from 4 to 11 mg/l (Ivanov et al., 1964). Mainly rainfalls and small springs form the influx share of water balance of the lake. Only a small amount of sea water infiltrates through the sand strip. The average salinity of Durankulak Lake

in the 50s and the 60s was about 2‰ and it could reach even 4‰ at the end of the summer. Until the end of the 60s the lake had been directly connected with the sea at the time of high spring waters by breaking the sand bar. In the 70s a dike was constructed on the lowest part of the sandbank, which broke the possibility for the connection with the sea. There was not direct flow of seawater since 1979 and as a result of this the average salinity decreased four times to about 0,56‰ (Naidenow, Saiz, 1984).

Shabla and Ezeretz Lakes.

The two lakes are situated in the North Black Sea coast of Bulgaria and they are connected into a unified lake system through s small channel. They are supplied by rains and mainly by underwater carst springs. The length of the lake system is 4,3 km and its surface area about 1,5 sq. km. During the highest water level in the spring it is about 50-80 cm above the sea level. The annual temperature fluctuations are 27,1°C. The salinity varies from 0,5 to 2‰ and pH values from 7,6 to 8,6 and are always little higher in Ezeretz (Naidenow, Profirov, 1998). The average depth of the lake system is 4 m (9,5 m maximal) and the dissolved oxygen ranges for the period 1992-1994 were 5,94-6,68 mg/l (Vassilev, 1998).

Pomoriisko Lake.

This is a small hypersaline lagoon lake situated in the North of the town of Pomorie. In the closest part to the town the lake is used for salt production. A small artificial channel controls the influx of marine water in the lake. The total surface area of the lake is about 6,7 sq. km. The lake is quite shallow – its maximum depth is 1,4 m and its average depth is about 0,6 m. The water level of the lake is about 70-80 cm below the sea level. The average salinity of Pomoriisko Lake is about 50‰ and it decreases during spring to 30‰ and highly increases at the end of the summer to 70-80‰. The summer salinity of this part of the lake, which is close to the town, is more than 100‰ (Ivanov et al., 1964).

Atanasovsko Lake.

Atanasovsko Lake is a hypersaline shallow lagoon situated very close to the Burgas Bay and the town of Burgas. The total area of the lake is about 16,9 sq. km and the depth is usually between 0,2 and 0,3 m (max depth is about 0,8 m). The average salinity is about 50-60‰ (Ivanov et al., 1964). It is divided into two parts by the Burgas-Varna road. The both parts have been salt pans since 1906. The lake lies about 1 m below the sea level. Small freshwater marshes and a system of channels overgrown with marsh vegetation surround the lake.

Burgasko Lake (Vaia).

Vaia is a shallow open liman, connected with the sea through a small channel. It is situated on the West side of the town of Burgas. This is the biggest Bulgarian Black Sea coastal lake. Its surface area is about 27,6 sq. km. The average depth of the lake is about 0,7 m and reaches maximum of 1,3 m. Vaia is a hypereutrophic lake. Its bottom is almost completely uniform, filled and levelled with liquid grey-black mud. The tickness of the mud is significant and reaches 17 m in central part of the lake. Three small rivers are flowing to the lake, but the inflow of fresh water in summer cannot compensate the evaporation. The salinity of the water is changing seasonally but usually it is about 10,5‰. Before 1956 the salinity was higher – approx. 14 ‰. In some dry years the salinity grows and it can reach even 45‰, like in 1950 (Ivanov et al., 1964). In summer and in the beginning of autumn sometimes a significant oxygen deficit is recorded. Huge seasonal fluctuations are typical for the temperature of the lake – up to 32°C. The pH values of the lake are between 8,9 and 9,5.

Ropotamo Complex.

The wetlands of the Ropotamo Complex include the marshes Alepu, Arcutino and Stamapolu. These are small eutrophic lagoons without a connection with the sea. They are situated south from the town of Sozopol and close to the mouth of Ropotamo River. The total surface of Alepu Marsh is 0,14 sq. km and its depth is between 0,6 and 1 m. it is separated from the sea with sandbank with width about 40-80 m. the inflow of freshwater is mainly by rainfalls during the spring. There is no inflow of marine water. The average salinity of the marsh is about 3,5‰, pH is between 8 and 8,6 (Ivanov et al.,1964). Arcutino Marsh is situated on 2,5 km NW from the mouth of Ropotamo River. Its total surface area is 0,03 sq. km and its depth is about 0,5 m. There is no connection of the marsh with the sea. This is a freshwater waterbody – average salinity is between 0,02 to 0,13‰. The main inflow of water is by rainfalls. Stamopolu Marsh is situated 1,5 km N from the town of Primorsko. Its surface area is about 0.06 sq. km and its average depth is about 0,5 m. The salinity of the marsh is about 4‰ but usually in the spring it decreases to 1,5‰.

Tectonic Lakes

There are only a few tectonic lakes in Bulgaria. The biggest and the only one of interest in ichthyological point of view is Rabisha. It is situated in the NW part of the country and it was the biggest inland lake in Bulgaria. Rabisha was completely closed water basin. It had neither surface

inflows nor outflows. It was filled by rains spring and lost water mainly through evaporation (Valkanov, 1938a). Now the lake is changed into reservoir for the needs of the irrigation system “Rabisha”. At present, water flows into the reservoir from two microdams through derivative channels.

Carst Lakes
There are not many surface carst lakes in Bulgaria. Most of them are underground and they are not well investigated till now. The biggest group of such lakes is Devetashki Lakes. The group contains few very small lakes, which do not possess a native ichthyofauna.

Landslide Lakes
The landslide lakes in Bulgaria can be found mainly in the region of Western Rhodopes Mountain. There are two groups of these lakes – Smolianski Lakes and Chairski Lakes.
Smolianski Lakes are located in the catchment of the Cherna River at altitudes between 1100-1590 m a. s. l. In the past the number of the lakes was 10, but recently some of them have been reconstructed as fish-farms and some of them have dried up. Water temperature in the vegetation period ranges between 10,8 and 22,2°C. The value of pH is between 6-7. The concentration of dissolved oxygen in the water is high, the water is very soft and the phytoplankton and zooplankton are not very abundant (Ivanov et al., 1964, Naidenow, 1975, Naidenow, Saiz, 1983). The biggest and most interesting in ichthyological point of view are Samodivsko Lake, Trevisto Lake, Osmanovo Lake and Miloushevo Lake.
Chairski Lakes are located in the catchment of Chairska River close to the town of Trigrad, at an altitudes between 1500-1550 m a. s. l. Water temperature ranges between 5,0 and 16,8°C. The lakes have high concentration of dissolved oxygen (6,7-10,5 mg/l), low pH (6,1-6,1) and low values of total hardness (Ivanov et al., 1964, Naidenow, Saiz, 1983). Interesting in ichthyological point of view are the next three lakes – Sini Vir Lake, Zablateno Lake and Dolno Chairsko Lake.

Material and Methods
A total of 56 published sources were used in the present study. A review of references and discussion were presented separately for every natural lake. The classification of the lakes follows that, adopted by Ivanov et al. (1964).
The field studies in different lakes were carried out in the period 1999-2005. The fishes were sampled with gill nets (8, 20 and 30 mm mesh size) and a seine net (4 mm mesh size). In the field, samples were fixed in 4% formalin and after that in the laboratory, each specimen was measured, labeled and transferred into 70% alcohol solution for permanent preservation.
Classification of families is according to Nelson (1994) and names of species – according to Eschmeyer (1998, 2004) and FishBase (Froese, Pauly, Eds., 2005).

Discussion
Glacial Lakes
Glacial lakes in the Rila Mountain.
Information concerning the fish fauna is provided for the first time by Valkanov (1938b). He studied the occurrence of *S. trutta* in some of the lakes. Further Raikova-Petrova, Zivkov (1996) studied the age and growth rate of *Ph. phoxinus* in Granchar Lake. Raikova-Petrova (2000) studied the ichthyofauna in the glacial waters of Rila Mountains and found only two species in the lakes – *S. trutta* and *Ph. phoxinus*. The ichthyofauna of the Rila Mountain Lakes is very poor (Table 1). In the past the lakes were stocked regularly with *S. trutta*, *S. fontinalis* and *O. mykiss*, but recently, as a result of poaching and irregular stocking the density of populations of the salmonid species have decreased. Only *Ph. phoxinus* maintains self-sustainable population (Trichkova et al., in press). During our research we found all the four species listed above.

Table 1. Ichthyofauna of the glacial lakes in the Rila Mountain

Species	**Published data**	**Our data**
Cyprinidae		
1. *Ph. phoxinus*	+	+
Salmonidae		
2. *O. mykiss*		+
3. *S. trutta*	+	+
4. *S. fontinalis*		+

Glacial lakes in the Pirin Mountain

There are almost no published data about the ichthyofauna of Pirin Lakes. Scarce information about the presence of *S. trutta* in the Pirin Lakes can be found in the works of Drensky (1922, 1948, 1951). Karapetkova, Marinov (1991) found the species *L. souffia* in Dolno Kremensko Lake. According to the authors it must be a relic species for Bulgaria. Only two specimen of this species were caught on the 1st of July 1988. Later this species have never been discovered again. During our investigations (2001-2002) on the territory of Pirin Mountain *L. souffia* was not established. We think that this relic species disappeared because of the introduction of aggressive species of fish like *O. mykiss* and *S. fontinalis* almost everywhere in the lakes of Pirin, for which *L. souffia* is easy prey. Probably Dolno Kremensko Lake was one of its final refuges, because it is one of the biggest and deepest lakes in the mountain, with a lot of places for hiding. In the same work the authors provide information about the other species of fish, which were caught together with *L. souffia*. These are *S. fontinalis* and *Ph. phoxinus*. During our surveys in the region we found at least 4 species (Table 2).

Table 2. Ichthyofauna of the glacial lakes in the Pirin Mountain.

Species	**Published data**	**Our data**
Cyprinidae		
1. *L. souffia*	+	
2. *Ph. phoxinus*	+	+
Salmonidae		
3. *O. mykiss*		+
4. *S. trutta*	+	+
5. *S. fontinalis*	+	+

Riverside Lakes

Srebarna Lake.

The first complete information about the ichthyofauna of Srebarna Lake was provided by Bulgurkov (1958). The author gave data about the fish species composition in the lake before 1949 when it was connected with the Danube River. According to Bulgurkov (1958) after the construction of the dyke, Srebarna lost its importance for the fisheries and many Danube species like *A. pontica, A. anguilla, G. cernuus* and *S. lucioperca* disappeared from the lake. The annual catches in the lake in the past reached 20-30 up to 50 t. The predominant fish species in this period were *C. carpio*, *S. erythrophthalmus*, *R. rutilus*, *Ch. chalcoides*, etc. After the separation, the annual catches dramatically fell down. The synopsis of the predominant species had also changed. During the catches at the end of 1952 and the beginning of 1953 most frequent species were *S. erythrophthalmus*, *Ch. chalcoides*, *C. carassius*, *A. brama*, etc. In the same period the lake was inhabited by 19 species of fish, belonging to 7 families (Bulgurkov, 1958). More than 40 years later Pehlivanov (2000) found 20 fish species, belonging to 7 families in the lake. Five of the species were reported for the first time for Srebarna, and there were also some extinct species (Table 3). According to Pehlivanov (2000) the most numerous and stable fish populations were those of small-sized with low economical value. Valuable species as *C. carpio, S. lucioperca* and *A. brama* were represented by sparse and unstable populations, formed mainly by small-sized specimens. New species for Srebarna Lake, found by Pehlivanov (2000) were *A. alburnus*, *L. delineatus*, *C. gibelio*, *N. melanostomus* and *P. platygaster*. Later Velkov et al. (2004) found the species *U. krameri* in the channel connecting the lake with the Danube River. Last compiled work for the ichthyofauna of Srebarna Lake was made by Pehlivanov et al. (2005). The authors made comparison with the previous works and identified the main factors influencing the development of the fish community. They found at least 24 species from 11 families (Table 3). It is interesting that some typical Danube species like *A. pontica* and *G. cernuus* were found again in the lake due to the reconnection with the Danube River.

A total of 29 species belonging to 11 families are reported for the Srebarna Lake till now. Most numerous family is Cyprinidae (15 species), followed by Percidae and Gobiidae (3 species). All the results are summarized in Table 3. We exclude from the list the species *Rutilus heckeli* published by Bulgurkov (1958) and Pehlivanov (2000), because its validation as a distinct species/subspecies is questionable (Kottelat, 1997). We cannot accept also the presence of *Gymnocephalus schraetser* published by Pehlivanov (2000) for the period before 1949, because there were no serious evidence for this.

Table 3. Ichthyofauna of the Srebarna Lake

Species	**Till 1949**	**Bulgurkov**	**Pehlivanov**	**Pehlivanov**

		(1958)	(2000)	et al. (2005)
Angullidae				
1. *A. anguilla*	+			
Clupeidae				
2. *A. pontica*	+			+
Cyprinidae				
3. *A. brama*	+	+	+	+
4. *A. sapa*	+	+		
5. *A. alburnus*			+	+
6. *A. aspius*	+	+		+
7. *B. bjoerkna*	+	+		
8. *C. carassius*	+	+	+	+
9. *C. gibelio*			+	+
10. *Ch. chalcoides*	+	+	+	+
11. *C. carpio*	+	+	+	+
12. *L. delineatus*			+	+
13. *L. idus*	+	+		
14. *Rh. amarus*	+	+	+	+
15. *R. rutilus*	+	+	+	+
16. *S. erythrophthalmus*	+	+	+	+
17. *T. tinca*	+	+	+	
Cobitidae				
18. *M. fossilis*	+	+	+	+
Siluridae				
19. *S. glanis*	+	+		+
Esocidae				
20. *E. lucius*	+	+	+	+
Umbridae				
21. *U. krameri*				+
Gasterosteidae				
22. *P. platygaster*			+	+
Centrarchidae				
23. *L. gibbosus*		+	+	+
Percidae				
24. *G. cernuus*	+		+	+
25. *P. fluviatilis*	+	+	+	+
26. *S. lucioperca*	+		+	+
Gobiidae				
27. *N. fluviatilis*		+	+	+
28. *N. melanostomus*			+	+
29. *Pr. marmoratus*				+

Coastal Lakes

Durankulak Lake.

Scarce information about the ichthyofauna of Durankulak Lake can be found in the works of Valkanov (1941), Aleksandrova (1967) and Ivanov (1968). The first complete reference about the species composition of the lake was made by Manolov-Gueorguiev (1967). He found 21 species, belonging to 10 families. A total of 16 species were listed as permanent inhabitants of the lake. At this time Durankulak Lake was connected with the sea and in the high water levels some marine species from the families Mugilidae, Atherinidae and Pleuronectidae entered the lake. According to Manolov-Gueorguiev (1967) the predominant species were *C. carpio* and *C. gibelio* and the most rare were *V. vimba* and *Ch. chalcoides*. In the recent times ichthyological investigations in Durankulak Lake were implemented by Vassilev (1999) who found 17 species, belonging to 7 families. Four species of fish were new for the lake – the introduced *C. idella*, *H. molitrix* and *G. holbrooki,* as well as the native *G. aculeatus*. On the other side, all the temporary inhabitants (*L. aurata*, *L. saliens*, *M. cephalus*, *A. boyeri* and *P. flesus*) disappeared from the lake after the breaking of the connection with the sea and the decreasing of the salinity. The species *C. cultriventris*, *Ch. chalcoides* and *V. vimba* were also extinct, but the reasons for their extinction were not very clear (Vassilev, 1999). The presence of the wild form of *C. carpio* is doubtful. It is probably totally replaced by the artificially stocked “cultivated” form. The first stocking with carp in Durankulak Lake was made at the end of the 60s (Manolov-

Gueorguiev, 1967). However, there were some specimens in the lake, which resemble phenotypically the wild form (Vassilev, 1999). According to Vassilev (1999) most numerous in the lake were the following species: *R. rutilus*, *S. erythrophthalmus*, *P. fluviatilis*, *K. caucasica*, *N. melanostomus*, *Pr. marmoratus* and *S. abaster*.

A total of 25 species belonging to 11 families are reported for the Durankulak Lake till now. Most numerous family is Cyprinidae (8 species), followed by Gobiidae (4 species). All the results are summarized in Table 4. The status of the species *N. platyrostris* in Bulgaria is not very clear and it is marked with [?] and the temporary species are marked with [T].

Table 4. Ichthyofauna of the Durankulak Lake.

Species	**Manolov-Gueorguiev (1967)**	**Vassilev (1999)**
Clupeidae		
1. *C. cultriventris*	+	
Cyprinidae		
2. *C. gibelio*	+	+
3. *Ch. chalcoides*	+	
4. *C. idella*		+
5. *C. carpio*	+	+
6. *H. molitrix*		+
7. *R. rutilus*	+	+
8. *S. erythrophthalmus*	+	+
9. *V. vimba*	+	
Siluridae		
10. *S. glanis*	+	+
Mugilidae		
11. *L. aurata* T	+	
12. *L. saliens* T	+	
13. *M. cephalus* T	+	
Atherinidae		
14. *A. boyeri* T	+	
Poecilidae		
15. *G. holbrooki*		+
Gasterosteidae		
16. *G. aculeatus*		+
17. *P. platygaster*	+	+
Syngnathidae		
18. *S. abaster*	+	+
Percidae		
19. *P. fluviatilis*	+	+
20. *S. lucioperca*	+	+
Gobiidae		
21. *K. caucasica*	+	+
22. *N. melanostomus*	+	+
23. *N. platyrostris* ?	+	+
24. *Pr. marmoratus*	+	+
Pleuronectidae		
25. *P. flesus* T	+	

Shabla and Ezeretz Lakes.

The first information about the ichthyofauna of Shabla and Ezeretz Lakes is provided by Valkanov (1941). Seven species were found by the author. Later Gueorguiev (1953) established the species *B. brauneri* in the lake. The most complete study of the ichthyofauna of Shabla and Ezeretz Lakes was made by Manolov-Gueorguiev (1967) who found 20 species belonging to 12 families. Of them 15 species were listed as permanent inhabitants and another 5 species as temporary ones (Table 5). The predominant species were *C. carpio*, *A. brama*, *E. lucius*, *S. glanis* and *P. fluviatilis*. Next investigations in the region were implemented by Vassilev (1998) who found 21 species, belonging to 9 families. Eight of these species were not reported for the lakes by Manolov-Gueorguiev (1967). The species *C. idella*, *H. molitrix, S. lucioperca* and *G. holbrooki* were stocked additionally with purpose for

aquaculture and mosquito control. *C. gibelio* and *Rh. amarus* inhabited the lake probably after its stocking with *C. carpio* during the 70s and 80s (Vassilev, 1998). *R. rutilus* was not listed by Manolov-Gueorguiev (1967), but according to Ivanov, Ivanova (1967) this was a common species in Shabla and Ezeretz Lakes. The species *K. longecaudata* found by Vassilev (1998) was also new for the lakes. It was considered as extinct from Bulgaria according to the Bulgarian Red Book. Now Shabla and Ezeretz Lakes are its only place of distribution in the country. All the temporary species from the families Mugilidae, Atherinidae and Pleuronectidae disappeared from the lakes because of the lack of direct contact with the sea and decreasing of salinity (Vassilev, 1998). The species *P. platygaster* and *B. brauneri* are also extinct from the lakes. For the latter Shabla and Ezeretz Lakes were the only habitats in Bulgaria and this means that this species are now extinct from Bulgarian ichthyofauna. According to Vassilev (1998) the most numerous species in the recent times are *S. erythrophthalmus*, *R. rutilus*, *P. fluviatilis*, *K. caucasica*, *N. melanostomus*, *N. gymnotrachelus*, *Pr. marmoratus* and *S. abaster*.

A total of 28 species belonging to 13 families are reported for the Shabla and Ezeretz Lakes till now. Most numerous family is Cyprinidae (8 species), followed by Gobiidae (6 species). All the results are summarized in Table 5. All the temporary species are marked with [T].

Table 5. Ichthyofauna of the Shabla and Ezeretz Lakes.

Species	**Valkanov (1941)**	**Manolov-Gueorguiev (1967)**	**Vassilev (1998)**
Clupeidae			
1. *C. cultriventris*	+	+	+
Cyprinidae			
2. *A. brama*		+	+
3. *C. gibelio*			+
4. *C. idella*			+
5. *C. carpio*	+	+	+
6. *H. molitrix*			+
7. *Rh. amarus*			+
8. *R. rutilus*			+
9. *S. erythrophthalmus*	+	+	+
Cobitidae			
10. *M. fossilis*		+	+
Siluridae			
11. *S. glanis*	+	+	+
Esocidae			
12. *E. lucius*	+	+	+
Mugilidae			
13. *L. aurata* T		+	
14. *L. saliens* T		+	
15. *M. cephalus* T		+	
Atherinidae			
16. *A. boyeri* T		+	
Poecilidae			
17. *G. holbrooki*			+
Gasterosteidae			
18. *P. platygaster*		+	
Syngnathidae			
19. *S. abaster*	+	+	+
Percidae			
20. *P. fluviatilis*	+	+	+
21. *S. lucioperca*			+
Gobiidae			
22. *K. caucasica*		+	+
23. *K. longecaudata*			+
24. *N. melanostomus*		+	+
25. *N. gymnotrachelus*		+	+
26. *Pr. marmoratus*		+	+
27. *B. brauneri*		+	

Pleuronectidae 28. *P. flesus* T		+	

Pomoriisko Lake.
Information about the ichthyofauna of Pomoriisko Lake can be found in the works of Nechaev, Chernev (1938), Aleksandrova (1967) and Manolov-Gueorguiev (1967). Aleksandrova (1967) investigated the species of the family Mugilidae in the lake. Three species of mullets were found from which *L. aurata* predominated. According to Manolov-Gueorguiev (1967) the lake was inhabited permanently only by one species – *K. caucasica*. Irregularly from the sea entered the species *L. aurata*, *L. saliens, M. cephalus* and *A. boyeri.* During our field research in the last years four permanent species of fish are found in the Pomoriisko Lake (Table 6). Two of them are found for the first time here – *Pr. marmoratus* and *Z. ophiocephalus*.
A total of 7 species belonging to 3 families were reported for the Pomoriisko Lake till now. The lake is comparatively poor in ichthyofauna because of its extremely high salinity (up to more than 100‰ in some parts of the lake during summer). All the results are summarized in Table 6. The temporary species are marked with [T].

Table 6. Ichthyofauna of the Pomoriisko Lake.

Species	**Published data**	**Our data**
Mugilidae		
1. *L. aurata* T	+	
2. *L. saliens* T	+	
3. *M. cephalus* T	+	
Atherinidae		
4. *A. boyeri*	+	+
Gobiidae		
5. *K. caucasica*	+	+
6. *Z. ophiocephalus*		+
7. *Pr. Marmoratus*		+

Atanasovsko Lake.
There are no published data about the ichthyofauna of the Atanasovsko Lake. During our investigations in the last years a total of 8 species of fish, belonging to 6 families have been established. All the species inhabit the lake permanently. Although it is a hypersaline lagoon a few typical freshwater fishes like *C. gibelio*, *P. parva* and *L. gibbosus* were found. They live in the small freshwater marshes and in the system of freshwater channels, which surround the lake. The predominant species in Atanasovsko Lake are *K. caucasica* and *G. aculeatus. C. gibelio* is the main species in the channel system. All the results are summarized in Table 7.

Table 7. Ichthyofauna of the Atanasovsko Lake.

Species	**Our data**
Cyprinidae	
1. *C. gibelio*	+
2. *P. parva*	+
Poecilidae	
3. *G. holbrooki*	+
Gasterosteidae	
4. *G. aculeatus*	+
5. *P. platygaster*	+
Syngnathidae	
6. *S. abaster*	+
Centrarchidae	
7. *L. gibbosus*	+
Gobiidae	
8. *K. caucasica*	+

Burgasko Lake (Vaya).
First data on the ichthyofauna of the Vaya Lake were given by Saschev, Angelov (1957/1958) who found 23 species from 14 families. Many of the species were with marine origin due to the big

fluctuation in the salinity at this time and the connection with the sea via channel. In the period 1954-1957 the salinity of the lake was reached 18,4‰ and species like *B. belone*, *P. saltatrix, T. mediterraneus, S. scomrus, Rh. maeoticus*, species from the family Mugilidae, etc. entered from the sea (Saschev, Angelov, 1957/1958). Later ichthyological surveys were made by Manolov-Gueorguiev (1967) who found 29 species belonging to 12 families. According to the author only a small part of the ichthyofauna survived after the irregular increasing of the salinity of the lake. Such species were *C. cultiventris*, *G. aculeatus*, *P. platygaster*, *S. abaster*, *K. caucasica*, *N. melanostomus*, *N. fluviatilis*, *Pr. marmoratus* and *Z. ophiocephalus*. The typical freshwater and brakish species usually died in the years with high salinity of the water. In the past in the years of extremely high waters sometimes both Lakes Mandra and Vaya became connected. In such a case in 1956 some freshwater species (*C. gibelio*, *Ch. chalcoides*, *C. carpio*, *S. erythrophthalmus*, *V. vimba*, *S. lucioperca*, *N. syrman*) migrated from Mandra to Vaya Lake (Manolov-Gueorguiev, 1967). The temporary species in the same period were *L. aurata*, *L. saliens*, *M. cephalus*, *A. boyeri* as well as *P. saltatrix*, *T. mediterraneus*, *P. minutus*, *P. marmoratus*, *G. niger* and *P. flesus*. During our investigations in the last years 19 species belonging to 9 families were found. Six of the species were not reported from Vaya Lake before (Table 8). Almost all of them are typical freshwater species – *H. molitrix*, *P. parva*, *R. rutilus*, *C. strumicae* and *L. gibbosus*, because of the low salinity of the lake in the recent years. This is the reason for the extinction of all temporary species. A single specimen of *A. anguilla* was also caught in the last years (Mihov, pers. com.). All of the ichthyofauna of the Vaya Lake was destroyed after the pollution from the Petrol refinery in the town of Burgas in the recent years. The species complex, which inhabits the lake now was formed due to artificial stocking and migrating of the ichthyofauna from the adjacent freshwater wetlands.

A total of 40 species belonging to 18 families are reported for the Burgasko Lake till now, but most of the listed species are disappeared nowadays. Most numerous family is Cyprinidae (10 species), followed by Gobiidae (9 species). All the results are summarized in Table 8. All the temporary species are marked with [T].

Table 8. Ichthyofauna of the Burgasko Lake.

Species	**Saschev, Angelov (1957/1958)**	**Manolov-Gueorguiev (1967)**	**Our data**
Anguillidae			
1. *A. anguilla* T			+
Clupeidae			
2. *C. cultriventris*	+	+	
Cyprinidae			
3. *C. gibelio*	+	+	+
4. *Ch. chalcoides*	+	+	+
5. *C. idella*		+	+
6. *C. carpio*	+	+	+
7. *H. molitrix*			+
8. *P. parva*			+
9. *R. rutilus*			+
10. *S. erythrophthalmus*	+	+	
11. *T. tinca*		+	
12. *V. vimba*		+	
Cobitidae			
13. *C. strumicae*			+
Mugilidae			
14. *L. aurata* T	+	+	
15. *L. saliens* T	+	+	
16. *M. cephalus* T	+	+	
Atherinidae			
17. *A. boyeri*	+	+	+
Belonidae			
18. *B. belone* T	+		
Poecilidae			
19. *G. holbrooki*		+	+
Gasterosteidae			
20. *G. aculeatus*	+	+	+

21. *P. platygaster*	+	+	
Syngnathidae			
22. *N. ophidion* T	+		
23. *S. abaster*		+	
Centrarchidae			
24. *L. gibbosus*		+	+
Percidae	+	+	+
25. *P. fluviatilis*			
26. *S. lucioperca*			+
Pomatomidae			
27. *P. saltatrix* T	+	+	
Carangidae			
28. *T. mediterraneus* T	+	+	
Gobiidae			
29. *G. niger* T		+	
30. *K. caucasica*	+	+	+
31. *N. fluviatilis*	+	+	+
32. *N. melanostomus*	+	+	+
33. *N. syrman*		+	
34. *P. marmoratus* T		+	
35. *P. minutus* T		+	
36. *Pr. marmoratus*		+	+
37. *Z. ophiocephalus*	+	+	
Scombridae			
38. *S. scombrus* T	+		
Scophthalmidae			
39. *P. maxima* T	+		
Pleuronectidae			
40. *P. flesus* T	+	+	

Ropotamo Complex.

Information concerning the ichthyofauna of the three studied coastal marshes was provided only by Pehlivanov (1999). The author found a total of 9 species belonging to 5 families. The reason for this lower species diversity is the absence of direct connection between these wetlands and the sea and the lack of temporary inhabitants in them. With lowest species diversity was Arcutino Marsh as a result of its drying out in 1995. Only two species were found in it – *G. aculeatus* and *G. holbrooki*. Richest in species was the largest of the three marshes – Alepu. Six species, mainly typical freshwater inhabitants, were found in it. Common species among them were *C. gibelio*, *S. erythrophthalmus* and *G. holbrooki*. *C. carpio* is a rare species in recent times. The species *G. aculeatus* and *P. fluviatilis* were also found. In the past Stamopolu Marsh was used for pisciculture and in 1991 it was stocked with *C. carpio* and *T. tinca*. Another three, non-indigenous for Bulgarian ichthyofauna species, were found in it – *P. parva*, *G. holbrooki* and *L. gibbosus* (Pehlivanov, 1999).

All the results are summarized in Table 9.

Table 9. Ichthyofauna of the Ropotamo Complex marshlands.

Species	**Pehlivanov (1999)**
Cyprinidae	
1. *C. gibelio*	+
2. *C. carpio*	+
3. *P. parva*	+
4. *S. erythrophthalmus*	+
5. *T. tinca*	+
Poecilidae	
6. *G. holbrooki*	+
Gasterosteidae	
7. *G. aculeatus*	+
Centrarchidae	
8. *L. gibbosus*	+
Percidae	

9. *P. fluviatilis*	+

Tectonic Lakes
The biggest and the only one of interest in ichthyological point of view tectonic lake in Bulgaria is Rabisha. Now the lake is changed into reservoir for the needs of the irrigation system "Rabisha" and it is not subject of this work. In the past its ichthyofauna was studied only by Valkanov (1938a) and Angelov (1956) who reported only three species – *C. carpio*, *S. erythrophthalmus* and *S. glanis*. After the lake was transformed into a reservoir in 1963, ichthyological research was carried out by Trichkova et al. (2001). A total of 10 species belonging to 4 families were listed – *A. alburnus*, *A. nobilis*, *C. gibelio*, *C. idella*, *C. carpio*, *G. gobio*, *R. rutilus*, *S. glanis*, *P. fluviatilis* and *L. gibbosus*.

Carst Lakes
This group in Bulgaria contains only few, very small lakes, which do not possess native ichthyofauna.

Landslide Lakes
Smolianski Lakes.
Karapetkova (1987) implemented the first profound study of the ichthyofauna in the group of Smolianski Lakes. She found a total of 11 species belonging to 4 families. The most common species were the species *A. alburnus*, *C. carpio*, *L. cephalus* and *T. tinca*. During our investigation in the last years a total of 13 species have been found. Some of the species listed by Karapetkova (1987) like *T. tinca* and *C. lavaretus* were not found, but another 4 new species have been established – *P. parva*, *R. rutilus*, *E. lucius* and *P. fluviatilis*. The species *C. strumicae* was listed by Karapetkova (1987) under the name *Cobitis taenia*. In our opinion this species is not distributed in the waters belonging to the Aegean Sea watershed. The only cobitid species in Smolianski Lakes is *C. strumicae*, which is quite abundand now.
A total of 15 species belonging to 6 families are reported for the Smolianski Lakes till now. Most numerous family is Cyprinidae (8 species), followed by Salmonidae (3 species). All the results are summarized in Table 10.

Table 10. Ichthyofauna of the Smolianski Lakes.

Species	**Karapetkova (1987)**	**Our data**
Cyprinidae		
1. *A. alburnus*	+	+
2. *C. gibelio*	+	+
3. *C. idella*	+	+
4. *C. carpio*	+	+
5. *L. cephalus*	+	+
6. *P. parva*		+
7. *R. rutilus*		+
8. *T. tinca*	+	
Cobitidae		
9. *C. strumicae*	+	+
Esocidae		
10. *E. lucius*		+
Salmonidae		
11. *C. lavaretus*	+	
12. *O. mykiss*	+	+
13. *S. trutta*	+	+
Centrarchidae		
14. *L. gibbosus*		+
Percidae		
15. *P. fluviatilis*	+	+

Chairski Lakes.
Only Karapetkova (1987) provided information about the ichthyofauna of Chairski Lakes. A total of 8 species belonging to 2 families were established. According to the author the most numerous were cyprinids. The lakes were stocked with *C. carpio*, *O. mykiss*, *S. trutta* and *S. fontinalis*. The origin of the other species is not very clear (Karapetkova, 1987).
All the results are summarized in Table 11.

Table 11. Ichthyofauna of the Chairski Lakes.

Species	**Karapetkova (1987)**
Cyprinidae	
1. *C. gibelio*	+
2. *C. carpio*	+
3. *G. gobio*	+
4. *L. cephalus*	+
5. *S. erythrophthalmus*	+
Salmonidae	
6. *O. mykiss*	+
7. *S. trutta*	+
8. *S. fontinalis*	+

Conclusions

A total of 67 species belonging to 22 families have been reported for the natural lakes in Bulgaria. The faunistic survey shows that 58 of the species are native for the Bulgarian ichthyofauna. One of them is Balkan endemic – *C. strumicae*. A total of 9 species are introduced with different purpose – pisciculture (*C. idella*, *H. molitrix*, *C. lavaretus*, *O. mykiss*, *S. fontinalis*), mosquito control (*G. holbrooki*) or accidentally together with the stocking material (*C. gibelio*, *P. parva*, *L. gibbosus*).

Some of the natural lakes in Bulgaria such as glacial lakes and landslide lakes support very low fish species diversity as well as a low abundance and biomass of the fish populations. In the group of the glacial lakes only 5 species are found and only 3 of them are native. Landslide lakes possess slightly rich ichthyofauna – 18 species. With highest species diversity is the group of Black Sea coastal lakes. A total of 50 species are found in them. The species composition in this group is enriched by the temporary migrating marine species, which occasionally or regularly entered in the lakes for feeding, reproduction and wintering – 15 species. Based on their origin the fish species from the coastal lakes belong to 5 different groups (Table 12). Most numerous is the group of Mediterranean immigrants (15 species), followed by Freshwater species (14 species), Ponto-Caspian relicts (12 species) and Boreal-Atlantic relicts (2species). Six species are not typical for Bulgarian ichthyofauna. Comparatively rich in species is also the group of riverside lakes – 29 species found in Srebarna Lake.

Despite the fact that the total area of the Bulgarian natural lakes is very small – 95 sq. km (0,09% of the country's territory) 67 fish species belonging to 22 families have been reported for them up to date (Table 12). This is by any measure a high diversity – more than 43% of all 154 freshwater fish species confirmed for Bulgaria (Vassilev, Pehlivanov, 2005). Many of the reported species have a high conservation status. 13 species are included in the Red Book of Bulgaria (Botev, Peshev, eds., 1985) – 2 species in the category "Rare", 10 species as "Endangered" and 1 species as "Extinct". A total of 18 species are listed in the different categories of IUCN Red List (IUCN, 2004) – of them 15 species in the category "Data Deficient", 2 species in the category "Low Risk" and one species in the category "Vulnerable". One species is included in Appendix II and 18 species in Appendix III of the Bern Convention and 7 species are included in Annexes II and V of the Council Directive 92/43 EEC (Table 12).

The ichthyofauna of the natural lakes in Bulgaria has great importance for the stable state of the biodiversity in the country. Most of the natural lakes are also important protected areas. But the fish species diversity undergoes constantly unfavorable changes as a result of environmental changes (changes in hydrological and hydrochemical characteristics of the lakes) and human pressure (pollution, poaching and overfishing). This shows the strong necessity of undertaking conservation activities in the natural lakes in Bulgaria in order to protect the native ichthyofauna, especially the species with high conservation status.

Table 12. List of the fish species occurring in Bulgarian natural lakes with their origin and conservation status. The next abbreviations are used. Origin: BA – Borel-Atlantic relict, E – Balkan endemic species, F – Freshwater species, I – Introduced species, MI – Mediterranean immigrant, PC – Ponto-Caspian relict. Conservation status: RB – Red Book of Bulgaria, EX – Extinct species, EN – Endangered species, RA – Rare species; IUCN – IUCN Red List of Threatened Species, DD – Data Deficient, LR – Lower Risk, VU – Vulnerable species; BERN – Bern Convention, Appendices II and III; DC 92/43 – Council Directive 92/43 of the EEC of the European Union, Annexes II and V. The status of the species *N. platyrostris* in Bulgaria is not very clear and it is marked with [?]. The temporary

species in the Black Sea coastal lakes are marked with [T]. [*] – information concerning only the wild populations of *C. carpio*.

Species	Origin	Conservation status			
		RB	IUCN	BERN	DC 92/43
Anguillidae					
1. *Anguilla anguilla* (Linnaeus, 1758) T	BA	EN			
Clupeidae					
2. *Alosa pontica* (Eichwald, 1838) T	PC		DD	III	II, V
3. *Clupeonella cultriventris* (Nordmann, 1840)	PC	EN	DD		
Cyprinidae					
4. *Abramis brama* (Linnaeus, 1758)	F				
5. *Abramis sapa* (Pallas, 1814)	F			III	
6. *Alburnus alburnus* (Linnaeus, 1758)	F				
7. *Aspius aspius* (Linnaeus, 1758)	F		DD	III	II
8. *Blicca bjoerkna* (Linnaeus, 1758)	F				
9. *Carassius carassius* (Linnaeus, 1758)	F		LR		
10. *Carassius gibelio* (Bloch, 1782)	I				
11. *Chalcalburnus chalcoides* (Gueldenstaedt, 1772)	PC	EN	DD	III	II
12. *Ctenopharyngodon idella* (Valenciennes, 1884)	I				
13. *Cyprinus carpio* Linnaeus, 1758	F	EN*	DD*		
14. *Gobio gobio* (Linnaeus, 1758)	F				
15. *Hypophthalmichthys molitrix* (Valenciennes, 1884)	I				
16. *Leucaspius delineatus* (Heckel, 1843)	F	EN		III	
17. *Leuciscus cephalus* (Linnaeus, 1758)	F				
18. *Leuciscus idus* (Linnaeus, 1758)	F				
19. *Leuciscus souffia* Risso, 1827	F			III	II
20. *Phoxinus phoxinus* (Linnaeus, 1758)	F				
21. *Pseudorasbora parva* (Temminck & Schlegel, 1842)	I				
22. *Rhodeus amarus* (Bloch, 1782)	F				II
23. *Rutilus rutilus* (Linnaeus, 1758)	F				
24. *Scardinius erythrophthalmus* (Linnaeus, 1758)	F				
25. *Tinca tinca* (Linnaeus, 1758)	F				
26. *Vimba vimba* (Linnaeus, 1758)	F			III	
Cobitidae					
27. *Cobitis strumicae* Karaman, 1955	E		DD		
28. *Misgurnus fossilis* (Linnaeus, 1758)	F		LR	III	II
Siluridae					
29. *Silurus glanis* Linnaeus, 1758	F			III	
Esocidae					
30. *Esox lucius* Linnaeus, 1758	F				
Umbridae					
31. *Umbra krameri* Walbaum, 1792	F		VU	II	
Salmonidae					
32. *Coregonus lavaretus* (Linnaeus, 1758)	I		DD	III	V
33. *Oncorhynchus mykiss* (Walbaum, 1792)	I				
34. *Salmo trutta* Linnaeus, 1758	F				
35. *Salvelinus fontinalis* (Mitchill, 1814)	I				
Mugilidae					
36. *Liza aurata* (Risso, 1810) T	MI				
37. *Liza saliens* (Risso, 1810) T	MI				
38. *Mugil cephalus* Linnaeus, 1758 T	MI				
Atherinidae					
39. *Atherina boyeri* Risso, 1810 T	MI	EN	DD		
Belonidae					
40. *Belone belone* (Linnaeus, 1761) T	MI				

Poecilidae					
41. *Gambusia holbrooki* Girard, 1859	I				
Gasterosteidae					
42. *Gasterosteus aculeatus* Linnaeus, 1758	BA	EN			
43. *Pungitius platygaster* (Kessler, 1859)	PC	EN		III	
Syngnathidae					
44. *Nerophis ophidion* (Linnaeus, 1758) T	MI				
45. *Syngnathus abaster* Risso, 1826	MI		DD	III	
Centrarchidae					
46. *Lepomis gibbosus* (Linnaeus, 1758)	I				
Percidae					
47. *Gymnocephalus cernuus* (Linnaeus, 1758)	F				
48. *Perca fluviatilis* Linnaeus, 1758	F				
49. *Sander lucioperca* (Linnaeus, 1758)	F				
Pomatomidae					
50. *Pomatomus saltatrix* (Linnaeus, 1766) T	MI				
Carangidae					
51. *Trachurus mediterraneus* (Steindachner, 1868) T	MI				
Gobiidae					
52. *Benthophiloides brauneri* Beling & Iljin, 1927	PC	RA	DD		
53. *Gobius niger* Linnaeus, 1758 T	MI				
54. *Knipowitschia caucasica* (Berg, 1916)	PC	EN			
55. *Knipowitschia longecaudata* (Kessler, 1877)	PC	EX			
56. *Neogobius fluviatilis* (Pallas, 1811)	PC		DD	III	
57. *Neogobius gymnotrachelus* (Kessler, 1857)	PC		DD		
58. *Neogobius melanostomus* (Pallas, 1814)	PC		DD		
59. *Neogobius platyrostris* (Pallas, 1814) ?	PC				
60. *Neogobius syrman* (Nordmann, 1840)	PC	RA	DD	III	
61. *Pomatoschistus marmoratus* (Risso, 1810) T	MI			III	
62. *Pomatoschistus minutus* (Pallas, 1770) T	MI			III	
63. *Proterorhinus marmoratus* (Pallas, 1814)	PC			III	
64. *Zosterisessor ophiocephalus* (Pallas, 1814)	MI		DD	III	
Scombridae					
65. *Scomber scombrus* Linnaeus, 1758 T	MI	EN			
Scophthalmidae					
66. *Psetta maxima* (Linnaeus, 1758) T	MI				
Pleuronectidae					
67. *Platichthys flesus* (Linnaeus, 1758) T	BA				

Acknowledgements

The author would like to thank the Bulgarian ichthyologists Teodora Trichkova, Stoyan Mihov and Dr. Milen Vassilev for the providing help, advises and references.

References

Aleksandrova K., 1967: Mullets in the lakes along the Bulgarian Black Sea coast. Proc. Res. Inst. Fish. and Oceanogr., Varna, 8: 263-293. (In Bulgarian)

Angelov A., 1956: Hydrologische und hydrobiologische Untersuchungen ueber den Rabischa-See. Ann. de l'Univ. de Sofia, Fac. Biol. Geol. Geogr., 59 (1): 1-30. (In Bulgarian, Russian and German summaries)

Botev B., T. Peshev (eds.), 1985: Red Book of the People's Republic of Bulgaria. Vol. 2. Animals. Sofia, BAS: 183 pp. (In Bulgarian)

Bulgurkov K., 1958: Hydrological peculiarities of the reservation of Lake Srebarna and composition of its fish fauna. Bull. de l`Inst. zool. de l`Academie des sciences de Bulgarie, Sofia, 7: 251-263. (In Bulgarian)

Council of Europe. Convention on the Conservation of European Wildlife and Natural Habitats. Bern, 19.09.1979.

Council of the European Communities. Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. 21 May 1992.
Drensky P., 1922: Fishes and fisheries in the Lakes of Varna, Gebedje, Karaach and Sultanlars. Inf. Agric., 3. (In Bulgarian)
Drensky P., 1926: Neue und seltene Fischarten aus Bulgarien. Trav. Soc. Bulg. Sci. Natur., Sofia, 12: 121-150. (In Bulgarian, German summary)
Drensky P., 1948: Synopsis and distribution of fishes in Bulgaria. Ann. de l'Univ. de Sofia, Fac. Phys. Math., 44 (3): 11-71. (In Bulgarian, English summary)
Drensky P., 1951: The fishes of Bulgaria. Fauna of Bulgaria, 2: 268 pp. (In Bulgarian)
Eschmeyer W.N. (Ed.), 1998: Catalog of fishes. Special Publication, California Academy of Sciences, San Francisco, 3 Vols., 2905 pp.
Eschmeyer W.N. (Ed.), 2004: Catalog of fishes. Updated database version of January 2004.
Froese R., D. Pauly (Eds.), 2005: FishBase. World Wide Web electronic publication. www.fishbase.org, Version (10/2005).
Gueorguiev J., 1953: Une forme inconnue dans l'ichthyofaune Bulgare – Benthophiloides brauneri Beling et Iljin. Bull. de l'Inst. de zool. de l'Academie des Scienes Bulgarie, Sofia, 2: 359-372. (In Bulgarian, French summary)
IUCN 2004. 2004 IUCN Red List of Threatened Species. (Computer Edition)
Ivanov K., A. Sotirov, A. Rozhdestvenski, D. Vodenicharov, 1964: Lakes in Bulgaria. Works Inst. Hydrol. Meteorol., Sofia, 242 pp. (In Bulgarian)
Ivanov L., 1968: The pikeperch (*Lucioperca lucioperca* L.) as a fishing object in our lakes near the Black Sea. Proc. Res. Inst. Fish. and Oceanogr., Varna, 9: 31-55. (In Bulgarian)
Ivanov L., G. Ivanova, 1967: Fish productivity in the largest Bulgarian lakes along the Black Sea coast and the efficiency of fishing in them. Proc. Res. Inst. Fish. and Oceanogr., Varna, 8: 295-323. (In Bulgarian)
Karapetkova M., 1987: Survey of the ichthyofauna in some natural lakes in the Rhodope Mountains (Smolyan and Chairski Ezera Lakes). pp. 107-110. In: Botev, B. (ed.), Modern Contributions to the Bulgarian Zoology, S., BAS, 400 pp. (In Bulgarian)
Karapetkova M., B. Marinov, 1991: A new species for the ichthyofauna in Bulgaria: *Leuciscus souffia* Risso, 1826. Hydrobiology, Sofia, 37: 75-78.
Karapetkova M., M. Zivkov, 1995: Fishes in Bulgaria. Gea-Libris Publ., S., 247 pp. (In Bulgarian)
Karapetkova M, M. Zivkov, K. Alexandrova-Kolemanova, 1998: The freshwater fishes of Bulgaria. In: Bulgaria's Biological Diversity: Conservation Status and Needs Assessment, Vol. 1 and 2 (C. Meine, ed.), Pensoft Publishers, 375-393.
Karapetkova M., M. Zivkov, G. Raikova-Petrova, E. Nikolova, 1995: Content of toxic elements in bioindicatory species of fish and amphibians from Rila Mountain. Observatoire de montagne de Moussala, OM2: 3: 212-214.
Kottelat M. 1997: European freshwater fishes. An heuristic checklist of the freshwater fishes of Europe (exclusive of former USSR), with an introduction for non-systematists and comments on nomenclature and conservation. Biologia, 52 (Suppl. 5): 1-271.
Kovatchev V., 1923: Faune des poissons d`eau douce en Bulgarie. Archives du Ministere de l`Agriculture, 3: 163 pp. (In Bulgarian)
Kozuharov S., V. Naidenow, 1979: Biological resources of Bulgaria. Narodna Prosveta Publ., Sofia, 182 pp. (In Bulgarian)
Manolov-Gueorguiev J., 1967: Composition d'espece de l'ichthyofaune des lacs Bulgares de la Mer Noire. Proc. Res. Inst. Fish. and Oceanogr., Varna, 8: 211-227. (In Bulgarian, Russian and French summaries)
Morov T., 1931: The freshwater fishes of Bulgaria. Union of Hunters and Fishermen of Bulgaria, Sofia: 93 pp. (In Bulgarian)
Naidenow V., 1975: Die Krebsartigen aus einigen Wasserbecken des Rila-Gebirges und Versuch zu einer biologischen Klassifikation. Hydrobiology, Sofia, 2: 46-65. (In Bulgarian, German summary)
Naidenow V., L. Profirov, 1998: The Shabla Lake System. In: Golemansky, V. & W. Naidenow (eds.), Biodiversity of Shabla Lake System, "Prof. Marin Drinov" Acad. Publ. House, Sofia, 5-6.
Naidenow V., D. Saiz, 1983: The plankton of stagnant waters in the Trigradsko-Yagodinski Region (Central Rhodopes). Hydrobiology, Sofia, 19: 3-13. (In Bulgarian, English summary)
Naidenow V., D. Saiz, 1984: The plankton as a basis for estimation of the possible natural fish productivity of Durankulak lake. Hydrobiology, Sofia, 21: 3-13. (In Bulgarian, English summary)
Nechaev A., 1932: The fish mortality in the Vajia Lake in the autumn 1931. Rybarsky Pregled, 6: 88-89. (In Bulgarian)

Nechaev A., 1943: Peculiarities of the Shabla Lake in fisheries aspect. Rybarsky Pregled, 5: 16. (In Bulgarian)
Nechaev A., 1944: The fishery in the Durankulack Lake. Rybarsky Pregled, 1-2. (In Bulgarian)
Nechaev A., S. Chernev, 1938: Le lac de Pomorie (Ankhialo). Proc. Exper. Ichth. Station, Sozopol, 7: 37-55. (In Bulgarian)
Nelson J., 1994: Fishes of the world. Wiley-Interscience Publ., New Work, 416 pp.
Pehlivanov L., 1999: State of the ichthyofauna in Ropotamo Reserve Complex: ecological, conservation and economic aspects. Water Science and Technology, 39 (8): 201-206.
Pehlivanov L., 2000: Ichthyofauna in the Srebarna Lake, the Danube Basin: state and significance of the management and conservation strategies of this wetland. Internat. Assoc. Danube Res., 33: 317-322.
Pehlivanov L., V. Vasilev, M. Vassilev, 2005: Changes of the ichthyofauna of Srebarna Lake during last 60 years. In: N. Chipev et al. (eds.), Proceedings of the First National Conference on Ecology, Sofia, 265-270. (In Bulgarian, English summary)
Raikova-Petrova G., 2000: The ichthyofauna in glacial waters of the Rila Mountains. In: Golemansky, V. & W. Naidenow (eds.), Biodiversity and Evolution of Glacial Water Ecosystems in the Rila Mountains, Academic Publishing House "Prof. Marin Drinov", Sofia, 75-78.
Raikova-Petrova G., M. Zivkov, 1996: Age and growth of minnow, *Phoxinus phoxinus* (L.), in the Beli Iskur Reservoir and Grunchar Lake of Rila National Park (Bulgaria). In: National Parks and their Role in Biodiversity Protection on the Balkan Peninsula, Ohrid, 127-129.
Saschev G., A. Angelov, 1957/1958: Untersuchungen ueber den Burgas-See (Waja) in Beziehung zur Verbesserung seiner fischwirtschaftlichen Ausbeutung. Ann. de l'Univ. de Sofia, Fac. Biol. Geol. Geogr., 51 (1): 161-210. (In Bulgarian, Russian and German summaries)
Trichkova T., G. Raikova-Petrova, M. Zivkov, 2001: Ichthyofauna and growth rate of dominant fish species in Rabisha Reservoir (Bulgaria). Arch. Biol. Sci., Belgrade, 53 (3-4): 87-90.
Trichkova, T., M. Zivkov, G. Raikova-Petrova, E. Uzunova, 2003: Characteristics of the ichthyofauna in the Bulgarian standing water basins. In: Michev, T., M. Stoyneva, eds., Bulgarian Wetlands Inventory (In press).
Valkanov A., 1935a: The Pomorie Lake. Rybarsky Pregled, 6: 84-86. (In Bulgarian)
Valkanov A., 1935b: The Pomorie Lake: its fisheries aspects. Rybarsky Pregled, 8: 116-119. (In Bulgarian)
Valkanov A., 1936: The Bourgas Lake. Rybarsky Pregled, 5: 69-71. (In Bulgarian)
Valkanov A., 1938a: Rabisha Lake. Ribarski Pregled, 8 (3): 41-42. (In Bulgarian)
Valkanov A., 1938b: Hydrobiologische Untersuchungen an einigen Hochgebirgsseen Bulgariens. Jahrb. Sof. Univ. Phys.-Math. Fakultat, 34 (3): 101-145. (In Bulgarian, German summary)
Valkanov A., 1941: Bulgarian lakes along the Black Sea coast in Dobrudja. Rybarsky Pregled, 6: 6-9. (In Bulgarian)
Valkanov A., 1966: Lakes. In: Geography of Bulgaria, Vol. 1, Physical Geography, Sofia, 308-320. (In Bulgarian)
Vassilev M., 1998: Alteration of the ichthyofauna in the Shabla and Ezerets Lakes. In: Golemansky, V. & W. Naidenow (eds.), Biodiversity of Shabla Lake System, "Prof. Marin Drinov" Acad. Publ. House, Sofia, 101-106.
Vassilev M., 1999: Changes of ichthyofauna in the Durankulak Lake. Acta zool. bulg., 51 (1): 61-68.
Vassilev M., L. Pehlivanov, 2005: Checklist of Bulgarian Freshwater Fishes. Acta zool. bulg., 57(2): 161-190.
Velkov B., L. Pehlivanov, M. Vassilev, 2004: Umbra krameri (Pisces: Umbridae): A Reinstated Species for the Bulgarian Ichthyofauna. Acta zool. bulg., 56 (2): 233-235.