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New Records for Distribution of Invasive Topmouth gudgeon (*Pseudorasbora parva* Temminck & Schlegel, 1846) in Anatolia

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ABSTRACT

The topmouth gudgeon *Pseudorasbora parva* is described as most invasive fish in Europe. It's a small cyprinid fish native to East Asia. In 1982, the existence of this species was first recorded from the Thrace region of Türkiye. Todays it is recorded from Thrace to Ceyhan region. In this study was carried out Afyonkarahisar, Bilecik, Burdur, Denizli, Eskişehir, Isparta, Konya, Kütahya and Uşak provinces between 2001 and 2013. Specimens collected from various localities in these provinces. Our results are shown *P. parva* has invaded many freshwater systems in Türkiye. This species has a potential threat to the diversity of the ichthyofauna of Anatolia and fish farms because of causing an increased mortality pressure on some salmonids and cyprinids, and totally inhibiting spawning of existing native fish.

Keywords: Freshwater fishes, invasive species, *Pseudorasbora parva*, Anatolia

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İstilacı Bir Tür Olan Çakıl Balığı (*Pseudorasbora parva* Temminck & Schlegel, 1846)'nın Anadolu'daki Yayılımına Yeni Eklentiler

Öz: Çakıl Balığı *Pseudorasbora parva* Avrupa'nın en istilacı balık türü olarak tanımlanmaktadır. Doğu Asya kökenli, küçük cüsseli bir balıktır. Ülkemizdeki varlığı ilk defa 1982 yılında Trakya bölgesinden bildirilmiştir. Günümüzde Trakya'dan Ceyhan havzasına kadar geniş bir bölgede yayılım göstermektedir. Çalışmamız 2001 - 2013 yılları arasında Afyonkarahisar, Bilecik, Burdur, Denizli, Eskişehir, Isparta, Konya, Kütahya ve Uşak illerinde yürütülmüştür. Örnekler bu illerdeki çeşitli kaynaklardan elde edilmiştir. Çalışmamızın sonuçları *P. parva* istilasının ülkemizin tüm içsularını kaplamaya başladığını göstermektedir. Bazı Salmonid ve Cyprinid türlerinde ölümlerin artmasına ve doğal faunadaki türlerin üremelerini kısıtlamalarından dolayı Anadolu'nun ihtiyofaunası ve balık çiftlikleri açısından tehlike oluşturma potansiyeli bulunmaktadır.

Anahtar kelimeler: Tatlısu balıkları, istilacı tür, *Pseudorasbora parva*, Anadolu

Introduction

The topmouth gudgeon *Pseudorasbora parva* (Temminck & Schlegel, 1846) is a small cyprinid, originating from Japan, China, Korea and the River Amur catchment (Gozlan et al. 2002; Cakic et al. 2004; Witkovski 2011). It was first recorded for Europe in 1960, its inadvertent introduction mixed with herbivorous fishes (*Ctenopharyngodon idella, Aristichthys nobilis, Hypophathalmichthys molitrix*) imported from China to fish farms in neighbouring the lower course of the River Danube in 1961 and it has become distributed along this basin to other European countries (Erk'akan 1984; Caiola and Sostoa 2002; Gozlan et al. 2002; Pollux and Korosi 2006; Witkovski, 2011). This fish species was first recorded from Thrace region in 1982, afterwards from Aksu stream in Anatolia in 1996 (Erk'akan 1984; Wildekamp et al. 1997). Today, it has invaded many freshwater environments from Thrace to Ceyhan basins (Balık et al. 2003; Şaşı and Balık 2003; Barlas and Dirican 2004; Ekmekçi and Kırankaya 2006; Uğurlu and Polat 2007; Ekmekçi and Kırankaya 2008; İlhan and Balık 2008; Yardım and Erdem, 2010; Apaydın Yağcı et al. 2011; Meke et al. 2012; Çınar et al. 2013; Ekmekçi et al. 2013; İlhan and Sarı 2013; Özuluğ et al. 2013; Özeren and Arslan 2014). This study aimed to provide information about new localities by *P. parva* in Türkiye.

Materials and Methods

Study area covers of Afyonkarahisar, Bilecik, Burdur, Denizli, Eskişehir, Isparta, Konya, Kütahya and Uşak provinces (Figure 1). Sampling was carried out at 507 stations included lakes, dams, ponds and streams by using different sampling equipment such as (gill nets, seine net, electroshocker) between 2001-2013 years. Samples were preserved in 4% formalin and collected in Eğirdir Fisheries Research Station.

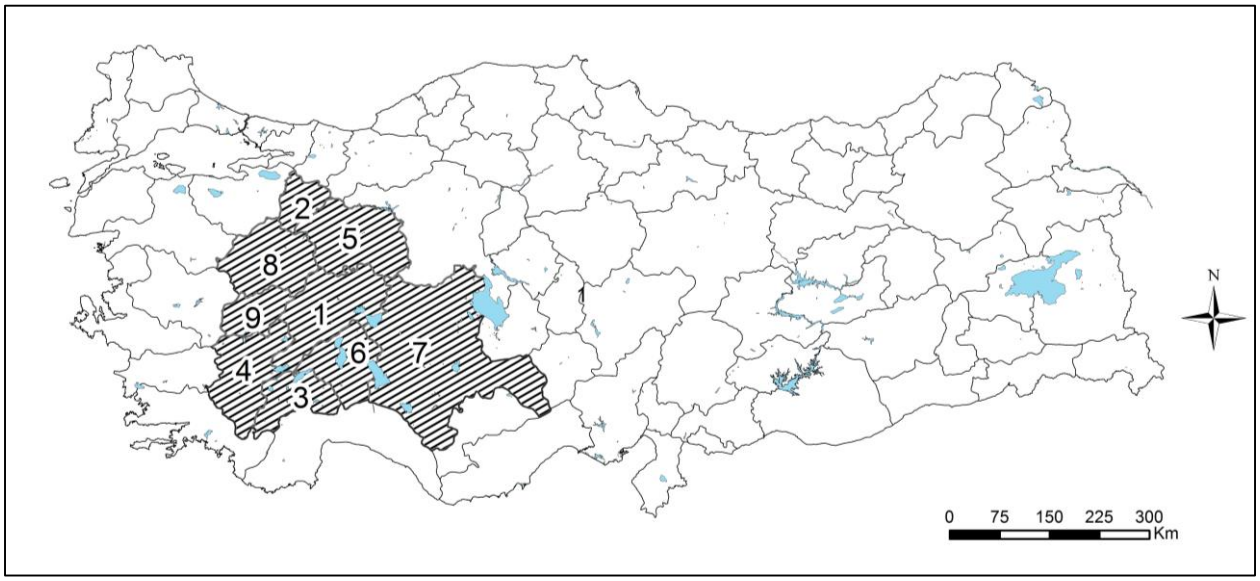

Figure 1. Study area (1.Afyonkarahisar, 2.Bilecik, 3.Burdur, 4.Denizli, 5.Eskişehir, 6.Isparta, 7.Konya, 8.Kütahya, 9.Uşak).

Results

We have obtained *P. parva* samples from 1 lake, 12 dams, 12 ponds and 2 stream in the Bilecik, Burdur, Eskişehir, Isparta, Kütahya and Uşak provinces, any samples couldn't be obtained from Afyonkarahisar, Denizli, and Konya provinces (Table 1).

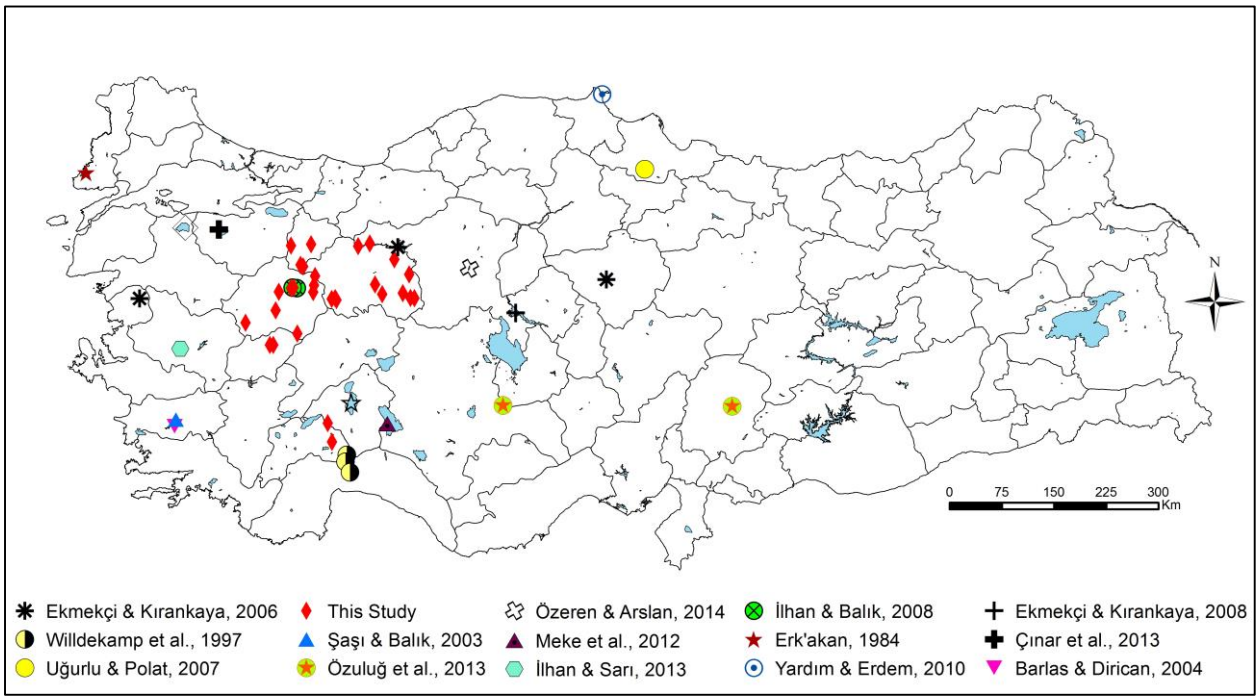

Figure 2. Distribution of *P. parva* in Türkiye.

Table 1. Distribution of *P. parva* according to provinces.

Province	Locality	Coordinates	Date
Bilecik	Dodurga Dam	39°46'33"N - 29°57'36"E	18.08.2010
	Kızıldamlar Dam	40°02'24"N - 30°07'55"E	06.07.2010
	Küçükelmalı Pond	40°01'04"N - 29°47'28"E	06.05.2010
Burdur	Onaç Dam	37°29'58"N - 30°34'12"E	02.10.2013
Eskişehir	Çatören Dam	39°19'25"N - 30°34'48"E	24.10.2008
	Gökçekaya Dam	40°01'57"N - 31°00'54"E	27.05.2009
	Kaymaz Dam	39°32'32"N - 31°13'04"E	30.04.2009
	Kunduzlar Dam	39°21'22"N - 30°34'04"E	24.10.2008
	Yenice Dam	40°02'07"N - 30°55'48"E	26.05.2009
	Bahçecik Pond	39°25'16"N - 31°20'20"E	29.04.2009
	Erenköy Pond	39°45'09"N - 30°00'19"E	01.05.2008
	Günyüzü II Pond	39°22'28"N - 31°48'55"E	28.04.2009
	Koçaş II Pond	39°26'20"N - 31°41'16"E	28.04.2009
	Mercan Pond	39°22'31"N - 31°52'54"E	29.04.2009
	Akın Creek	39°20'14"N - 30°30'15"E	13.09.2011
	Porsuk River	39°40'38"N - 31°47'26"E	16.08.2011
Isparta	Gölcük Lake	37°43'96"N - 30°29'94"E	17.05.2003
Kütahya	Çavdarhisar Dam	39°10'29"N - 29°35'04"E	19.08.2010
	Enne Dam	39°28'29"N - 29°51'40"E	28.08.2007
	Kayaboğazı Dam	39°23'41"N - 29°36'27"E	30.08.2007
	Söğüt Dam	39°25'20"N - 30°11'25"E	24.05.2007
	Doğluşah Pond	39°30'51"N - 30°12'05"E	24.05.2007
	Dumlupınar Pond	38°52'47"N - 29°57'00"E	19.08.2010
	Pazarlar Pond	38°59'38"N - 29°04'59"E	22.05.2007
	Sekiören Pond	39°27'52"N - 29°49'13"E	03.05.2007
Uşak	Altıntaş Pond	38°43'19"N - 29°30'01"E	14.06.2007
	Göğem Pond	38°43'14"N - 29°33'23"E	14.06.2007

Discussion

P. parva has expanded its range and has established successful populations in Turkish inland waters since 1982 (Figure 2). A discussion is how it passed the Bosphorus and Dardanelles. Its success can be explained by its life-history characteristics such as high reproductive effort and nest guarding behaviour, early sexual maturity (after 1 year), plasticity in spawning area preference, wide ecological tolerance, lack of enemy in its spreading areas and lower predation pressure due to its prefer to dense vegetated areas in littoral zone (Rosecchi et al. 2001; Gozlan et al. 2002; Witkowski 2011).

P. parva have negative impacts on the native fish fauna via competition spawning area, food and other sources (Ekmekçi et al. 2013). Additionally it is vector an deadly pathogen rosette agent *Sphaerothecum destruens,* which is responsible for increased mortality and inhibited spawning of some cyprinids and salmonids (Arkush et al. 1998; Gozlan et al. 2005; Pinder et al. 2005; Andreou et al. 2011, 2012). This pathogen were determined from Sarıçay Creek, Muğla in Türkiye (Ercan et al. 2013). Therefore *P. parva is* considered as a serious threat to both native and farmed fishes in Türkiye.

Recently control activities is focused on eradication of *P. parva* from natural waters in some European countries, particularly in England (Allen et al. 2006; Britton and Brazier 2006; Britton et al. 2008, 2009, 2010). Also there are numerous researches about biological properties and genetic structure of *P. parva* in Türkiye (Ağdamar et al. 2013; Akbaş et al. 2013; Kırankaya et al. 2013; Özdilek et al. 2013). Anatolia is accepted as a continental land in terms of biodiversity. Initiation of an effective fight against this species is highly crucial for both freshwater fish fauna and aquaculture sector in our country. In other

words, effective reduction strategies must be created and put into practice utilizing the information obtained from studies on the species.

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