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A Study on Fish Species of Sarıkum Lake in Sinop Province in the Black Sea Region

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Abstract: *This study was carried out between January and December 2009 in order to discover the fish species found in Sarıkum Lake of Sinop Province. Sampling activities were done by using multi-filament trammel nets, scoop nets and cast nets. As a result of the sampling, 9 species (Atherina boyeri, Liza aurata, Mugil cephalus, Planiliza haematocheila, Neogobius melanostomus, Aphanius marassantensis, Gasterosteus aculeatus, Cyprinus carpio and Platichthys flesus) were determined. Results were discussed with other studies.*

Keywords: *Sarıkum Lake, Freshwater fish species, Sinop Province* .

Karadeniz Bölgesi'ndeki Sinop İli, Sarıkum Gölünün Balık Türleri Üzerine Bir Araştırma

Öz: *Bu çalışma, Ocak ve Aralık 2009 tarihleri arasında Sinop İli Sarıkum Gölü'nde bulunan balık türlerini keşfetmek amacıyla gerçekleştirilmiştir. Örnekleme faaliyetleri, çok filamentli fanyalı ağlar, kepçe ağlar ve dökme ağlar kullanılarak gerçekleştirildi. Örnekleme sonucunda 9 tür (Atherina boyeri, Liza aurata, Mugil cephalus, Planiliza haematocheila, Neogobius melanostomus, Aphanius marassantensis, Gasterosteus aculeatus, Cyprinus carpio ve Platichthys flesus) belirlenmiştir. Sonuçlar diğer çalışmalarla tartışılmıştır.*

Anahtar sözcükler: *Sarıkum Gölü, Tatlısu balıkları, Sinop İli*

INTRODUCTION

Lagoons are special ecosystems with great ecological importance, and they undertake many functional tasks such as regulating the water regime of the region where they exist, providing housing facilities for characteristic plant and animal communities and creating a great resource for economic, cultural, scientific and recreational purposes (Sümer and Balık, 2007).

Sarıkum Lagoon Lake is located on the western coasts of the Sinop Peninsula (34° 54' 46"-34° 58' 22" E and 42° 00' 00"- 42° 02' 42" N) in the southern Black Sea Region. This lake and its surroundings are among the important bird areas of our country and are included in the (Special Protected Areas) list with number 49. According to the National Parks Law no. 2873, Lake Sarıkum and its surroundings have attracted attention as an important ecosystem due to its sea, coastal forest, lake and sand dune and wetland area with 826 ha. For this reason, this lake was declared as a Nature Conservation Area by the Ministry of Forestry in 1987. It contains about 20.000 birds during migration.

Lake Sarıkum has about 184.0 ha consisting of 102.0 ha surface and 82.0 ha marsh area. Various analyses have been performed on the water surface and waterbed of the lake. According to the results of the analyses, it has been determined that the water of the lake is brackish (0.3-0.4%) and contains sodium, clay and moderate lime, has high organic matter and potassium ratios, has clear appearance and color, is odor-free and non-potable, and that the lake bed is covered with 25-30 cm thick silage and silt. The lake water temperature has a mean annual change of 17.1 °C, reaching its lowest value by 6.9 °C in March and its highest value by 24.0 °C in August (Karaduman, 1993). A total area of 785 hectares was increased to a total of 826 hectares in 1991. This region first and second grade has been declared a natural protected area and all types of hunting is prohibited. The average depth of the lake does not exceed 2 m (Yardım *et al.*, 2008; Sıvacı *et al.*, 2008).

Lake Sarıkum is a coastal barrier lake (lagoon) formed as a result of the fact that the front side of the streams flowing into the old bay is closed by coastal dunes dragged by the waves and activated by northwest winds for many years. It is a shallow lake that is fed by small streams and flows into the sea through a small connection when the water level rises. The lake is fed by five streams. It has connections with the Keçideresi, Sarıkum Stream, inactive Karakurt Stream, Büyükdüz Stream, and Dereönü Stream which was opened by drainage to prevent lake water from overflowing (Bat *et al.*, 2006).

In the temperature measurements performed on various dates, water temperature was measured to be 19.1°C and 11.5°C, and the air temperature was measured to be 22.4°C and 16.3°C.

The presence of Mediterranean tooth-carp (*Aphanius marassantensis*), grey mullet species (*Mugil* sp., *Liza* sp.), goby fish (*Neogobius melanostomus*), flounder (*Platichthys flesus*), gasterosteus (*Gasterosteus aculeatus*), sand smelt (*Atherine boyeri*) and cyprinus (*Cyprinus carpio*) in Lake Sarıkum was revealed in another studies (Şendoğan, 2006; Yardım and Erdem, 2011).

MATERIAL and METHOD

This study was carried out in 2011. Fishing supplies such as spoon-net, seine net, trammel net, blind net or gillnet, cover net, pinter, fishing line, electric shock, etc. and various types of fishponds and traps are generally used in catching fish samples. Trammel net, cover net and seine were mostly used in catching the samples. Study area is shown in Fig. 1.

Trammel nets: These are three-layer nets made of fine-porous tor network made of thin nylon thread in the middle and thick yarn on both sides of it and consisting of large-meshed trammel net, and its top line is usually equipped with cork, and its lower line is mainly equipped with lead. Samples were caught using a network of approximately 100 m.

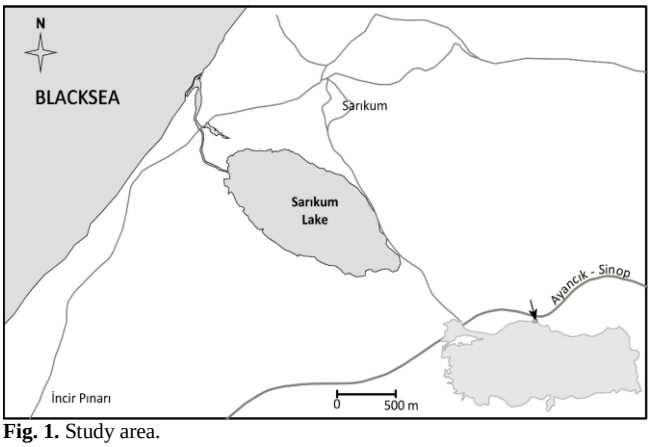

Fig. 1. Study area.

Seine nets: It is basically a kind of trawl with a bag in the middle and two wings on both sides. Seine nets are used to catch fish particularly in lakes and dams that are not too deep and slowly flowing rivers with a flat surface. A seine net with a length of approximately 30 m and height of 1.5-2 m and 2x2 cm length of mesh was used to catch silver fish in the channel where the sea and the lake are merged in Sarıkum Lake.

Cover net: These are small circular nets with different diameters. There are sinkers that allow the net to sit on the floor and small pouches for the confinement of fish on the sides of the circle, and there is a cord with 3-4 m length used to collect the nets at the center (Geldiay and Balık, 1988).

SPECIES IDENTIFICATION

The fish species obtained from the nets in the sampling performed during the study were put into formaldehyde in the study field and to perform species identification later, and they were brought to the laboratory. 100 cm wooden ruler for fish measurements, digital thermometer measuring both water and air temperature to detect water and air temperatures, DENSI PW-200 branded digital display weighing instrument to determine fish weights, and CANON 350 D brand camera to monitor the fish were used. The identification of species was performed using the relevant sources (Balık and Ustaoğlu, 1984; Geldiay and Balık, 1988; Polat and Uğurlu, 2007; Bat *et al*., 2008) and considering the anatomical and morphological characteristics of fish (WoRMS Editorial Board, 2016; Froese and Pauly, 2017).

RESULTS and DISCUSSION

In the present study, *Atherina boyeri* Risso, 1810 (Sand smelt), *Liza aurata* Risso, 1810 (Golden grey mullet), *Mugil cephalus* Linnaeus,1758 (Flathead grey mullet), *Mugil soiuy* Basilewsky, 1855 (Russian grey mullet), *Neogobius melanostomus* (Pallas, 1814) (Goby fish), *Aphanius marassantensis* Pfleiderer, Geiger & Herder, 2014 (Mediterranean tooth-carp), *Gasterosteus aculeatus* Linnaeus, 1758 (Pungitius), *Cyprinus carpio* Linnaeus, 1758 (carp) and *Platichthys flesus* Linnaeus, 1758 (flounder) were caught.

Table 1. Fishes in the study area.

*N	Species	Family
18	***Cyprinus carpio*** Linnaeus, 1758	Cyprinidae
10	***Aphanius marassantensis*** Pfleiderer, Geiger & Herder, 2014	Cyprinodontidae
8	***Gasterosteus aculeatus*** Linnaeus, 1758	Gasterosteidae
25	***Atherina boyeri*** Risso, 1810	Atherinidae
12	***Liza aurata*** (Risso, 1810)	Mugilidae
17	***Mugil cephalus*** Linnaeus, 1758	Mugilidae
4	***Planiliza haematocheila*** (Temminck & Schlegel, 1845)	Mugilidae
9	***Neogobius melanostomus*** (Pallas, 1814)	Gobiidae
14	***Platichthys flesus*** (Linnaeus, 1758)	Pleuronectidae

*N: Number of fish.

Whether the sampled fish species were outside of their main habitat was evaluated based on station's connection with the sea and the fish species living in rivers supplying the field (Yardım and Erdem, 2010).

In the sampling studies, the lengths of *Atherina boyeri* species are between 8.5 cm and 11.5 cm, and their weights are between 5.0 g and 13.0 g.

The lengths of *Liza aurata* species are between 13.5 cm and 18.0 cm, and their weights are between 30.0 g and 55.0 g. It has two dorsal fin, the first one has 4 unbranched rays and no branched ray, and the second one has 1 unbranched ray and 9 branched rays, and the anal fin has 3 unbranched rays and 8 branched rays.

The lengths of *Mugil cephalus* species are between 15.0 cm and 18.5 cm, and their weights are between 35.0 g and 60.0 g. It has two dorsal fin, the first one has 4 unbranched rays and no branched ray, and the second one has 1 unbranched ray and 8 branched rays, and the anal fin has 3 unbranched rays and 9 branched rays.

The lengths of *Planiliza haematocheila* species are between 14.0 cm and 17.0 cm, and their weights are between 30.0 g and 45.0 g. It has two dorsal fin, the first one has unbranched rays and no branched ray, and the second one has 1 unbranched ray and 8 branched rays, and the anal fin has 2 unbranched rays and 9 branched rays.

The lengths of *Neogobius melanostomus* species are between 12.0 cm and 18.0 cm, and their weights are between 20.0 g and 90.0 g.

The lengths of *Aphanius marassantensis* species are between 5.0 cm and 7.5 cm, and their weights are between 5.0 g and 7.0 g. The dorsal fin has 2 hard rays and 11 soft rays, and the anal fin has 1 hard ray and 9 soft rays.

The lengths of *Gasterosteus aculeatus* species are between 6.5 cm and 7.5 cm, and their weights are between 5.0 g and 8.0 g. The dorsal fin has 3 hard rays and 12 soft rays, and the anal fin has 1 hard ray and 9 soft rays.

The lengths of *Cyprinus carpio* species are between 25.0 cm and 72.5 cm, and their weights are between 210 g and 9.19 kg.

The lengths of *Platichthys flesus* species are between 15.0 cm and 18.0 cm, and their weights are between 40.0 g and 50.0 g. The dorsal fin and anal fin do not have a hard ray, and the dorsal fin has 63 soft rays, and the anal fin has 44 soft rays.

Since *Gasterosteus aculeatus* species living in Lake Sarıkum has bio-indicator characteristics, it is important to examine Sarıkum Lake from this aspect.

Neogobius melanostomus is one of the fish species that is well-known by its invasiveness in the wetlands of the Black Sea basin, especially in terms of the diseases hosted by it (Özer, 2003 and 2007). *Mugil soiuy* the samples of the species that is a guest species in the Black Sea were obtained from Sarıkum, which are lagoons connected to the sea by precipitation. While it is in competition with local grey mullet species in the Black Sea, it has become an economic species since it is abundantly caught during its migration to our coasts between April and June.

Cyprinus carpio is a species that spreads to ponds and dams for fishing purposes, usually within the framework of a specific plan because of its economic value. It has been determined to come from the outside to Lake Sarıkum. The characters belonging to culture breeds of carp such as mirrored flake, humpback, reduced and flattened intermuscular bones were observed in the samples caught from the areas where it came from the outside.

In Lake Sarıkum, the population of *Cyprinus carpio* species is denser than other species. It is very important that the lake is first opened to hand-line fishing and monitored by the inspection to be carried out in the lake in a controlled manner and by determining the conditions by the Directorate of Nature Conservation and National Parks, and by performing the monthly determination of carp populations and investigating their effects on other fish species.

In this study that is carried out in general, fish population studies should be carried out in the areas where fish is identified, dominant species should be revealed, and undesirable species should be identified.

Moreover, it is necessary to introduce and promote culture fishing methods in our inland waters and dam lakes, to develop economic fish species, and to ensure the adaptation of non-existent economic species to the fauna in a way that they will not cause damage (Karakas and Türkoğlu, 2005).

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