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Study of Ichthyofauna: Fishes in the Enipeas River's Catchment Area, Central Macedonia, Greece

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Abstract: The management of water resources and the achievement of the Water Framework Directive 2000/60 / EC's objectives were the key research themes for this study. The study of Ichthyofauna was conducted at nine areas of Enipeas river basin in central Macedonia region of Greece. At the sampling stations, the electrofishing method was applied. The physicochemical parameters at the sampling site were measured with a multiparametric HANNA water quality meter, while water samples were collected and transferred to laboratories of the Biology Department of the Aristotle University of Thessaloniki for analysis of nutrients and major ions. Out of nine stations, only one station discovered fish. Because the sampling was only done once, it is suggested that it be repeated at a different time because the research location is located in one of Greece's major catchments. Only three fish species were identified in the entire catchment area, indicating that more detailed studies are needed covering different surrounding areas.

Keywords: *Basin, Catchment area, Enipeas river, Fish, Ichthyofauna, Water framework directive*

Conflicts of interest: None
Supporting agencies: None

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1. Introduction

The European Water Framework Directive 2000/60 is incorporated in Greek legislation by the Law 3399/2003. Enipeas river catchment area resides in the Aliakmonas River Basin (GR02), which is part of the 9th river basin district (West Macedonia District). The study area was located on the eastern slopes of Mount Olympus. It is part of Pieria Regional unit and belongs to the District of West Macedonia. Generally, Mt Olympus is an area of a critical importance and scientific interest, due to its complex geology and geotectonic development. This study presents the ichthyofauna recorded in Enipeas river basin (Palatos et al., 2013). There are no existing literature on the fish fauna in the study area, so this was the first attempt to conduct research in the area.

2. Materials and methods

The total area of the Enipeas river basin is 104.60 km^2. Sampling was carried out in May 2013 at nine stations (Figure 1) (Palatos et al., 2013). Of the nine sampling stations, five from them had water and four were dry. Fish were collected only from one station by the method of electric fishing (electrofishing) (Bohlin et al., 1989; Porreca et al., 2013). This is a portable device type Samus 752, weighing about 20 kg. It consists of a source (battery), an ascent and a cathode. It works in fresh water and in some cases in water with low salinity. The electric field generated affects the fish's nervous system, immobilizing them and then capturing them. The method should be applied by a group of two people. The operator, who was responsible for holding the ascent and the other person who is standing behind him to collect any fish that had escaped, the descent. The method was applied in the opposite direction from the river flow. The sampling station where fishes were caught, was St5 with coordinates, latitude: 40° 9'4.80"N and Longitude: 22°30'39.40"E (Figure 2).

The assembled individuals firstly were placed in plastic jars containing water and formalin and then refrigerated, in order to be transported safely to the laboratory without any loss. The species were identified in the laboratory (Kottelat & Freyhof, 2007). The measurements of the total (TL) and the fork (FL) length as well as the body weight

(w) were then recorded using an electronic precision balance.

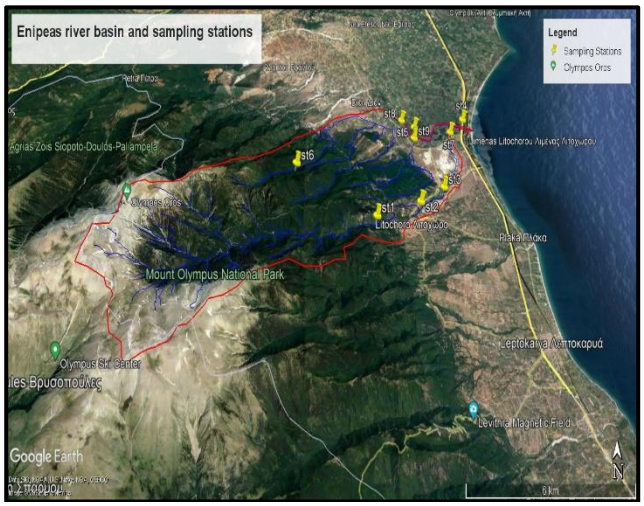


Figure 1: Sampling stations in Enipeas river basin

Figure 2: Habitat of fishes at Enipeas River in St5 station

3. Results and discussion

A total of 15 fishes were caught in the area. Specifically, eight fishes of the species *Squalius vardarensis* of the family Cyprinidae, five fishes of the species *Gambusia holbrooki* of the family Poecilidae and two fishes of the species *Gasterosteus gymnurus* of the family Gasterosteidae were found. In terms of their total biomass it was estimated at 630.48 gr of which 629.39 gr come from the species Squalius vardarensis, 1.05 gr from the species Gambusia holbrooki and 0.04 g from the species Gasterosteus gymnurus (Table 1).

The physicochemical parameters at the sampling site were measured with a multiparametric HANNA water quality meter, while water samples were collected and transferred to laboratories of the Biology Department of the Aristotle University of Thessaloniki for analysis of nutrients and major ions. The physicochemical, chemical and habitats of the sampling site are presented in Table 2. Overall, the physicochemical quality of the sampling site is poor, as classified according to the physicochemical quality index (Skoulikidis et al., 2006).

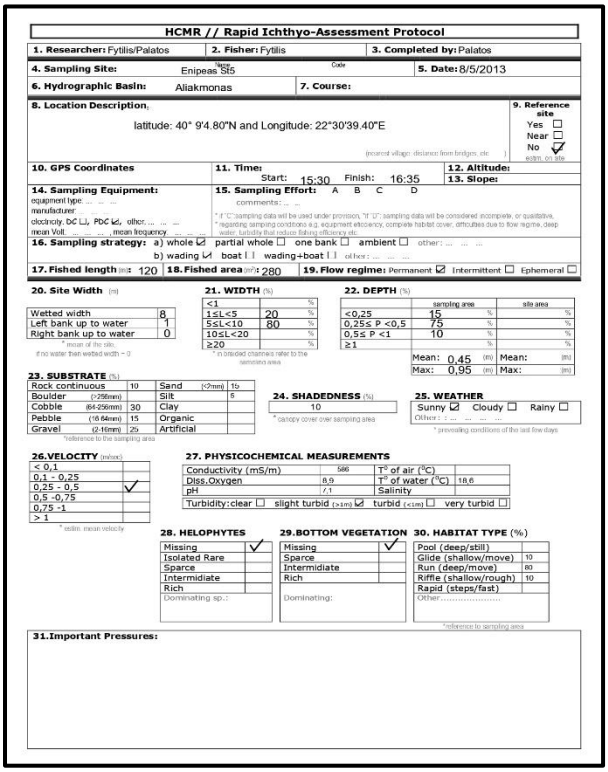
The Figures 3 and 4 show the fish fauna protocol which was completed at the sampling station and mentions some habitat data such as the width of the station, the depth, the length, etc.

Table 1: Length and weight of fishes collected at the station St5

Species	Total length (cm)		Fork length (cm)		Weight (gr)	
	Max	Min	Max	Min	Max	Min
Squalius vardarensis	19,60	17,40	18,80	16,70	100,90	61,57
Gambusia holbrooki	2,70	2,30	2,60	2,20	0,32	0,15
Gasterosteus gymnurus	1,20	1,10	1,10	1,00	0,02	0,02

Table 2: Physicochemical and chemical parameters and habitat characteristics of the three fishes species collection site in Enipeas River (St5)

Parameters (Units)	**Grade**
pH	7.10
Water Temperature (°C)	18.6
Conductivity (μS/cm)	586
TSS (mg/l)	5
D.O. (mg/l)	8.9
BOD (mg/l)	2.3
N-NO2 (mg/l)	0,0142
N-NO3 (mg/l)	1,0914
N-NH4 (mg/l)	0,0953
TN (mg/l)	0,3249
P-PO4 (mg/l)	0,0054
TP (mg/l)	0,001762
Cobbles and Pebbles (16 –256 mm) (%)	45
Gravel and sand (2-64 mm) (%)	40
Rock continuous (%)	10
Silt &Clay (<0.0625mm) (%)	5
Discharge (m^3/s)	0.023
Indice HMS	25
Indice IHF	40
Indice QBR	10
Physicochemical Quality	Poor



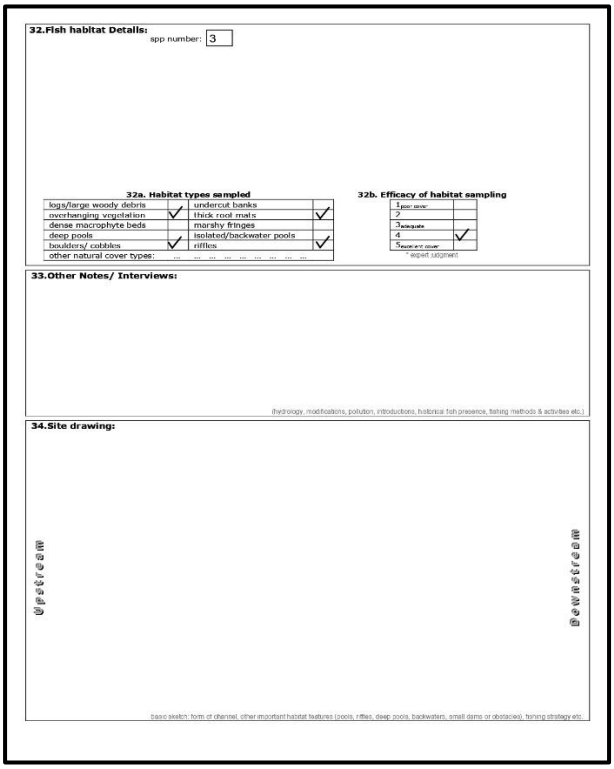


Figure 3: Protocols of Ichthyofauna

4. Conclusion

The Enipeas river springs are situated in the largest mountain of Greece, Mount Olympus. Further study should be done in this area and in different seasons, as it was pointed out that several stations did not have water. The water quality of the river Enipeas is vital as it supplies with water Litochoro city. At the same time, the relatively small literature for this area leaves room for further development and additional study.

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