Acta Biologica Turcica, 35(1), 29-35, 2022 Received 27 Jul. 2021; Accepted 05 Dec. 2021; Published Online 13 Jan. 2022

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.com

Research article

New locality for the pumpkinseed, *Lepomis gibbosus* (Linnaeus, 1758) in the Marmara Region, Turkey

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Abstract: This study contributes new knowledge to the geographic distribution of the Pumpkinseed *Lepomis gibbosus* (Linnaeus, 1758). This fish has been reported from the Marmara Region of Turkey, but there are no records from Balikesir Province. In this study, fish samples were obtained from 2 irrigation ponds in Yağcılar and Kamçılı districts of Balıkesir Province. *L. gibbosus* was reported for the first time from Balıkesir Province as a new locality. The geographical distribution and records of the pumpkinseed are given with a checklist and map. Knowing the current distributions of the pumpkinseed fish is important for understanding their impact on the environment and biodiversity.

Keywords: body measurements; correlation; genetic diversity; General Linear model

Citation: Türker, D., Ünal, A., & Öktener, A. (2022). New locality for the pumpkinseed, *Lepomis gibbosus* (Linnaeus, 1758) in the Marmara Region, Turkey. *Acta Biologica Turcica,* 35(1), 29-35.

Introduction

A total of 384 fish are listed from inland waters of Turkey. 208 of these species are endemic and 15 are non-native fish species Çicek et al. (2020). On the other hand, Çicek et al. (2020) mentioned the presence of 32 exotic fish species from Turkey. They found that 15 fish species were adapted to nature and the remaining 17 species were removed from invasive fish list of the Turkey.

The pumpkinseed, *Lepomis gibbosus* is a native fish of North America and was recorded as an invasive fish species with high distribution in Europe at the end of the 19th century (Künstler, 1908; Wheeler and Maitland, 1973; Lever, 1977). This is a carnivorous that lives in the benthopelagic zone (Froese and Pauly, 2020).

The pumpkinseed was reported first time by Erk'akan (1983) from the Thrace Region (Northern Marmara), Turkey. Later, it was given from various localities, especially in the Aegean Region (Baran and Ongan, 1988, Dirican, 2001, Koca et al., 2005, Bay 2010, Ağdamar et al., 2015, Özuluğ et al., 2019, İlhan et al., 2020)

The aim of this study is to give the first record from Southern Marmara, which is between the Northern Marmara and Aegean Regions.

Materials and Methods

Fish samples were obtained from 2 irrigation ponds in Yağcılar (39.875309 N-27.918170 E) and Kamçılı (39.809605 N-27.913213 E) districts in Balıkesir Province. The fish was caught by a local fisherman with a fishing rod. The samples were preserved in 4% formaldehyde. Several articles and identification key were used for species identification.

Results and Discussion

Pumpkinseed was collected from two irrigation ponds, which are named Kamçılı and Yağcılar in Balıkesir Province in the Southern Marmara Region (Figure 1). The

morphological characters of the pumpkinseed found in this study are as follows (Table 1). Yağcılar and Kamçılı ponds were built for irrigation purposes. There are no studies on fish taxonomy, population dynamics etc. in these ponds. Therefore, there is no clear information about the fish fauna of these ponds. However, according to the information obtained from local fishermen, it was learned that gibel carp (*Carassius gibelio*) and common carp (*Cyprinus carpio*) were caught in these ponds. On the other hand, whether sun perch affects these fish species can be revealed with further detailed studies.

Figure 1. The Pumpkinseed, *Lepomis gibbosus*

Table 1. Comparison of morphometric characters of Pumpkinseed in Turkey

	Şaşı and Balık (2003)	Barlas and Dirican (2004)	Demir (2015)	Dirican (2001)	Present Study
TL (cm)	8-11.7	2.7-9.5		2.7-9.5	7.8
SL (cm)	6.5-9.6				6.4
D	X 10 - X 11	X-XI 11-12	X-XII 10-12	X-XI 11-12	X 10
A	III 9 - III 10	III 10-11	III 8-9	III 10-11	III 9
lateral line	48-49	36-44		36-44	48

It is seen that *L. gibbosus* is reported in Muğla and Aydın Provinces in the Aegean Region, when the localities where the pumpkinseed reported in Turkey are examined. This is followed by the Thrace Region (North Marmara Region) in the Marmara Region. When the distribution of the pumpkinseed in the Aegean Region is examined, the last study from the Gediz River is Dereli et al. (2019) reported. Gediz River passes through the provinces of Uşak and Manisa and flows into the Aegean Sea (Anonymous, 2021).

There are also reports of the pumpkinseed from these cities (Table 2, Figure 2). Balıkesir is geographically close to the Province of Manisa. Therefore, this geographical proximity makes it possible to find the pumpkinseed in Balikesir in this study. It was learned that the Pumpkinseed was found in these ponds for nearly eight years. According to the information provided by the local fishermen who supplied the fish. According to the news on internet resources, the existence of this fish is also mentioned from the Murvetler River, which is connected to Lake Manyas (Anonymous, 2016).

There is another report of pumpkinseed from Dağyenice Pond in Nilüfer District in Bursa Province according to internet news (Anonymous, 2017). In this study, the finding of Pumpkinseed provides a new locality for Balıkesir Province, which is located in the Southern Marmara Region between the Aegean and Northern Marmara Regions.

Habitats where Pumpkinseed have been reported are generally streams and reservoirs. Considering the habitats from which the Pumpkinseed samples were obtained in this study, they are generally irrigation ponds that are not connected to the outside. The presence of fish in these ponds is more likely to be in the form of being left in the pond by human hands from the outside.

In addition to being able to compete with the existing fish populations in the habitats where it is found, the Pumpkinseed also carries some pathogens such as parasites. There are two studies on parasites of Pumpkinseed in the Northern Marmara Region of Turkey. Soylu (2014) reported eight parasite species [*Onchocleidus similis* (Monogenea), *Diplostomum* sp, *Tylodelphys clavata* (Digenea), *Acanthocephalus* sp (Acanthocephala), *Eustrongylides excisus*, Nematod gen. sp. (Nematoda), *Lernaea cyprinacea* (Copepoda), Glochidia (Mollusca)] of Pumpkinseed in Lake Gala (Edirne, Turkey). Çolak (2012) identified the presence of seven parasite species (*Onchocleidus similis*, *Gyrodactylus* sp (Monogenea), *Tetracotyl* sp, *Diplostomum* sp, *Tylodelphys clavata*, *Clinostomum complanatum* (Digenea), Glochidia larvae (Mollusca) of Pumpkinseed in Lake Sığırcı (Edirne, Turkey).

Table 2. Localities where Pumpkinseed are collected in Turkey

Locality Number	Locality	Province/Region	Author
1	İpsala Canal	Edirne/ Marmara Region	Erk'akan (1983)
2	Gala Lake	Edirne/ Marmara Region	Baran and Ongan (1988)
3	Sarıçay Stream	Muğla/ Aegean Region	Dirican (2001)
3	Sarıçay Stream	Muğla/ Aegean Region	Barlas et al. (2001)
4	Dipsiz-Çine Stream	Muğla-Aydın/ Aegean Region	Barlas et al. (2001)
5	Topçam Dam Lake	Aydın/ Aegean Region	Şaşı and Balık (2003)
4	Dipsiz-Çine Stream	Muğla-Aydın/ Aegean Region	Barlas and Dirican (2004)
4	Dipsiz-Çine Stream	Muğla-Aydın/ Aegean Region	Dirican and Barlas (2005)
4	Dipsiz-Çine Stream	Muğla-Aydın/ Aegean Region	Koca et al. (2005)
4	Dipsiz-Çine Stream	Muğla-Aydın/ Aegean Region	Yılmaz et al. (2006)
6	Geyik Dam Lake	Muğla/ Aegean Region	Yılmaz et al. (2006)
3	Sarıçay Stream	Muğla/ Aegean Region	Yılmaz et al. (2006)
3	Sarıçay Stream	Muğla/ Aegean Region	Yılmaz et al. (2007)
7	Akçay Stream	Aydın/ Aegean Region	Özcan (2007)
8	Kemer Dam Lake	Aydın/ Aegean Region	Özcan (2007)
8	Kemer Dam Lake	Aydın/ Aegean Region	Özcan and Balık (2008)
7	Akçay Stream	Aydın/ Aegean Region	Özcan and Balık (2008)
9	Azizabat Pond	Aydın/ Aegean Region	Bay (2010)
7	Akçay Stream	Aydın/ Aegean Region	Bay (2010)
8	Kemer Dam Lake	Aydın/ Aegean Region	Bay (2010)
3	Sarıçay Stream	Muğla/ Aegean Region	Top (2012)
3	Sarıçay Stream	Muğla/ Aegean Region	Keskin et al. (2013)
10	Bayraktar Reservoir	İzmit, Kocaeli/ Marmara Region	Keskin et al. (2013)
11	Davuldere Reservoir	İzmit, Kocaeli/ Marmara Region	Keskin et al. (2013)
12	Çayırköy Reservoir	İzmit, Kocaeli/ Marmara Region	Keskin et al. (2013)
1	İpsala Canal	Edirne/ Marmara Region	Keskin et al. (2013)
13	Uşak Reservoirs	Uşak/ Aegean Region	Yeğen et al. (2013)
3	Sarıçay Stream	Muğla/ Aegean Region	Karakuş (2014)
3	Sarıçay Stream	Muğla/ Aegean Region	Ağdamar et al. (2015)
10	Bayraktar Reservoir	İzmit, Kocaeli/ Marmara Region	Ağdamar et al. (2015)
12	Çayırköy Reservoir	İzmit, Kocaeli/ Marmara Region	Ağdamar et al. (2015)
11	Davuldere Reservoir	İzmit, Kocaeli/ Marmara Region	Ağdamar et al. (2015)
1	İpsala Canal	Edirne/ Marmara Region	Ağdamar et al. (2015)
14	Bafa Lake	Aydın/ Aegean Region	Demir (2015)
3	Sarıçay Stream	Muğla/ Aegean Region	Top et al. (2016)
15	Akgedik Reservoir	Muğla/ Aegean Region	Aygen (2017)
16	Meriç River	Edirne/ Marmara Region	İlhan et al. (2017)
17	Değirmenköy Pond	İstanbul/ Marmara Region	Saç and Özuluğ (2017)
15	Akgedik Reservoir	Muğla/ Aegean Region	Mangıt et al. (2018)
3	Sarıçay Stream	Muğla/ Aegean Region	Mangıt et al. (2018)
18	Hayrabolu Pond	Muğla/ Aegean Region	Mangıt et al. (2018)
3	Sarıçay Stream	Muğla/ Aegean Region	Top Karakuş (2018)
19	Sakarya River	Sakarya/ Marmara Region	Reis et al. (2018)
20	Deniz Lake	Kırklareli/ Marmara Region	Sarı et al. (2018)
21	Saka Lake	Kırklareli/ Marmara Region	Sarı et al. (2018)
22	Erikli Lake	Kırklareli/ Marmara Region	Sarı et al. (2018)
23	Mert Lake	Kırklareli/ Marmara Region	Sarı et al. (2018)
24	Hamam Lake	Kırklareli/ Marmara Region	Sarı et al. (2018)
23	Mert Lake	Kırklareli/ Marmara Region	Kırcalar (2018)
3	Sarıçay Stream	Muğla/ Aegean Region	Karakuş (2019)
25	Rezve stream	Kırklareli/ Marmara Region	Özuluğ et al. (2019)
26	Sultanbahçe stream	Kırklareli/ Marmara Region	Özuluğ et al. (2019)
27	Gediz River	Aegean Region	Dereli et al. (2019)
16	Meriç River	Edirne/ Marmara Region	İlhan et al. (2020)
28	Yağcılar Pond and Kamçillı Pond	Balıkesir/ Marmara Region	Present study

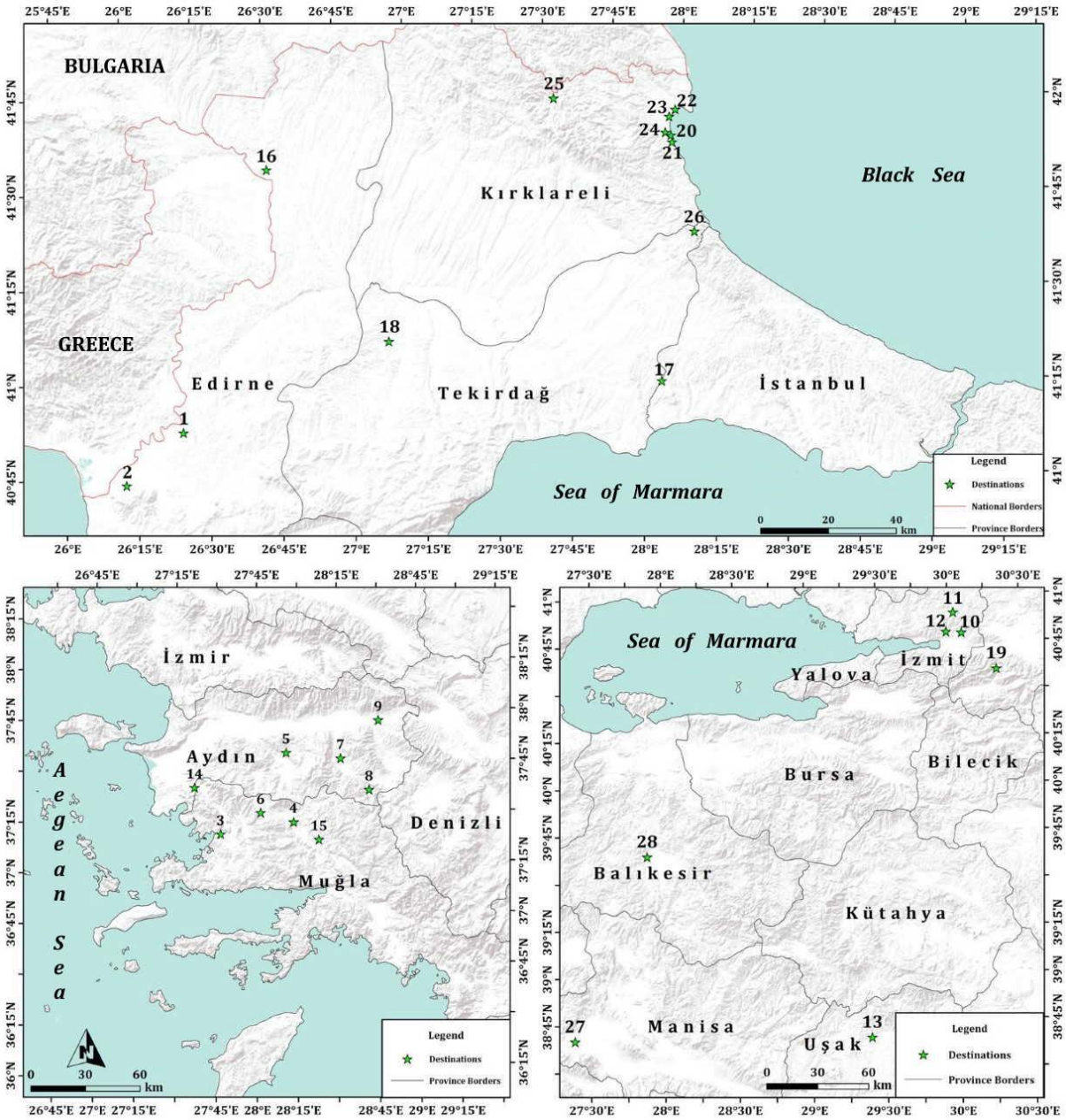

Figure 2. Distribution of the Pumpkinseed in Turkey

Among these parasites, *Onchocleidus similis*, the monogenean (Platyhelminth) is a non-native parasite. This parasite is a native species reported from freshwater fishes of North America. This non-native parasite was introduced to the fresh waters of Europe by the co-introduction of Pumpkinseed (Kvach et al., 2018).

There is several studies about the interactions of pumpkinseed on the different taxonomic groups such as fish, invertebrates in the inland waters (Declerck et al., 2002, Angeler et al., 2002, Van Kleef et al., 2008, Bramard et al., 2006, Hartel et al., 2007, Almeida et al., 2014, Top et al., 2016, Copp et al., 2017, Tarkan et al., 2021, Top-Karakuş and Tarkan, 2021).

Karakuş and Tarkan (2021) represent the relationship between *Capoeta aydinensis* and *L. gibbosus* in ex situ growth experiment. They revealed that specific growth rate of *C. aydinensis* was lowest while number of *L. gibbosus* increased. Copp et al. (2017) examined the effects of *L. gibbosus* on other freshwater fishes in southern England. They found that these native fishes changed their diet as more specialized in *L. gibbosus* presence. They mentioned the significant reduction of

trophic position in these native fishes and a significant decrease in the somatic growth rate and body condition of *Gobius gobio* in *L. gibbosus* presence. Almeida et al (2014) investigated the effects of the pumpkinseed on the native residents in River Bullaque. They found that medium and large of pumpkinseed can show aggressive behavior on various organisms living in the stream.

Acknowledgement

We thank Mrs.-Melike Durak from the Department of Geography, Balıkesir University for preparing the map and Mr.-Kazım Çokdinçer for collecting fish samples.

Ethical Approval

All applicable international, national, and/or institutional guidelines for the care and use of animals followed.

Funding Statement

The authors do not declare any fund.

Conflict of Interest

The authors declare that they have no conflict of interest.

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