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Notes on the Fish Fauna Composition of Mesta (Nestos) River in Regard to Management and Conservation

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Abstract: Nestos or Mesta is a trans-boundary river, which flows approximately half in Bulgarian and half in Greek territory. It is the median of the three North Aegean Rivers raised in Bulgaria and it possess the higher watershed in this country. In the current paper it is given a description of the freshwater fish species composition in the system from its source to the estuary and its alterations for a period of almost seventy years. Twenty seven freshwater fish species in total including the European eel *Anguilla anguilla* L. 1758 are found inhabiting the river system. The number of the discovered non-native limnophilic species increases in time on account of the native rheophilic ones due to anthropogenic changes, mainly microhabitat destruction and introductions.

Key words: Mesta (Nestos) River, ichthyofauna, fish, species composition, North Aegean Rivers

Introduction

Nestos (Mesta) River is a trans-boundary river flowing approximately half in Bulgarian and half in Greek territory. It is the median of the three North Aegean Rivers risen in Bulgaria and it possess the highest watershed in this country (Marinov 1957). The native fish species complex is specific, represented by Central European, pan European and Palearctic species, endemic forms and Anatolian elements. On the other hand, in view to the fact that the certain river system is mountainous along its bigger part, the number of fish species in it is reduced in comparison with the other two neighboring North Aegean Rivers of the Thracian-East Macedonia subdivision (Economidis 1974, Economidis & Banarescu 1991). Chichkoff (1938) discovered only 10 fish taxa in the river. Investigations concerning the concrete ichthyofauna have been carried out also by Michailova (1970), but the species composition is not given by each river system but generally for all three rivers: Mesta, Strouma (Strymon) and Maritsa (Evros). A checklist for the Greek sector of Mesta including 17 species has been constructed by Economidis (1974). Other authors give only fragmentary information or data concerning some of the species (Chichkoff 1939, Drensky 1951, Kovatcheff 1922, Morov 1931). Recent information about the ichthyofauna of the Bulgarian sector of Mesta River is given by Apostolou (2005).

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Material and Methods

The study area includes the upper, middle and lower flow of the river and its main tributaries. The material has been collected from 1996 to 2008 in the frame of the performance of one dissertation and the implementation of two monitoring projects. In this paper only freshwater species (including *Anguilla anguila* L. 1758, a fish with unique life circle) are mentioned and discussed. All fish have been recorded according to sampling sites and date in order to register eventual alterations in the composition of the local fish fauna. The material was collected by various nets and electrofishing. Part of the material has been fixed in 4% formaldehyde solution and deposited in the Institute of Zoology, BAS. Determination of the species has been accomplished according to Maitland 2000. Changes of the accepted in the paper classification are explained in the text.

Results and Discussion

Totally 27 fish taxa belonging to 11 families have been established in Mesta River (Table 1). The cyprinid family (*Cyprinidae*) is the most representative including 14 species. The trout and the loaches families (*Salmonidae* and *Balitoridae* respectively) follow with two species each and the rest of families with one. *Barbus cyclolepis* Heckel, 1837, *Squalius orpheus* Kottelat & Economidis, 2006 and *Chondrostoma vardarense* Karaman 1928 predominate in the sample. All of them are of native origin and rheophilic. Three of the recently established now species are mentioned in preceding investigations as characteristic of the river Mesta, but other authors did not found them later: *Rutilus rutilus* Linnaeus 1758, *Scardinius erythropthalmus* Linnaeus 1758 and *Cyprinus carpio* Linnaeus 1758, all of them inhabitants of still waters. The fluviolacustrine species *Perca fluviatilis* Linnaeus 1758 is found recently in the system. Other three new alien species, *Gambusia holdbrooki* Girard 1859, *Lepomis gibbosus* Linnaeus 1758 and *Pseudorasbora parva* Shlegel 1842 probably have been introduced by the means of carp stocking undertaken in the past. All the sampled specimens of *Oncorhynchus mykiss* Walbaum 1792 have to be also introduced, as no proofs about the natural reproduction of this species in continental Europe until now.

In view to *Barbatula barbatula* Linnaeus 1758, and *Coregonus peled* Gmelin 1788, both found in Dospat reservoir (Zivkov 1987), the first has been also established in Dospat River and some tributaries and the second has no more been detected. *Barbatula barbatula* seems to be a competitor to the endemic *Oxynoemacheilus bureshi* Drensky 1928 since they have never been found in the same sampling point and for this reason it is not very likely to be of wider distribution. Although *Alburnus alburnus* Linnaeus 1758 is accepted as native for the system, (Drensky 1930), it is recently found only in some dam lakes as Dospat, Thisavros, Platanovrysi and in the sandpit Ormanski Gyol. *Vimba melanops* Heckel 1841 was never been found in Mesta River, although there is a reference under Drensky 1930. The presence of *Esox lucius* Linnaeus 1758 and *Silurus glanis* Linnaeus 1758 mentioned earlier (Drensky 1948, 1951) has also been confirmed. The European eel *Anguilla anguilla* has not been established recently in the Bulgarian sector of the river although near the estuary have been collected some specimens. The construction of dams in the main stream in late 90's forms a barrier for the species migration upstream to the Bulgarian sector.

Another rheophilic species of Central European origin, *Barbus petenyi* Heckel 1852 has not been found in the system, although it was mentioned before. Its presence in the certain system remains doubtful, as is the case with *Vimba melanops*. *Salaria fluviatilis* is localized only in the lower flow as well as channels, estuary and one carstic spring of the system, mostly together with *Anguilla anguilla*.

The recent occurrence of the fish species in different habitats depends on accordance to their specific preferences (Table 2). The autochthonous fauna is composed mainly by rheophilic or eurybiontic species (for example *Squalius orpheus*), as it was recorded by various authors in the beginning of the previous century. The works of Drensky 1948, 1951 are remarkable, in view to the fact that still water species are mentioned as inhabiting Mesta River. These species were never been found in the lower

Table 1. Recent species composition of the ichthyofauna from Mesta (Nestos) river.

Species	Origin	Presence and abundance according to the current investigation	First reference
Fam. Salmonidae			
1. *Salmo trutta fario*	Native	+	Kovatscheff 1922
2. *Oncorhynchus mykiss*	Alien	+	Economidis 1974
Fam. Coregonidae			
3. *Coregonus peled*	Alien - in Dospat reservoir only -probably extinct	-	Zivkov 1987
Fam. Anguillidae			
4. *Anguilla anguilla*	Native	+	Drensky 1951
Fam. Esocidae			
5. *Esox lucius*	Probably translocated	+	Drensky 1951
Fam. Cyprinidae			
6. *Rutilus rutilus*	Probably native	++	Berg 1949
7. *Squalius orpheus**	Native	+++	Kovatscheff 1922
8. *Phoxinus phoxinus*	Native	++	Drensky 1930
9. *Scardinius erythrophthalmus*	Probably native	+	Drensky 1948
10. *Alburnus alburnus*	Translocated	++	Zivkov 1987
11. *Alburnoides bipunctatus*	Native	++	Chichkoff 1940
12. *Leucaspius delineatus*	Native	+	Sampling 2008
13. *Vimba melanops*	Doubtful presence	-	Drensky 1930
14. *Chondrostoma vardarense*	Native	++	Drensky 1930
15. *Tinca tinca*	Probably native	+	Drensky 1948
16. *Rhodeus amarus*	Native	+++	Drensky 1930
17. *Gobio bulgaricus*	Native	++	Drensky 1948
18. *Barbus cyclolepis*	Native	+++	Berg 1949
19. *Barbus petenyi*	Doubtful presence	-	Drensky 1951
20. *Cyprinus carpio*	Probably native	+	Drensky 1948
21. *Carassius gibelio*	Translocated	+	Economidis 1974
22. *Pseudorasbora parva*	Alien	+	Apostolou 2002
Fam. Balitoridae			
23. *Oxynoemacheilus bureshi*	Native	++	Drensky 1948
24. *Barbatula barbatula*	Translocated	+	Zivkov 1987
Fam. Cobitidae			
25. *Cobitus strumicae* **	Native	++	Drensky 1928
Fam. Siluridae			
26.*Silurus glanis*	Probably translocated	+	Drensky 1948
Fam. Poecillidae			
27.*Gambusia holdbrooki*	Alien	+	Apostolou 2002
Fam. Percidae			
28. *Perca fluviatilis*	Translocated	+	Apostolou 2002
Fam. Centrarchidae			
29. *Lepomis gibbosus*	Alien	+	Apostolou 2002
Fam. Bleniidae			
30. *Salaria fluviatilis*	Native	+	Sampling 2008

Table 2. Species composition in different habitat types in Mesta (Nestos) river.

Species	Habitat types					
	Upper flow including tributaries	Middle flow including tributaries	Lower flow	Carstic springs	Dams & other artificial still water basins	Lowland channels and estuary
1. *Salmo trutta fario*	+	-	-	-	-	-
2. *Oncorhynchus mykiss*	+	-	-	-	-	-
3. *Coregonus peled*	-	-	-	-	In Dospat Dam only	-
4. *Anguilla anguilla*	-	-	+	-	-	+
5. *Esox lucius*	-	-	-	-	+	-
6. *Rutilus rutilus*	-	-	+	-	+	-
7. *Squalius orpheus*	+	+	+	+	+	+
8. *Phoxinus phoxinus*	+	+	-	+	-	-
9. *Scardinius erythrophthalmus*	-	-	-	-	+	-
10. *Alburnus alburnus*	-	-	+	-	+	-
11. *Alburnoides bipunctatus*	-	-	+	+	-	-
12. *Leucaspius delineatus*	-	-	-	-	-	+
13. *Vimba melanops*	-	-	-	-	-	-
14. *Chondrostoma vardarense*	-	+	+	-	+	-
15. *Tinca tinca*	-	-	-	+	+	-
16. *Rhodeus amarus*	-	+	+	-	+	+
17. *Gobio bulgaricus*	-	+	+	+	-	+
18. *Barbus cyclolepis*	+	+	+	+	+	+
19. *Barbus petenyi*	-	-	-	-	-	-
20. *Cyprinus carpio*	-	-	-	-	+	-
21. *Carassius gibelio*	-	-	+	-	+	-
22. *Pseudorasbora parva*	-	-	+	-	+	+
23. *Oxynoemacheilus bureshi*	-	+	-	-	-	-
24. *Barbatula barbatula*	-	In some tributaries only	-	-	-	-
25. *Cobitus strumicae*	-	+	+	-	-	+
26. *Silurus glanis*	-	-	-	-	+	-
27. *Gambusia holdbrooki*	-	-	+	-	+	+
28. *Perca fluviatilis*	-	-	+	-	+	-
29. *Lepomis gibbosus*	-	+	+	-	+	-
30. *Salaria fluviatilis*	-	-	+	+	-	+

part of the river till the dam constructions and functioning in 1997 in its Greek part, except *Tinca tinca* and *Carassius gibelio*. It seems unlikely that *Rutilus rutilus*, *Scardinius erythrophthalmus*, *Silurus glanis*, *Esox lucius, Cyprinus carpio* could be found only in the middle flow, and not in the lower flow, the lowland channels or the part just upstream the estuary s as reported by Economidis 1974. This could mean only that these species have been introduced in the Bulgarian part of the river and are not able to migrate downstream. The construction of four dams since 1997 is the main reason for the river fragmentations and habitat alterations, affecting the qualitative species composition. Thus riverine and lacustrine habitats are following each other and the species complex is also changing in accordance. The cold water which is released by the water powerplant of Platanovrysi and Thisavros dams is an additional barrier for fish migrations. Diadromous species fishes as *Anguilla anguilla* and *Alosa fallax* Lacepède 1803 are not able to migrate upstream. Recently the first one is localized downstream the first lower dam of Toxotes, whereas the second one is no longer entering the river for reproduction. In few words, the recent ichthyofauna from Mesta (Nestos) River represents a dynamic complex continually changing due to anthropogenic influence, mainly microhabitat destruction and introductions of new species.

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Бележки върху състава на рибната фауна от река Места (Нестос) във връзка с нейното управление и опазване

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(Резюме)

Места е трансгранична река, която тече приблизително наполовина на българска и гръцка територия. Тя е средната от трите североегейски реки, извиращи от България. Басейнът й е с най-голяма надморска височина за тази държава. В настоящата публикация се съобщава съставът на сладководната ихтио-фауна на системата от извора до устието и промените, които са настъпили в продължение на почти 70 години. Установени са 27 вида сладководни риби, включително и змиорката *Anguilla anguilla* L. 1758. Числото на неместните лимнофилни видове се увеличава с времето за сметка на автохтонните реофилни, което се дължи на антропогенните промени, главно разрушаването на микрохабитатите и интродукции.