

## 4. Fauna Inventory in the Zaghen Wetland after the Ecological Restoration Works

**MARINOV Mihai, DOROȘENCU Alexandru, NĂSTASE Aurel, LUPU Gabriel, SULIMAN Iasemin, ALEXE Vasile, IBRAM Orhan, TUDOR Iuliana-Mihaela, TRIFANOV Cristian, MIERLĂ Marian**

*Danube Delta National Institute for Research and Development, Street Babadag 165, Tulcea 820112, Romania, e-mail: [office@ddni.ro](mailto:office@ddni.ro)  
E-mail for correspondence: [mihai.marinov@ddni.ro](mailto:mihai.marinov@ddni.ro)*

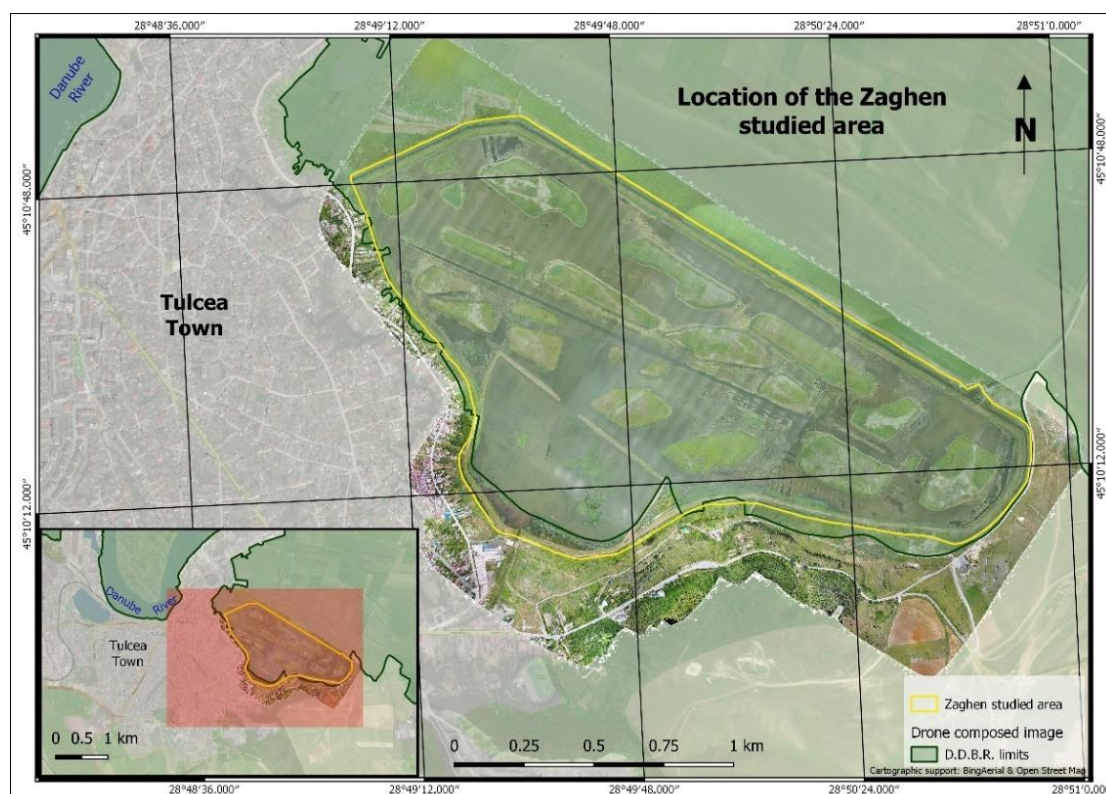
**A**bstract: Drained in the past to be used as an agricultural polder, the Zaghen area has recently undergone quite a lot of ecological restoration work, meant to become attractive area for the locals and a natural refuge for the wetland species that were once found here. Our observations argue to the current trend of species as well as the care measures that may be taken in the future to benefit and accelerate the restoration of the area. The present article is intended for a brief survey of fauna which aim to identify the species diversity occurring in a study area such as the Zaghen wetland near Tulcea town, and in a study period, which is in our case, in 2017-2018, after ecological restoration works. Frequency, abundance and occurrence of invertebrates, fish fauna, reptiles and amphibians, birds and mammals are the main evaluation indices shown in a grid monitoring system. On the site, there were identified 241 species of fauna. At the scale of our sampling, the data is showing a high number of species that can be found in anthropogenic habitats.

**Keywords:** wetland fauna, Zaghen, species checklist, habitat restoration

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### INTRODUCTION

A fauna species inventory should express the shortest understanding into groups of biodiversity being the main tool assessment and the first point of reference in order to identify the ecological values (Colwell & Coddington, 1994). Based on these data targeted measures can be applied for conservation purposes towards species of particular importance such as endangered, invasive or economic interest (Stork & Samways, 1995). To realize the potential of the Zaghen wetland where the goals of conservation are met, we analysed how biodiversity is distributed in different habitats. Zaghen wetland is the most silted floodplain sector north of Tulcea's hills, which comprised several well-developed fluvial levees and former riverbeds. From the beginning of the century, it was mentioned about the Zaghen area as a marsh that had no connection with the Danube but was flooded only at high water levels and the locals in the vicinity of the pond occasionally carried out fishing activities, though the area was not being rich in fish resources. The vegetation, for the most part, consisted of reed and aquatic vegetation for streams and canals. In 1962, in the context of the collectivization process (1949 - 1962) and the situations of drought and floods of the agricultural lands established in the Danube floodplain (Borșa, 2013), a flood defence dike was built as well as a network of internal channels for draining (Lup, 2003), intercepted by the main channel and connected downstream to a pumping station. From the former lake area, once very extensive, until 2016 there are only two water surfaces left, Zaghen and Malcoci, the rest of the territory being transformed into arable land. The floodplain was transformed into an agricultural polder, drained through channels and embankment works. Inside the polder the activities were grazing, agriculture, and fishing. The article is focusing on the species monitoring carried out after the hydro-technical works in 2016. Starting from the necessity of restoring the Zaghen wetland area, both from belonging to the Danube Delta Biosphere Reserve but also due to its positioning near the urban area of Tulcea municipality (Fig.1). From a morpho-hydrographic point of view, the area is a river levee, within the depression unit of the Danube floodplain, formed by an intense process of accumulation - silting in both natural and anthropogenic system. Following the completion of the ecological restoration works in the Zaghen area, which was aimed at initiating or accelerating the recovery of ecosystems, major changes were made in the physical as well as in the biotic component.



**Figure 1.** Location of Zaghen studied area in the vicinity of Tulcea administrative limits

## MATERIAL AND METHODS

The study focused on the fauna biodiversity after the restored area (Fig.1). All the group species, analysed and identified were grid on the map (Fig. 5) with indices and classes (Table 1). The monitoring studies were carried out between May 2017 - December 2018.

**Table 1.** Grouping of 7 fauna species group and methodology

Species group	Methods	Data collection and analysis	Indices and classes
Invertebrates	4 sampling stations. Sampling period May – December 2017	19 zooplankton samples in total Grid map, inventory of species	Frequency - F ( $F = P_i / P \times 100$ ) and Relative abundance - A ( $A = n_i / N \times 100$ ). The relative abundance categories for the evaluation of invertebrates and the proportion of individuals belonging to a species from the total number of individuals in a sample (I - 1 - 10%; II - 10 - 20%; III - <20%). For zooplankton following frequency classes have been used: F1 = 0%-10%; F2 = 10%- 30%; F3 = 30% - 50%; F4 = >50%.
Fish	2 complementary methods of sampling gillnets fishing (passive Nordic or commercial gillnets) and electric fishing. Sampling period June - December 2017	numbers of sites by water depth and surface. Indicators were expressed in Catch Per Unit Effort (CPUE) standardization at 100 m <sup>2</sup> gillnets/night and	Dominance (D) classes (sporadic - D1< 1%; subrecedent - D2=1-2%; recedent - D3=2-4%; subdominant - D4=4-8%; dominant - D5=8-16%; eudominant - D6>16%). Constancy (C) classes (very rare - C1=0-10%; rare - C2=10.1-25%; accessory - C3=25.1-45%; constant - C4=45.1-70%; euconstant - C5=70.1-100%). Ecological significance (W) classes (accidental - W1< 0.1%; accessory - W2=0.1-1; associate -

		1 hour/electric fishing.	W3=1-5%; complementary - W4=5-10%; characteristic - W5=10-20%; main - W6>20%). The main indexes used in biodiversity and fairness/equitability analysis are the Shannon-Wiener (H) and Evenness (E).
Reptiles and amphibians	30 - 45 minutes/transect 1000 m long and 20 m wide (aquatic habitats); 15 minutes on a transect of 100 m long and 20 m wide (terrestrial habitats). Sampling period June – September 2017	5 transects each	Abundance scale (very rare (A1) 1-10%; rare (A2) 10-25%; present significant number (A3) 25-50%; abundant (A4) 50-75%; very abundant (A5) <75%).
Birds and mammals	population size, estimation, census method, transect method (Bibby <i>et al.</i> , 2000), observation points, the camera with a sensor trigger height of 120 cm (2 months regardless of the weather conditions) Sampling period February – December 2017 and 2018	optical instruments and indirect observations auditory type or by the recognition of the nests, feathers, fur, the dens and burrows, the traces and excrements.	Abundance scale (very rare (A1) 1-10%; rare (A2) 10-25%; present significant number (A3) 25-50%; abundant (A4) 50-75%; very abundant (A5) <75%). Frequency (F) = n/N x 100, where: n = no. of surveys in which the species is present; N = total no. of surveys. Classes of frequency (accidental (F1) 1 – 25%; accessories (F2) 25.1 – 50%; characteristic (F3) 50.1 – 75%; frequent (F4) 75.1 – 100%.

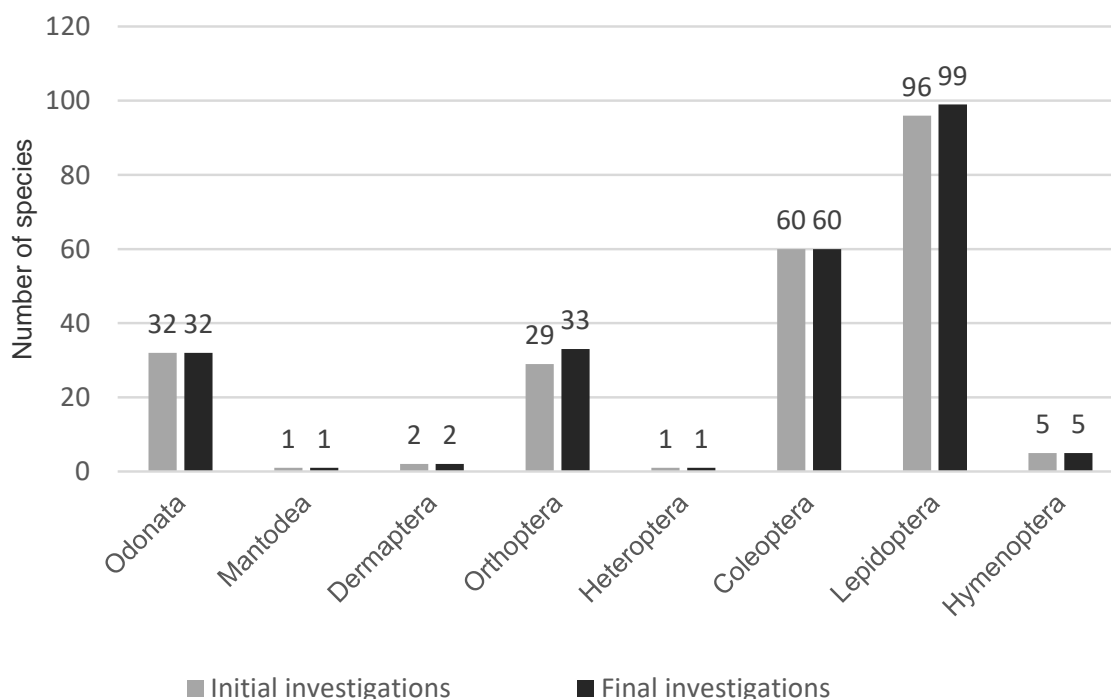
## RESULTS AND DISCUSSION

**Invertebrates** - Zooplankton abundance, biomass, and species richness were investigated monthly between June and September and in December. Copepods and rotifers are numerically dominant groups sharing 90% of the total zooplankton abundance. Regarding the biomass of zooplankton organisms, in the area of the Zaghen studied area, its highest value was calculated in June with the value of - 13.09 mg / L ww (wet weight), and the smallest value is calculated in the month July -1.26 mg / L ww. The total number of species identified was 85 (Suliman *et al.*, 2019; Tudor *et al.*, 2016). Zooplankton species abundance, frequency and distribution in 2017 is listed below: *Cladocera*: *Alona quadrangularis* (A1/F2; C1), *A. rectangularis* (A1/F2; C1), *Bosmina longirostris* (A1/F2; F3), *Ceriodaphnia reticulata* (A1/F2; C1), *Chydorus sphaericus* (A1/F4; C1,D4,F3), *Diaphanosoma brachiurum* (A1/F4; C1, D4, F9), *Macrothrix laticornis* (A1/F2; C1), *Moina brachiata* (A1/F4; C1, F3, F9), *Pleuroxus aduncus* (A1/F3; C1, F9), *P. trigonellus* (A1/F2; C1), *Scapholeberis mucronata* (A2/F3; C1, D4), *Simocephalus expinosus* (A1/F3; C1, D4), *S. serrulatus* (A1/F3; C1, D4), *S. vetulus* (A1/F2; C1); *Copepoda*: *Acanthocyclops vernalis* (A1/F2; C1), *Calanipeda aquaedulcis* (A1/F2; C1), *Cyclops strenuus* (A1/F3; F3, F9), *C. vicinus* (A1/F3; D4, F9), *Ectocyclops phaleratus* (A1/F3; F3, F9), *Eucyclops serrulatus* (A1/F3; F3,F9), *Eudiaptomus graciloides* (A1/F3; C1, F3), *Macrocyclops albidus* (A1/F4; C1,D4,F3,F9), *M. fuscus* (A1/F4; C1, D4, F3, F9), *Megacyclops viridis* (A1/F4; C1, D4, F3, F9), *Mesocyclops leuckarti* (A1/F2; F9), *Paracyclops fimbriatus* (A1/F4; C1, D4, F3), *Thermocyclops crassus* (A1/F4; C1, D4, F3, F9), *T. oithonoides* (A1/F4; C1, D4, F3, F9); *Rotifera*: *Anuraeopsis fissa* (A1/F4; C1, D4, F3, F9), *Ascomorpha ovalis* (A1/F4; C1, D4, F3, F9), *Asplanchna girodi* (A1/F3; D4, F9), *A. priodonta* (A1/F4; C1, D4, F3, F9), *Brachionus angularis* (A1/F4; C1, D4, F3, F9), *B. angularis subsp. bidens* (A1/F4; C1, D4, F3, F9), *B. budapestinensis* (A1/F4; C1, D4, F3, F9), *B. calyciflorus subsp. amphicerus* (A1/F2; F3), *B. calyciflorus subsp. dorcus* (A1/F3; C1, F9), *B. calyciflorus subsp. pala* (A2/F4; C1, D4, F3, F9), *B. diversicornis subsp. homoceras* (A1/F2; C1), *B. forcifcula* (A2/F4; C1, D4, F3, F9), *B. leydigii* (A1/F4; C1, D4, F3, F9), *B. plicatilis* (A1/F4; C1, D4, F3, F9), *B. quadridentatus* (A1/F2; C1), *B. rubens* (A1/F4; C1, D4, F3), *B. urceolaris* (A1/F4; C1, D4, F3, F9), *Cephalodella derbyi* (A1/F3; C1, D4), *C. gibba* (A1/F3; C1, F3), *Colurella obtusa* (A1/F2; D4), *C. uncinata* (A1/F3; C1, D4), *Eosphora najas* (A1/F2; F3), *Epiphanes macroura* (A1/F2; C1), *Euchlanis deflexa* (A1/F4; C1, D4, F3),

*E. dilatata* (A1/F4; C1, D4, F3, F9), *Filinia longiseta* (A1/F4; C1, D4, F3, F9), *Keratella cochlearis* (A1/F4; C1, D4, F3, F9), *K. quadrata* (A1/F4; C1, D4, F9), *K. serrulata* (A1/F3; C1, D4), *K. tecta* (A1/F4; C1, D4, F3, F9), *K. ticinensis* (A1/F3; C1, F3), *K. tropica* (A1/F2; C1), *K. valga* (A1/F4; C1, D4, F3, F9), *Lecane flexilis* (A1/F2; D4), *L. luna* (A1/F4; C1, D4, F3, F9), *L. quadridentata* (A1/F2; D4), *L. unguata* (A1/F2; C1), *Lepadella ovalis* (A1/F4; C1, F3, F9), *L. patella* (A1/F4; C1, D4, F3), *L. rhomboides* (A1/F2; C1), *L. triptera* (A1/F3; C1, D4), *Mytilina mucronata* (A1/F2; C1), *M. ventralis* (A1/F3; C1, D4), *Platonus patulus* (A1/F2; C1), *Polyarthra vulgaris* (A3/F4; C1, D4, F3, F9), *Pompholyx sulcata* (A1/F4; C1, D4, F9), *Scaridium longicaudatum* (A1/F2; D4), *Synchaeta oblonga* (A1/F4; C1, D4, F9), *S. pectinata* (A1/F4; C1, D4, F3, F9), *Testudinella parva* (A1/F4; C1, F3, F9), *T. patina* (A1/F4; C1, D4, F9), *Trichocerca capucina* (A1/F2; C1), *T. cylindrica* (A1/F4; C1, D4, F3, F9), *T. longiseta* (A1/F4; C1, D4, F3, F9), *Trichotria tetractis* (A1/F2; F9), *Wolga spinifera* (A1/F2; C1).

Investigations related to the presence and distribution in the territory of the entomofauna species reveal minor differences in the periods dedicated to observations. The species of entomofauna generally characterized by particular opportunism and mobility had less to suffer due to the works carried out. The capacity of restoring the populations of the entomofauna species affected by the anthropogenic intervention is optimal so that it can be about continuity (**Fig. 3**). Differences in the number of species observed during investigations appear only for the Orders Orthoptera (locusts, crickets, mole crickets) and Lepidoptera (butterflies), meaning that the total number of species observed increases. However, the observations regarding the total number of species are relative because the entomofauna is characterized by discontinuous population evolution, differences appearing from year to year and even from one season to another.

The investigations carried out do not show major differences between the investigation periods that attract attention. These were completed in October; the species of insects being dependent on the temperature of the environment, these can no longer be observed during the cold period of the year. Regarding the entomofauna, it is evident the predominance of species belonging to the Order **Lepidoptera** - butterflies (99 species), while the smallest number of observed species belong to Orders **Mantodea** (one species), **Heteroptera** (one species), and **Dermaptera** (2 species) (Sârbu and Benedek, 2004).



**Figure 3.** Analysis of the evolution of the entomofauna species in Zaghen

From relative abundance, the best-represented species of entomofauna in the field are the species belonging to the Order **Orthoptera** (crickets, locusts, moths). In the study area, it was identified a species of entomofauna of community importance from D.D.B.R. whose conservation requires the

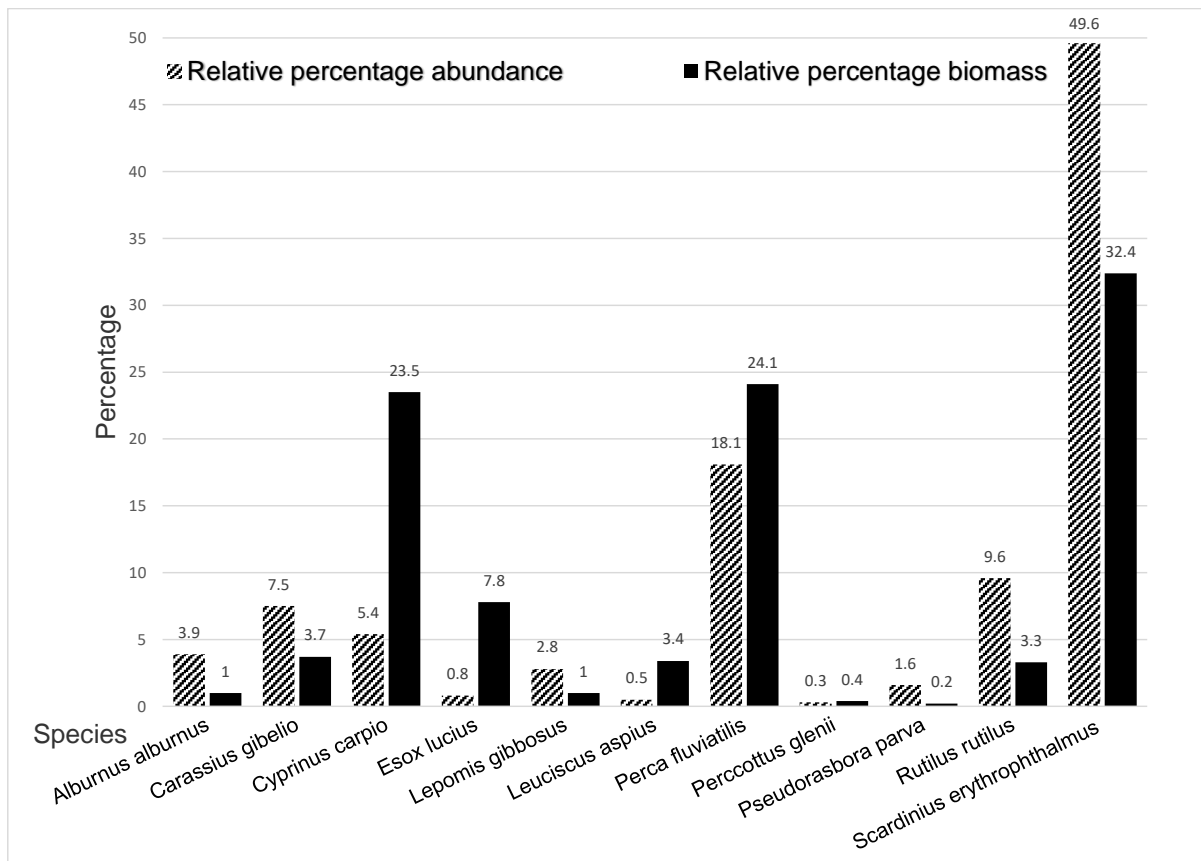
designation of special conservation areas (Directive 92/43 / EEC - Annex II), according to NATURA 2000 Standard Form - *Lycaena dispar* (Haworth, 1802) (NATURA 2000 Code: 1060). There have also been identified two species of entomofauna of Community importance whose presence requires strict protection (Directive 92/43 / EEC - Annex IV) - *Lycaena dispar* (Haworth, 1802) (NATURA 2000 code: 1060) and *Saga pedo* (Pallas 1771) (NATURE Code 2000: 1050). The list of invertebrates (entomofauna) species identified in 2017: Order **Odonata**: *Aeshna affinis* (F1/A2; G3-G9), *A. isoceles* (F1/A1; G3-G6), *A. mixta* (F1/A1; G3-G5), *Anax imperator* (F1/A1; G6-G8), *A. parthenope* (F1/A1; G6-G8), *Calopteryx splendens* (F3/A2; G2-G10), *Coenagrion pulchellum* (F2/A1; G3-G8), *Crocothemis erythraea* (F2/A3; A2-A3, B1, F10, E10, G7-G10), *Erythromma najas* (F1/A1; G5-G8), *E. viridulum* (F1/A1; G5-G8), *Gomphus flavipes* (F2/A1; G3-G5), *G. vulgatissimus* (F1/A1; G3-G5), *Ischnura elegans* (F1/A1; G5-G7), *Lestes barbarus* (F2/A2; G3-G10), *L. dryas* (F1/A1; G3-G10), *L. spona* (F1/A1; G3-G10), *L. virens* (F2/A1; G3-G10), *L. viridis* (F1/A1; G3-G10), *Libellula depressa* (F1/A2; G5-G9), *L. fulva* (F1/A1; G5-G9), *L. quadrimaculata* (F1/A1; G5-G9), *Orthetrum albistylum* (F1/A1; G5-G9), *O. brunneum* (F1/A1; G5-G9), *O. cancellatum* (F1/A1; G5-G9), *O. coerulescens* (F2/A1; G5-G9), *Sympetma fusca* (F1/A1; G5-G9), *Sympetrum depressiusculum* (F1/A1; G7-G10), *S. flaveolum* (F1/A1; G5-G7), *S. meridionale* (F3/A1; G7-G10), *S. sanguineum* (F1/A2; G7-G10), *S. striolatum* (F1/A1; G7-G10), *S. vulgatum* (F2/A2; G7-G10); Order **Mantodea**: *Mantis religiosa* (F2/A3; G8-G9); Order **Dermaptera**: *Forficula auricularia* (F2/A2; G4-G9), *Labidura riparia* (F1/A2; G7-G8); Order **Orthoptera**: *Acrida ungarica* (F3/A2; A1-A3, B1, G2-G10, F10, E10); *Acrotylus insubricus* (F2/A1; G9-G10), *Aiolopus thalassinus* (F1/A1; G9-G10), *Calliptamus italicus* (F3/A2; A2-A3, F10, E10, G7-G10), *C. barbarus subsp. barbarus* (F2/A2; A2-A3, F10, E10, G7-G9), *Chorthippus brunneus* (F3/A2; A2-A3, B1, F10, E10, G7-G10), *C. dichrous* (F3/A2; G9-G10), *C. loratus* (F2/A2; G9-G10), *C. mollis* (F1/A1; G9-G10), *C. parallelus* (F1/A2; F10, E9-E10, G7-G10), *Decticus albifrons* (F2/A1; F10, E9-E10, G7-G10), *D. verrucivorus* (F3/A2; D8, F10, E9-E10, G7-G10), *Ephippiger ephippiger* (F1/A1; G5-G7), *Eumodicogryllus burdigalensis* (F2/A1; G5-G7), *Gryllotalpa gryllotalpa* (F2/A2; G5-G8), *Gryllus campestris* (F2/A2; G5-G8), *Leptophyes albivittata* (F2/A1; G5-G7), *Melanogryllus desertus* (F2/A1; G5-G7), *Oecanthus pellucens* (F2/A2; G5-G8), *Oedaleus decorus subsp. decorus* (F2/A2; G5-G9), *Oedipoda caerulea subsp. caerulea* (F2/A1; G3-G10), *Omocestus minutus* (F1/A1; G5-G7), *Paracinema tricolor* (F1/A1; G7-G9), *Pezotettix giornae* (F1/A1; G7-G9), *Phaneroptera nana* (F2/A2; G5-G7), *Platypleura affinis* (F1/A2; G5-G7), *P. veyseli* (F1/A1; G7), *Poecilimon fuscus* (F2/A1; G5-G7), *Pteronemobius heydenii* (F1/A1; G6), *Rhacocleis germanica* (F1/A1; G5-G8), *Tetrix bolivari* (F2/A1; G3-G7), *T. subulata* (F12/A2; G3-G7), *Tettigonia viridissima* (F3/A3; A1-A3, B1, G2-G10, F10, E10); Order **Heteroptera**: *Pyrrhocoris apterus* (F4/A3; A1-A3, B1, G2-G10, F10, E10); Order **Coleoptera**: *Adalia bipunctata* (F2/A1; D8, E9-E10, F10, G5-G10), *Agaphantia dahli* (F1/A1; G6-G7), *A. violacea* (F1/A1; G6-G7), *Amara aenea* (F1/A1; G6-G7), *A. apricaria* (F1/A1; G6-G7), *Amphimalus solstitialis* (F1/A1; G6-G7), *Anisoplia austriaca* (F1/A1; G6-G7), *A. segetum* (F1/A1; G6-G7), *Anthaxia fulgurans* (F1/A1; G6-G7), *Asaphidion flavipes* (F1/A1; G6-G7), *Calomera littoralis* (F1/A1; G5-G8), *Calosoma inquisitor* (F2/A1; G5-G8), *Carabus coriaceus* (F2/A1; G5-G7), *Cerambyx cerdo* (F1/A1; G6-G7), *C. scopoli* (F1/A1; G6-G7), *Cetonia aurata* (F2/A2; D7-D8, E10, F10, G5-G10), *Chlaenius spoliatus* (F1/A1; G6-G7), *Chlorophorus sartor* (F1/A1; G6-G7), *Coccinella septempunctata* (F3/A2; A2-A3, B1, E10, F10, G5-G10), *Copris lunaris* (F1/A1; G5-G7), *Coroebus elatus* (F1/A1; G5-G7), *Cybister lateralimarginalis* (F1/A1; G4-G8), *Dorcadion pedestre* (F2/A1; G5-G7), *D. fulvum subsp. canaliculatum* (F1/A1; G5-G7), *Epicometis hirta* (F1/A1; G5-G7), *Graphoderus cinereus* (F2/A1; E2, E10, F10, G5-G10), *Harmonia axyridis* (F2/A1; G7-G9), *Hister quadrimaculatus* (F1/A1; G7-G9), *Homalochthebius minimus* (F1/A1; E10, F10, G10), *Hydrochara flavipes* (F1/A1; G7-G10), *Hydrophorus piceus* (F2/A1; G5-G7), *Isotomus speciosus* (F1/A1; G5-G7), *Leptinotarsa decemlineata* (F3/A2; G4-G6), *Leptura scutellata* (F1/A1; G5-G7), *L. steveni* (F1/A1; G5-G7), *Lytta vesicatoria* (F2/A2; G5-G7), *Neodorcadion bilineatum* (F2/A1; G5-G9), *Oberea erythrocephala* (F1/A1; G5-G8), *Oryctes nasicornis* (F1/A1; G6), *Pentodon idiota* (F1/A1; G5-G7), *P. sulcifrons* (F1/A1; G5-G9), *Phytoecia coerulescens* (F2/A1; G5-G7), *P. coerulea* (F1/A1; G5-G7), *P. cylindrica* (F1/A1; G5-G7), *P. pustulata* (F1/A1; G5-G7), *P. virgula* (F1/A1; G5-G7), *Plagionotus arcuatus* (F1/A1; G5-G7), *P. detritus* (F2/A1; G5-G7), *P. floralis* (F1/A1; G5-G7), *P. speciosus* (F1/A1; G5-G7), *Polyphylla fullo* (F1/A1; G5-G8), *Purpuricenus kaehleri* (F1/A1; G5-G7), *Rhizothrogus aequinoctialis* (F1/A1; G5-G7), *Strangalia melanura* (F1/A1; G5-G7), *S. nigra* (F1/A1; G5-G8), *Strangalina attenuata* (F2/A1; G5-G7), *Tetrops praeusta* (F1/A1; G5-G7), *Trichodes apiarius* (F1/A1; G5-G7), *Vadonia livida subsp. pecta* (F1/A1; G5-G7), *Valgus hemipterus* (F1/A1; G5-G7); Order **Lepidoptera**: *Acleris boscanoides* (F1/A1; G5-G8), *Acontia trabealis* (F1/A1; G5-G8), *Aedia leucomelas* (F1/A1; G5-G8), *Agapeta zoegana* (F1/A1; G5-G8), *Aglais io* (F2/A1; G5-G10), *Agrius convolvuli* (F1/A1; G5-G8), *Agrotis ipsilon* (F2/A1; G5-G9), *Anthocaris cardamines* (F2/A2; A2-A3, E10, F10, G2-G10), *Aphomia zelleri* (F1/A1; G5-G7), *Aporophyla lutulenta* (F1/A1; G5-G8), *Argynnis pandora* (F2/A2; A2-A3, E10, F10, G2-G10), *Aricia agestis* (F1/A1; G5-G7), *Boloria dia* (F1/A1; G5-G7), *Cochyliomorpha*



*woliniana* (F1/A1; G5-G7), *Carcharodus orientalis* (F1/A1; C6-C7, D8, E9-E10, F10, G9-G10), *Cataclysta lemnata* (F1/A1; G5-G7), *Catarhoe putridaria subsp. bulgariata* (F1/A1; G5-G7), *Chiasmia clathrata* (F1/A1; G7-G10), *Chilo luteellus* (F1/A1; G5-G8), *Cochylimorpha woliniana* (F1/A1; G5-G10), *Coenonympha pamphilus* (F2/A1; G5-G10), *Colias croceus* (F2/A2; G5-G7), *C. erate* (F2/A2; D8, E8, E10, F10, G2-G10), *Cydia pomonella* (F1/A1; G5-G7), *Deilephila elpenor* (F1/A1; G5-G10), *D. porcellus* (F1/A1; G5-G8), *Donacaula forficella* (F1/A1; G7), *Earias clorana* (F1/A1; G5-G7), *Elophila nymphaeata* (F1/A1; G5-G7), *Emmelina monodactyla* (F1/A1; G5-G7), *Epiblema scutulana* (F1/A1; G5-G7), *Eremobia ochroleuca* (F1/A1; G5-G7), *Eublemma ostrina* (F1/A1; G5-G7), *Euchloe ausonia subsp. taurica* (F2/A1; G5-G8), *Euclidia triquetra* (F1/A1; G5-G7), *Eupithecia centaureata* (F1/A1; D8, E8, F10, G5-G10), *Gypsonoma minutana* (F1/A1; G5-G7), *Hyles euphorbiae* (F2/A2; A2-A3, E10, F10, G5-G10), *Hyphantria cunea* (F2/A1; F10, G5-G10), *Hypsopygia costalis* (F1/A1; G5-G7), *Iphiclidus podalirius podalirius* (F3/A2; C1, D1, A2-A3, E10, F10, G3-G10), *Issoria lathonia* (F1/A1; G5-G7), *Isturgia arenacearia* (F1/A1; G5-G7), *Jodia croceago* (F1/A1; G5-G7), *Laelia coenosa subsp. coenosa* (F1/A1; G5-G9), *Laothoe populi* (F1/A1; G5-G9), *Lasiommata megera* (F1/A1; G5-G7), *Lemonia balcanica* (F1/A1; G5-G7), *Litoligia literosa* (F1/A1; G5-G7), *Loxostege sticticalis* (F1/A1; G5-G7), *Lycaena dispar* (F2/A1; D8, E9-E10, F10, G3-G10), *Lycaena phlaeas* (F1/A1; D7-D8, E10, F10, G3-G10), *Lythria purpuraria* (F1/A1; G5-G7), *Macroglossum stellatarum* (F1/A1; G5-G9), *Malacosoma castrense* (F1/A1; G5-G7), *Maniola jurtina* (F1/A1; G5-G7), *Meganola togatalis* (F1/A1; G5-G7), *Melanargia galathea* (F2/A2; G5-G9), *Melitaea cinxia* (F1/A1; G5-G7), *M. phoebe* (F2/A1; G5-G7), *Nemophora mollella* (F1/A1; G5-G7), *Noctua comes* (F1/A1; G5-G7), *Nomophila noctuella* (F1/A1; G5-G7), *Nonagria typhae* (F1/A1; G5-G7), *Ochlodes sylvanus* (F1/A1; G5-G7), *Oncocera semirubella* (F1/A1; G5-G7), *Orthotelia sparganella* (F1/A1; G5-G7), *Ostrinia nubilalis* (F1/A1; G5-G9), *Papilio machaon subsp. machaon* (F3/A2; D7-D8, E10, F10, G3-G10), *Parnassius mnemosyne subsp. wagneri* (F2/A2; D7-D8, G3-G10), *Pechipogo plumigeralis* (F1/A1; G5-G7), *Phragmataecia castaneae* (F2/A1; G5-G7), *Phragmatobia fuliginosa* (F1/A1; G5-G7), *Pieris brassicae* (F2/A2; D8-E9-E10, F10, G3-G10), *P. rapae* (F2/A2; E9-E10, F10, G3-G10), *Plutella xylostella* (F1/A1; G5-G7), *Polia nebulosa* (F1/A1; G5-G7), *Polyommatus coridon subsp. coridon* (F2/A1; D8, E9-E10, F10, G3-G10), *Polyommatus icarus* (F3/A2; E9-E10, F10, G3-G10), *Pontia edusa* (F1/A1; D8, E8-E10, F10, G3-G10), *Protarchanara brevilinea* (F1/A1; G5-G9), *Pseudopanthera macularia* (F1/A1; G5-G9), *Pyrrhia purpura* (F1/A1; G5-G7), *Rhyparioides metelkana* (F1/A1; G5-G9), *Schoenobius gigantella* (F1/A1; G5-G7), *Scirpophaga praelata* (F1/A1; G5-G7), *Sideridis lampra* (F1/A1; G5-G7), *Smerinthus ocellata subsp. ocellata* (F1/A1; G5-G7), *Sphinx pinastri* (F1/A1; G5-G7), *Timandra comae* (F1/A1; G5-G9), *Tomares nogelii* (F1/A1; G5-G7), *Tortrix viridana* (F1/A1; G5-G7), *Trichoplusia ni* (F1/A1; G5-G7), *Vanessa atalanta* (F3/A2; D8, E9-E10, F10, G3-G10), *V. cardui* (F2/A1; E10, F10, G3-G10), *Yponomeuta rorrella* (F1/A1; G5-G7), *Zekelita antiqualis* (F1/A1; G5-G7), *Zerynthia polyxena* (F2/A1; G4-G9), *Zeuzera pyrina* (F2/A1; D8, E9, G5-G9); Order Hymenoptera: *Cataglyphis aenescens* (F1/A1; G4-G7), *Lasius niger* (F2/A1; G4-G7), *L. flavus* (F1/A1; A2-A3, D9, E9, G5-G7), *L. platythorax* (F2/A1; G5-G7), *Messor structor* (F1/A1; G4-G7).

**Fish species-** In 2017 in Zaghen wetland was captured 13 fish species, more abundant in the centre of polder (Fig. 1), with 9 commercial fish species, 10 native and 3 non-natives, including *Perccottus glenii* first record in DDBR in 2007 (Năstase, 2007; Năstase *et al.*, 2017); after a decade from the record this species becoming with increase invasive potential in the area (Năstase *et al.*, 2019). Fish species list shows most of the species like *Rutilus rutilus*, *Leuciscus aspicius*, *Sander lucioperca*, *Alburnus alburnus*, *Cyprinus carpio*, *Perca fluviatilis* in reversible transit between Danube and lakes, but also a series of limnophylic fish species which found favourable conditions like *Esox lucius*, *Perccottus glenii*, *Lepomis gibbosus*, *Pseudorasbora parva*, *Scardinius erythrophthalmus* and *Leucaspis delineatus* in the area. In 2017 in Zaghen polder main, dominant and constant fish species were *Scardinius erythrophthalmus* and *Carassius gibelio*, follow by characteristic fish species *Perca fluviatilis* and, complementary species as *Rutilus rutilus*, associate *Alburnus alburnus*, *Cyprinus carpio*, and *Lepomis gibbosus*, but for the moment are accidental fish species *Perccottus glenii* and *Leuciscus aspicius*, with differences between sampling methods. The species *Perccottus glenii* should not be regarded as insignificant in the Zaghen polder because this invasive species very quickly forms stable and numerous populations, sometimes due to its incredible resistance it may remain the only present species in the area in the case of survival step-by-step conditions. This species is one of the future threats to ichthyofauna, recognizing its character as a true predator on spawns and larvae of fish species and even amphibians. The ecological parameters on commercial gillnets (1), nordic gillnets (2) and electric fishing (3) sampling, as follows: *Alburnus alburnus* (2 - D3, C4, W3); *Carassius gibelio* (1 - D4, C3, W4; 2 - D4, C5, W4; 3 - D6, C5, W6); *Cyprinus carpio* (1 - D6, C5, W6; 2 - D4, C5, W3; 3 - D3, C3, W3); *Esox lucius* (1 - D3, C2, W2; 2 - D1, C3, W2); *Lepomis gibbosus* (2 - D3, C5, W3); *Leucaspis delineatus* (3 - D5, C5, W5); *Leuciscus aspicius* (1 - D3, C2, W2; 2 - D1, C2, W1); *Perca fluviatilis* (1 - D3, C2, W2; 2 - D6, C5, W5);

*Percottus glenii* (2 - D1, C2, W1); *Pseudorasbora parva* (2 - D2, C3, W2; 3 - D2, C3, W2); *Rutilus rutilus* (2 - D5, C5, W4); *Sander lucioperca* (1 - D5, C3, W4); *Scardinius erythrophthalmus* (2 - D6, C5, W6). Diversity indices show us a stable ecosystem, slightly reduced average ichthyocenosis in the banks area, with an above-average E index especially in the open water area sampled with gillnets. However, it is noted that Zaghen's ichthyocenosis is one in training, at a balancing moment, perhaps in the coming years will be finalized the fish fauna as a structure, but will always be subject to change (smaller or larger) with the introduction of water (related to the hydrology of the polder), so that with water new can enter eggs, larvae, juveniles, adults of the various species present in the Danube (as appears in Năstase *et al.*, 2017). The diversity indices from Zaghen polder in 2017 from sampling methods: electric (H - 0,592; Hmax - 1,386; E - 0,427); Nordic gillnets (H - 1,606; Hmax - 2,565; E - 0,626).



**Figure 4.** Relative percentage abundance and relative percentage biomass (in CPUE) for the complementary sampling method with northern gillnets from the Zaghen polder in 2017

**Reptiles and amphibians** - During the study period there identified 9 species of amphibians and 3 species of reptiles. Species abundance and the quadrats in which there were identified between 14.06.2017 and 18.09.2017: *Rana ridibunda* (A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F3, F4, F5, F6, F7, F8, F9, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Rana/Phelophylax lessonae* (A3; - A2, A3, B1, B2, B3, B4, C1, C5, C6, D1, D2, D7, D8, E2, E8, E9, E10, F2, F5, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Rana (kl.) esculenta* (A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Triturus (cristatus) dobrogicus* (A2; - A3, B1, D2, D8, E2, E3, E4, E9, E10, F2, F5, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Triturus/Lissotriton vulgaris* (A2; - A2, A3, B1, B4, B5, C5, C6, D2, D7, D8, E2, E3, E4, E9, E10, F2, F4, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Bombina bombina* (A3; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C5, C6, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Hyla arborea* (A2; - D1, D2, E2, F2, G3, G4, G5, G6, G7), *Pelobates fuscus* (A2; - A2, A3, B4, B5, C6, D7, D8, E8, E9, E10), *Bufo viridis* (A2; - B1, B4, C1, D1, D2, D7, E2, E3, E9, E10, F2, F10, G2, G3, G4, G5, G6, G7, G8, G9, G10), *Emys orbicularis* (A2; - A3, E3, E4, E9, F4, F10, G2, G3, G4, G6, G7, G9,

G10), *Natrix tessellata* (A1; – E3, E4, E9), *Natrix natrix* (A2; - A3, B1, C1, D1, D2, E2, E3, E4, E9, F2, F4, F10, G2, G3, G4, G5, G6, G7, G9, G10).

**Birds** - Were registered 123 bird species (89 species in 1971 – Marinov, 1973): *Tachybaptus ruficollis* (F2/A2; B1-B4, C1-C6, D1-D7); *Podiceps cristatus* - all squares except (F3/A3; A2, C7, E10, F2, G2, G6); *P. griseogen* (F1/A1; B1-B4, C1-C6, D1-D7, F3-F9); *P. nigricollis* (F2/A3; - B1-B4, C1-C6, D1-D7); *Phalacrocorax carbo* (F2/A3; - B1, B2, B3, B4, C1-C6, D2-D7, E3-E9, F3-F10, G4, G8, G9); *P. pygmeus* (F2/A3; - B1, B2, B3, B4, C1-C6, D2-D7, E3-E9, F3-F10, G4, G8, G9); *Pelecanus onocrotalus* (F1/A2; - E4, F4); *P. crispus* (F2/A1; - B3, B4, C2-C6, E3, F3, E4, D5, D6, E5, E6, F9, F10); *Botaurus stellaris* (F1/A1; - B1, B2); *Ixobrychus minutus* (F3/A2; - all squares except E4, F3, F4, G2, G10); *Nycticorax nycticorax* (F2/A1; - D2, G5); *Ardeola ralloides* (F2/A2; - all squares except A2, B5, C7, E10); *Egretta garzetta* (F2/A3; - all squares except A2, B5, C7, E10); *Ardea alba* (F3/A3; - all squares except A2, B5, C7, E10); *A. cinerea* (-F3/A3; all squares except A2, B5, C7, E10); *A. purpurea* (F2/A2; - all squares except A2, C1, D2, D3, E2, E3, E10, F2, F3, F4, G2, G5, G6, G10); *Ciconia ciconia* (F2/A2; - B1, C1, C2, D1, D2, G2, G4); *Plegadis falcinellus* (F2/A3; - D2, G3, G4, F10); *Platalea leucorodia* (F2/A2; - D2, G3, G4, F10); *Cygnus olor* (F4/A3; - all squares except A2, A3, B5, C7, D1, D8, E2, E10, G2, G6); *C. cygnus* (F1/A2; - D4-D6, E4-E8, F6-F9); *Anser anser* (F4/A4; - E6, E8, F7, G8 - also C6, C7, D8 but outside of the reconstructed area); *Tadorna tadorna* (F2/A2; - C3, C4, D3, D4, D5, F8, F9); *Anas penelope* (F3/A4; - all squares except A2, A3, B1, B4, B5, C1, C7, D1, D2, D8, E2, E10, G2, G6, G7, G10); *A. strepera* (F2/A2; - all squares except A2, A3, B5, C7, D1, D8, E2, E10, G2, G6); *A. crecca* (F3/A5; - A2, A3, B5, C7, D1, D8, E2, E10, G2, G6); *A. platyrhynchos* (F4/A4; - all squares); *A. querquedula* (F2/A3; - C2, C3, D2, D3, G3, G4); *A. clypeata* (F3/A4; - all squares except A2, A3, B5, C7, D1, D8, E2, E10, G2, G6); *Netta rufina* (F2/A2; - C3, C4, D3, D4, D5, F8, F9); *Aythya ferina* (F3/A4; - B2, C2, C3, C4, C5, C6, D4, D5, D6, D7, E4, E5, E8, F8, F9); *A. nyroca* (F3/A3; - B1, B2, B3, B4, C1, C2, C5, C6, D6, D7, E6, E7, F10, G8); *Haliaeetus albicilla* (F2/A1; - C2, C3, D3, D4); *Circus aeruginosus* (F3/A2; - all squares); *C. cyaneus* (F2/A2; - all squares); *Accipiter nisus* (F3/A2; - all squares except F3); *Buteo buteo* (F3/A2; - G5); *B. rufinus* (F2/A2; - G5, F8, F9); *Falco tinnunculus* (F4/A3; - all squares); *F. columbarius* (F2/A2; - E9, E10, F8-F10, G6-G10); *F. subbuteo* (F3/A2; - all squares); *F. peregrinus* (F2/A2; - E9, E10, F8-F10, G6-G10); *Phasianus colchicus* (F4/A4; - A2, A3, B1, B3, B5, C1, C5-C7, D1-D3, D7, D8, E2, E3, E7-E9, F2, F4, F5, F8- F10, G3-G10); *Rallus aquaticus* (F3/A3; - all squares except F3); *Gallinula chloropus* (F3/A3; - all squares); *Fulica atra* (F3/A3; - all squares); *Himantopus himantopus* (F4/A3; - all squares except A2, A3, B5, C7, D1, D8, E10, F3, G2, G4, G6, G7); *Glareola pratincola* (F2/A2; - F9, F10); *Charadrius dubius* (F3/A3; - F9, G9, G10); *C. hiaticula* (F2/A2; - F9, F10); *Vanellus vanellus* (F4/A3; B2, B3, B4, C2, C3, C4, C5, C6, D2, D3, D4, D5, D6, D7, E2, E4, E5, E6, E7, E8, E9, F4, F5, F6, F7, F8, F9, F10, G7, G8, G9); *Calidris ferruginea* (F3/A4; - C2, D2, F9, G9, G10); *C. alpina* (F3/A4; - C2, D2, F9, G9, G10); *Philomachus pugnax* (F4/A4; - F2, F9, F10, G3, G4, G9, G10); *Gallinago gallinago* (F4/A3; - B3, B4, G3, G4); *Limosa limosa* (F4/A4; - F2, F9, F10, G3, G4, G9, G10); *Tringa erythropus* (F4/A4; - all squares except D1, E10, F3, G2, G6); *T. totanus* (F3/A4; - all squares except D1, E10, F3, G2, G6); *T. nebularia* (F3/A4; - all squares except D1, E10, F3, G2, G6); *T. ochropus* (F3/A3; - D2, D3, G3-G5); *T. glareola* - (F3/A3; all squares except D1, E10, F3, G2, G6); *Actitis hypoleucos* (F3/A3; D2, D3, G3-G5); *Larus minutus* (F4/A5; - all squares except A2, A3, C7, D1, E10, F2, G2, G6); *L. ridibundus* (F4/A5; - all squares); *L. canus* (F3/A4; - all squares except A2, A3, C7, D1, E10, F2, G2, G6); *L. cachinnans* (F4/A3; - all squares except A2, A3, C7, D1, E10, F2, G2, G6); *Sterna hirundo* (F3/A3; - all squares); *Chlidonias hybrida* (F4/A4; - all squares); *C. niger* (F3/A3; - all squares); *C. leucopterus* (F2/A3; - all squares); *Columba palumbus* (F2/A2; - G5, G6); *Streptopelia decaocto* (F3/A3; - G5, G6); *Cuculus canorus* (F3/A3; - G5, G6); *Athene noctua* (F3/A3; - B1, A2, C1, D1, E2, F2, G2, G5, G6, G7, G8, G9); *Strix aluco* (F2/A2; - G5, G6); *Asio otus* (F2/A2; - G5, G6); *Alcedo atthis* (F3/A2; - A3, B4, B5, C5, C6, C7, D7, D8, E8, E9, E10, F10, G10, G9); *Merops apiaster* (F4/A4; - G4, G5, G6, G7, G8, G9, G10); *Coracias garrulus* (F2/A2; - G5-G9); *Upupa epops* (F3/A2; - A2, A3, B4, B5, G3-G10); *Picus canus* (F2/A2; - G5, G6); *Dendrocopos major* (F3/A2; - G5, G6); *D. syriacus* (F4/A3; - G5, G6); *D. minor* (F3/A2; - G5, G6); *Riparia riparia* (F4/A5; - all squares); *Hirundo rustica* (F4/A5; - all squares); *Delichon urbica* (F3/A4; - all squares); *M. flava* (F3/A4; - all squares); *M. alba* (F4/A3; - all squares); *Troglodytes troglodytes* (F4/A3; - all squares except F3); *Erithacus rubecula* (F3/A4; - all squares except F3); *Phoenicurus ochruros* (F2/A2; - G5, G6); *P. phoenicurus* (F3/A3; - G5, G6); *Turdus merula* (F2/A3; - B1, C1, D1, E2, F2, G5); *T. pilaris* (F2/A4; - G5, G6); *T. philomelos* (F2/A3; - G5, G6); *T. iliacus* (F2/A2; - G5, G6); *Locustella luscinioides* (F3/A2; A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Acrocephalus palustris* (F2/A2; A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *A. scirpaceus* (F4/A4; - A2,



A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *A. arundinaceus* (F3/A3; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Sylvia curruca* - B1, C1, D1, E2, F2, F5, G5, G6, E9, E10); *Phylloscopus collybita* (F4/A4; - B1, C1, D1, E2, F2, F5, G5, G6, E9, E10); *P. trochilus* (F4/A4; - B1, C1, D1, E2, F2, F5, G5, G6, E9, E10); *Panurus biarmicus* (F3/A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Parus caeruleus* (F4/A4; - all squares except F3); *P. major* (F4/A4; - B1, C1, D1, E2, F2, F5, G5, G6, E9, E10); *Remiz pendulinus* (F3/A3; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Oriolus oriolus* (F2/A2; - G5, G6); *Lanius collurio* (F2/A2; - G5, G6, G7, G8, G9, G10, F10, F8); *Pica pica* (F4/A4; - all squares except F3); *Corvus monedula* (F4/A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *C. frugilegus* (F4/A5; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *C. corone cornix* (F4/A3; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Sturnus vulgaris* (F4/A5; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Passer montanus* (F4/A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Fringilla coelebs* (F2/A2; - G5, G6); *Carduelis chloris* (F2/A2; - G5, G6); *C. carduelis* (F4/A4; - D4, D5, D6, E5, E6, E7, F5, F6, F7, F8, F9, F10, G5, G6); *Emberiza schoeniclus* (F3/A4; - A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, D1, D2, D3, D4, D5, D6, D7, D8, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F4, F5, F6, F7, F8, F9, F10, G3, G4, G5, G6, G7, G8, G9, G10); *Miliaria calandra* (F3/A3; - G5, G6, G7, G8, G9, G10, F10).

**Mammals** - During the study period, 8 mammal species belonging to 5 respective families and 3 orders: 38% *Rodenta*, 50% *Carnivora*, 12% *Insectivora* were identified in the Zaghen area: European souslik (*Spermophilus citellus* L. - F4/A5; G8, G10), Eurasian otter (*Lutra lutra* L. - F1/A1; E3, E4), house mouse (*Mus musculus* L. - F1/A1; A1; G5), European mole (*Talpa europaea* L. - F1/A2; A3, B4, B5, C5), Red fox (*Vulpes vulpes* L. - F1/A1; A2, B2, F8), Golden jackal (*Canis aureus* L. - F1/A1; A3), Stoat (*Mustela erminea* L. - F1/A1; G4), Brown rat (*Rattus norvegicus* B. - F1/A1; F8). Compared to other areas of the Danube Delta Biosphere Reserve, the number of mammal species is much smaller, because the Zaghen area is a newly renatured area and the mammal species have not yet managed to occupy it. More than surely in the coming years' mammal species number will grow. Following field investigations, *Spermophilus citellus* was observed in the south-eastern part of the study area. Being a species that does not prefer flooded areas, it was observed on the dams that surround the renatured area. Markings of the *Lutra lutra* were observed within the area at the spillway. The area of ecological reconstruction is rich in fish species, thus favouring the popularity of this mustelid. *Mustela erminea* and *Mus musculus* were found on the protection dam on the south side of the study area, and *Talpa europaea*, *Canis aureus*, *Vulpes vulpes* were located on the protection dam on the northwest side and inside the renamed Zaghen area. *Rattus norvegicus* was observed in the south-eastern part of the study area. Species reported before 2017 and not recorded in the period 2017 – 2018: *Mesocricetus newtoni* (N.), *Micromys minutus* (P.), *Mus spicilegus* (P.), *Arvicola terrestris* (L.), *Apodemus sp.* (K.), *Microtus sp.* (S.), *Neomys sp.* (K.) *Erinaceus roumanicus* (M.), *Nannospalax leucodon* (N.), *Ondatra zibethicus* (L.), *Nyctereutes procyonoides* (G.), *Mustela putorius* (L.), *Mustela lutreola* (L.), *Mustela vison* (S.), *Vormela peregusna* (G.), *Meles meles* (G.), *Lepus europaeus* (P.).

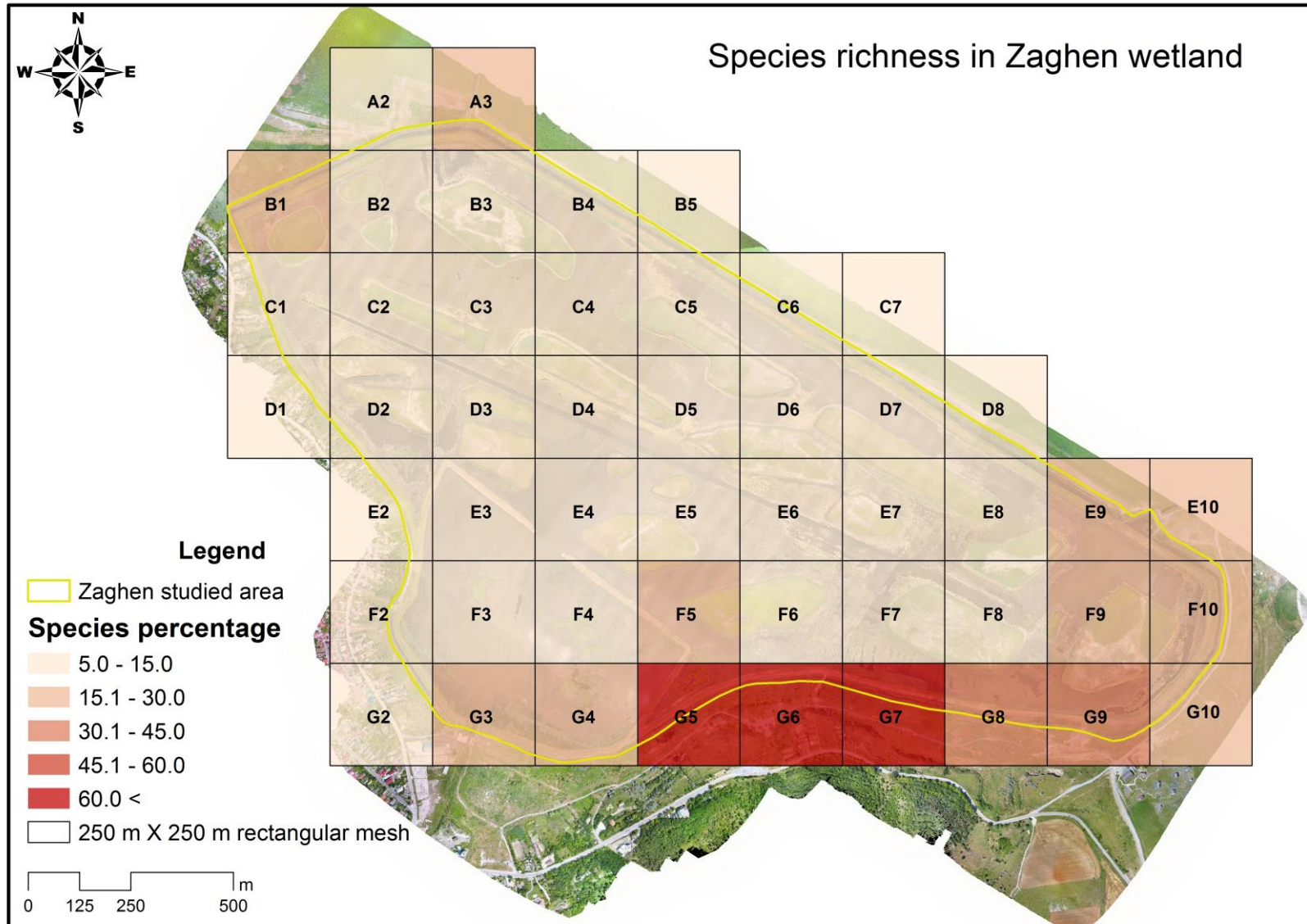


Figure 5. Areas of Zaghen where species richness was observed (grid)

## CONCLUSIONS

**Invertebrates** - The presence of 89 zooplankton species in four taxonomic groups: **Cladocera** (3%), **Copepoda** (46%), **Rotifera** (45%), and **Diptera** (6%), with a dominance of copepods and rotifers. Regarding the entomofauna, differences in the number of species observed during the investigations (226 species initially; 233 final species) appear only for the Orders **Orthoptera** and **Lepidoptera**, meaning the increase in the total number of species observed. Regarding the entomofauna, is evident the predominance of species belonging to the Order **Lepidoptera** - butterflies (99 species - 43%), while the smallest number of observed species belong to the **Mantodea** (one species - below 1%), **Heteroptera** (one species - below 1%) and **Dermaptera** - Ears (2 species - 1%). From the relative abundance, the best-represented species of entomofauna in the field are the species belonging to the Order **Orthoptera** (crickets, locusts, grasshoppers). In the study area, it was identified a species of entomofauna of community importance from D.D.B.R. whose conservation requires the designation of special conservation areas (Directive 92/43 / EEC - Annex II), according to NATURA 2000 Standard Form - *Lycaena dispar* (Haworth, 1802) (NATURA 2000 Code: 1060). They have also identified two species of entomofauna of Community importance whose presence requires strict protection (Directive 92/43 / EEC - Annex IV) - *Lycaena dispar* and *Saga pedo* (Pallas, 1771) (NATURA 2000 Code: 1050).

**Fish species**- Zaghen's fish fauna is one in training, at a balancing moment, perhaps in the coming years will be finalized the fish fauna as a structure, but will always be subject to change (smaller or larger) with the introduction of water (related to the hydrology of the polder), so that with water new can enter eggs, larvae, juveniles, adults of the various species dependents by Danube River.

**Reptiles and amphibians** - The total number of herpetofauna species identified in the Zaghen area is 14 species, only 12 species were confirmed in 2017. 2 were not found (Class *Reptilia*) and 2 species (Class *Amphibia*) are mentioned as new records for the database for this area.

### Birds

During the study period, 123 species of birds were recorded. Considering that in the former Zaghen wetland area several transition situations occur (the surface covered with reeds grows, the islands are covered with high grassy vegetation, the trees grow slowly in height, additions of cold water from deep springs and so on), the bird species list is constantly changing: new species are registered, previously registered species are no longer found or are very rare. Some measures are needed to increase the value from the ornithological point of view: continuation of the restriction of visiting the area; denudation of three central islands for attracting gulls and tern colonies; stopping the discharge of polluted water; intensification of anti-poaching actions (fish and game). If 50 years ago the number of birds was much lower, nowadays, although the number of species has increased, a decrease in absolute abundance and densities is observed.

**Mammals** - Of the 8 mammal species observed in the renatured area only 3 were observed within the study area, the rest being observed at the margin. This is explained by the fact that the dam offers protection against enemies. Except for the *Lutra lutra* species, the rest of the species have a favourable conservation status, which is why most of the conservation measures considered necessary are general, being oriented towards maintaining the current management of species conservation. To maintain the capacity of support for the otter, it is necessary to maintain the number of fish and to intervene with measures to reduce poaching and mortality. Permanent verification to ensure a minimum required level of water to maintain optimal habitat conditions for the otter population.

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