



## STATUS OF GOBIID ICHTHYOFAUNA (Gobiidae) IN BULGARIA: TAXONOMICAL, CONSERVATIVE, ECOLOGICAL AND SOCIAL ASPECTS

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### SYNOPSIS

#### Key words:

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Ichthyofauna,  
Benthic Fish,  
Black Sea basin,  
Ponto-Caspian relicts,  
immigrants.

At present the Bulgarian ichthyofauna includes 24 Gobiid species inhabiting the Black Sea, its rivers and coastal lakes, Danube River and its tributaries, rivers Maritsa and Tundzha (Aegean watershed). Six species live in the Bulgarian Danube section and its tributaries and 2 species are established in the Bulgarian sector of Maritsa River and its major tributary - Tundzha. The Black Sea Gobiid fauna is specific: fourteen species are brackish and freshwater autochthonous Ponto-Caspian relicts and 10 – Mediterranean immigrants.

Seventeen species of conservation significance are enlisted in different national and international documents. Alterations in the spatial distribution of some species in Bulgarian waters occur recently. The main commercial target species from catches for the Bulgarian market has occurred to be *Neogobius melanostomus*.

### INTRODUCTION

Globally, the Gobiid fish family (Gobiidae) includes more than 1500 species, which are grouped in 230 genera (HOESE et al., 2006). They are mostly small-size fishes living in marine, brackish and fresh waters in temperate, subtropical and tropical areas. Most of them are demersal species inhabiting the coastal areas. Bulgarian Black Sea basin, according to SVETOVIDOV (1964) and MILLER (2004), is inhabited with approximately 26-29 of Gobiid species. The most characteristic

morphological feature of the family is the adhesion of the two ventral fins in one pelvic disc. Sexual dimorphism is present.

During the breeding season, males build nest and take care of eggs during the incubation period. Their diet consists primarily of bottom invertebrates (crustaceans, molluscs, worms), eggs and small fish. In turn, Gobies represent a substantial food item for the bottom predators (sharks, rays, sturgeons, etc.) and also for dolphins (SVETOVIDOV, 1964).

Recently a significant increase of some Black Sea Gobiid species has been established, especially in the Lower and Middle Danube. Five species (*Proterorhinus marmoratus*, *Neogobius gymnotracheilus*, *N. kessleri*, *N. melanostomus* and *N. fluviatilis*) have expanded their areas westwards to the Upper Danube and some tributaries, in Serbian, Hungarian, Slovakian, Czech and even Austrian and German territory. *N. melanostomus* and *Pr. marmoratus* are distributed in even greater distance outside their original area – to the Aral and Baltic Seas and to the North American Great Lakes. In the North American Great Lakes, these two species have been acclimatized successfully and cause serious damages by finishing off or displacing the local fish fauna. In some regions the Gobies acquire even economic value after their invasion.

In Europe the Gobies are of commercial significance for the countries continuous to the Black and Azov Seas. The official statistics for the fishing on Gobies in Bulgaria are incomplete and the total catches can be considered lower than the actual ones mainly because the catches of anglers and the spear fishermen, as well as a significant part of commercial catches, are not taken into account. Although Gobies are not of the most valuable fish species, in Bulgaria their catches have kept the second/third place during the last two decades.

Studies on the Gobies in Bulgaria started with the development of the ichthyological science in the country, at the beginning of last century. They are mainly of faunistic and taxonomic nature and are associated with the names of following Bulgarian scientists: CHICHKOFF (1912), and DRENSKY (1923,1931). Until the 50's it was known, that a total of 16 gobiid species was inhabiting Bulgarian Black Sea coast, coastal lakes and rivers and some inland rivers. Significant contribution to the study of species composition and their distribution along the Bulgarian Black Sea coast and coastal lakes was given by GHEORGIEV (1966). During the 60's he reported 23 species for the Bulgarian ichthyofauna. This number and species composition was accurate until very recently. Other Bulgarian ichthyologists who contributed to the establishment of the gobiid species composition and some aspects of their biology in the Black Sea, Black Sea rivers and lakes, the Danube and its tributaries are: PESHEV (1970), MARINOV (1978), KARAPETKOVA (1976), VASSILEV & PEHLIVANOV (2005) and others. In the 90's DOBROVOLOV & PINCHUK, (1993), DOBROVOLOV et al. (1995) used and developed genetic and biochemical methods to establish specific differences in this complex taxonomic group. The spatial distribution and

abundance of invasive gobiid species inhabiting the upper and middle Danube was recently studied by POLAČIK et al. (2008).

This investigation was aimed to establish the recent species composition of Gobies in the Bulgarian waters, commercial and recreational catches, and to specify their conservation status.

## MATERIAL AND METHODS

Field studies were carried out from 2006 to 2010 covering various sites almost all along Bulgarian Black Sea coast: from Durankulak in north (43°41'55"N, 28°34'17"E) to Sinemorets in south (42°03'13"N, 27°59'15"E) at depths up to 15m and in inland waters: Danube and its tributaries, Black Sea Rivers and Rivers of the Aegean watershed. Fish were sampled mainly by different types of nets and spearfishing. In shallow wadable fresh water bodies portable electrofishing equipment is used for sampling as more appropriate. Moreover in coastal sea waters underwater direct species determination and underwater photos have been also accomplished. Bottom trawl survey was carried out at depths between 15 and 100 m. Altogether 24 hauls with duration of 90 minute each were accomplished in the investigated area. To establish the biomass index of *N. melanostomus* in front of the Bulgarian Black Sea coast a standard methodology for stratified sampling was employed (GULLAND, 1966; SPARRE & VENEMA, 1998; SABATELLA & FRANQUESA, 2004). A part of the material was fixed in 4% formaldehyde solution, 95% ethanol or frozen in -20° C on dependance of the following analysis. The rest of the caught fish, after species identification and counting *in situ*, were released back in the water at the same place. Information has also been collected from local fishermen by questionnaires and by direct observations of the local market. The taxonomic determination was accomplished according to GHEORGIEV (1966), MILLER (2004), and VASSIL'EVA (2007).

## RESULTS AND DISCUSSION

Twenty four species of Gobies were identified inhabiting in whole variety of the studied marine, brackish and fresh waters on the territory of Bulgaria during the present study (Table 1). Two species (*N. syrman*, *Chromogobius quadrivittatus*) reported only once in the references (GHEORGIEV, 1966) were not found in the present study. Their recent status is not entirely clear, since over the past 40 years their presence has not been confirmed again. Three new species for the Bulgarian ichthyofauna were found in the studied waters: *N. eurycephalus*, *Pomatoschistus marmoratus* and *P. bathi*.

According to our data the species *N. platyrostris*, reported by GHEORGIEV (1966), is not presented in Bulgarian waters. This species is typical for the North-Eastern part of Black Sea, and obviously it was reported in the past as a result of misidentification instead of *N. cephalargoides*. The same author (GHEORGIEV, 1966) wrongly described also *P. marmoratus* as *P. microps*. The last one is known in the Atlantic Ocean but not in the East Mediterranean, including Black Sea (MILLER, 2004).

Two groups of species were distinguished according their historical origin. The first group, including brackish and freshwater autochthonous Ponto-Caspian relict, is presented by 14 species and the second one including mediterranean immigrants - by 10 species. The highest species richness was recorded in the Black Sea and adjacent inland waters (coastal lakes and some rivers inflowing directly into the sea). The Black Sea Gobiid fauna, which consists of 21 species, is quite specific. This complex includes originally freshwater, brackish and marine elements (Tab. 1). Gobiid fauna in the Bulgarian stretch of the Danube and its tributaries is presented by 6 freshwater and euryhaline species. Only two freshwater species are found in the Bulgarian sector of Maritsa River (Aegean Sea basin) and its major tributary – Tundzha River (*N. fluviatilis* and *Pr. Marmoratus*).

Seventeen species of the established Bulgarian Gobiid fauna are of conservation significance according to different national and international documents. Seven species of that number are enlisted in the new Bulgarian Red Book (in press), 11 species - in the Black Sea Red Book (1999) and 8 are included in the IUCN Red List (Tab. 1).

Three marine species of gobies (*A. minuta*, *G. bucchichi*, *P. minutus*) are considered rare in the near shore sea zone according to the results of the present study.

A very rare species *B. brauneri* was reported previously only in Shabla Lake (GHEORGIEV, 1966). It was not detected again over the past 40 years until July 2010, when a single specimen was caught in the Ezerets – a lake connected with the Shabla by an artificial channel.

Another very rare species *K. longicaudata* was described in 1960's only in the Beloslav Lake (GHEORGIEV, 1966). The current investigation showed that recently this species inhabits all three coastal lakes located on the Northern Bulgarian Black Sea coast (north from the Kamchia River): Durankulak, Shabla-Ezerets and Beloslavsko (or Varna Lake).

Results about Gobiid abundance and biomass, obtained from bottom trawl surveys in Bulgarian Black Sea area during the period 2006 - 2009, show presence of the following species in hauls: *N. melanostomus*, *G. niger*, *M. batrachocephalus*, *G. cobitis* and *N. cephalargoides*, distributed at depths between 15 and 100 m. The most abundant species in offshore areas are *N. melanostomus* and *G. niger*. Spatial distributions of these two species during a recent study in autumn-winter season of

2009 show higher abundance of *N.melanostomus* at depths between 45 and 60 m in front of Kamchia River mouth and in Burgas Bay (Fig.1). Higher numbers of *G. niger* was observed in deeper areas – between 55 and 75 m off Varna, Burgas and Ahtopol.

**Table 1: Gobiid species composing the Bulgarian fish fauna.**

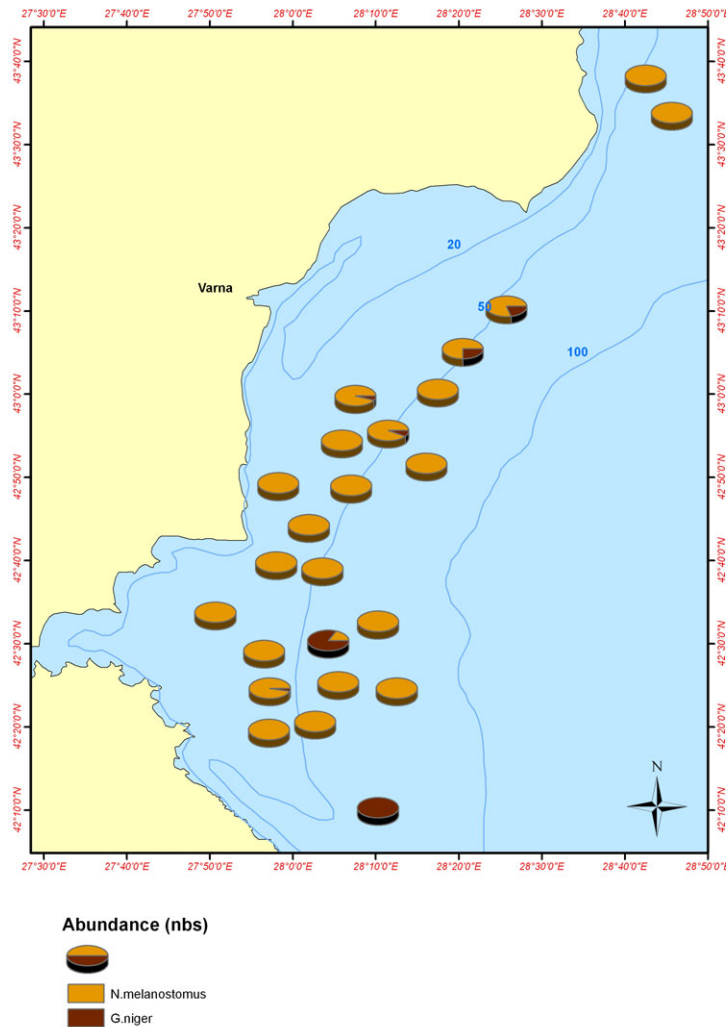
Species	Origin	Habitat		Conservation status
		Locality	Type	
<i>Aphyia minuta</i> (Risso, 1810)	Mediterranean	Black Sea	Marine, pelagic	
<i>Benthophiloides brauneri</i> (Beling & Iljin, 1927)	Ponto-Caspian	Shabla/Ezerets Lake	Freshwater, benthic	BRB, BSRB, IUCN
<i>Benthophilus stellatus</i> (Sauvage, 1874)	Ponto-Caspian	Danube	Freshwater, benthic	BRB
<i>Chromogobius quadrivittatus</i> (Steindachner, 1863)	Mediterranean	Black Sea	Marine, benthic	BSRB
<i>Gobius bucchichi</i> (Steindachner, 1870)	Mediterranean	Black Sea	Marine, benthic	BSRB
<i>Gobius cobitis</i> (Pallas, 1814)	Mediterranean	Black Sea	Marine, benthic	BSRB
<i>Gobius niger</i> (Linnaeus, 1758)	Mediterranean	Black Sea	Marine, benthic	-
<i>Gobius paganellus</i> (Linnaeus, 1758)	Mediterranean	Black Sea	Marine, benthic	-
<i>Knipowitschia caucasica</i> (Berg, 1916)	Ponto-Caspian	Black Sea Rivers Estuaries	Brackish, benthic	BRB
<i>Knipowitschia longicaudata</i> (Kessler, 1877)	Ponto-Caspian	Coastal Lakes	Brackish,	BRB, BSRB
<i>Mesogobius batrachocephalus</i> (Pallas, 1814)	Ponto-Caspian	Black Sea, Veleka River	Eurihaline, benthic	BSRB, IUCN
<i>Neogobius cephalargoides</i> (Pinchuk, 1976)	Ponto-Caspian	Black Sea	Brackish, benthic	-
<i>Neogobius eurycephalus</i> (Kessler, 1874) *	Ponto-Caspian	Black Sea	Brackish, benthic	-

<i>Neogobius fluviatilis</i> (Pallas, 1814)	Ponto-Caspian	Black Sea Rivers, Danube and tributaries, Tundzha R., Black Sea	Eurihaline, benthic	IUCN
<i>Neogobius gymnotrachelus</i> (Kessler, 1857)	Ponto-Caspian	Black Sea Rivers, Danube and tributaries,	Freshwater, benthic	IUCN
<i>Neogobius kessleri</i> (Günther, 1861)	Ponto-Caspian	Danube and tributaries	Freshwater, benthic	BRB, IUCN
<i>Neogobius melanostomus</i> (Pallas, 1814)	Ponto-Caspian	Black Sea, Black Sea Rivers, Danube and tributaries	Eurihaline, benthic	IUCN
<i>Neogobius platyrostris</i> (Pallas, 1814) **	Ponto-Caspian	Not inhabiting the Bulgarian coast	Brackish, benthic	
<i>Neogobius ratan</i> (Nordmann, 1840)	Ponto-Caspian	Black Sea	Brackish, benthic	BRB, BSRB
<i>Neogobius syrman</i> (Nordmann, 1840)	Ponto-Caspian	Mandra Coastal Lake	Freshwater, benthic	BRB, BSRB, IUCN
<i>Pomatoschistus bathi</i> (Miller, 1982) *	Mediterranean	Black Sea	Marine, benthic	-
<i>Pomatoschistus marmoratus</i> (Risso, 1810) *	Mediterranean	Black Sea	Marine, benthic	-
<i>Pomatoschistus microps</i> (Krøyer, 1838) **	Mediterranean	Not inhabiting the Bulgarian coast	Marine, benthic	-
<i>Pomatoschistus minutus</i> (Pallas, 1770)	Mediterranean	Black Sea	Marine, benthic	BRB
<i>Proterorhinus marmoratus</i>	Ponto-Caspian	Black Sea Rivers and Coastal lakes, Danube and tributaries, Maritsa and Tundzha R.,	Freshwater, benthic	BSRB
<i>Zostericola ophiocephalus</i> (Pallas, 1811)	Mediterranean	Black Sea	Marine, benthic	BSRB, IUCN

BRB – Bulgarian Red Book, BSRB– Black Sea Red Book, IUCN – World’s Red Book; \* new species for the Bulgarian ichthyofauna, \*\* reported before, but recently not inhabiting Bulgarian water basins.

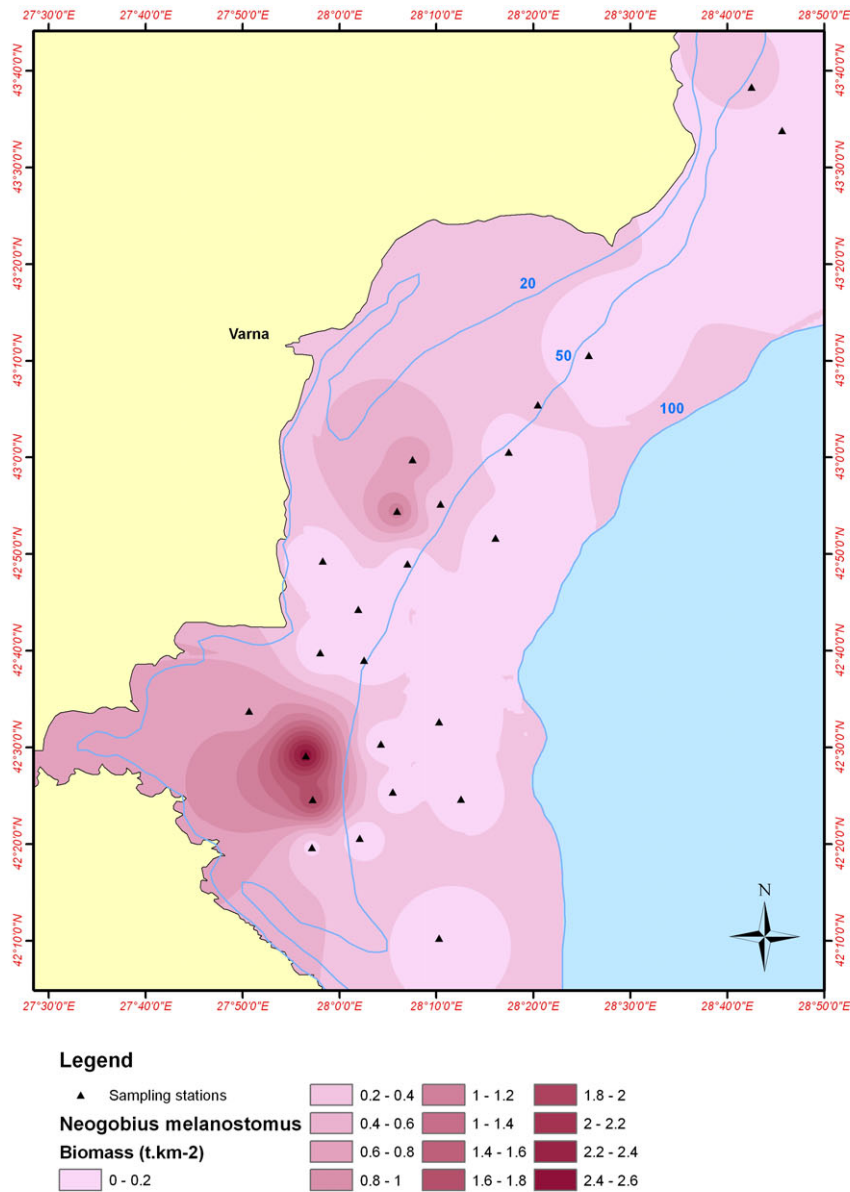
Market observations in 2009 indicate that the commercial catch (accomplished with nets and lines) is divided into two groups: catch realized and not realized in the market. Both consist of the following species: *G. cobitis*, *G.niger*, *M. batrachocephalus*, *N. cephalargoides*, *N. eurycephalus*, and *Z. ophiocephalus*. In

view to their comparatively lower economic value and their availability, Gobiid catches are of social significance for the local societies.



**Figure 1:**  
Distribution of *N. melanostomus* and *G. niger* in autumn-winter season of 2009.

The target species for the Bulgarian fisheries is *N. melanostomus*. The biomass of round goby was estimated at 33.58 t for the areas between 15 and 100 m amounted at a surface of 8010 km<sup>2</sup>. This area is planimetric and does not take into account the bottom relief. Two well distinguished maximums in biomass index were observed in the areas in front of Kamchia River mouth and Burgas Bay at depths up to 50 m (Fig. 2). It is evident, that the main stock of *N. melanostomus* is situated in shallower areas up to 50 m. Observed high densities of Gobiid species in offshore areas are usually associated with availability of mussel beds, which form appropriate habitat with good food availability due to high biodiversity of different taxa.



**Figure 2:**  
**Biomass Index**  
**of *Neogobius***  
***melanostomus* in**  
**autumn-winter**  
**season of 2009.**

## CONCLUSION

The established alterations in the species composing the Bulgarian Gobiid fauna result from contemporary changes in taxonomy on one side, and the more intensive investigations provided with modern methods in a wider area on the other. The human factor impacts rather the quantity of the commercial species, as well as the populations of some rare species. Protection of Gobiid habitat together with

sustainable use of their stocks are important issues related to the conservation and management of this valuable resource for the Bulgarian Black Sea region.

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