



FINS

FRESHWATER INVASIVES NETWORKING FOR STRATEGY

Book of abstracts of FINSII conference

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Introduction

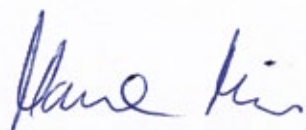
University of Zagreb, Faculty of Agriculture (UNIZG-FAZ) is dedicated to the education of highly qualified experts, development and broadening of professional knowledge in the field of agriculture and related sciences. Applying the highest academic standards we enable students to acquire competences based on the newest scientific knowledge, for the benefit of the society. In addition to teaching, the scientific research is a fundamental activity taken in pursuit of our mission - improvement in the Croatian agricultural sector. The University of Zagreb, Faculty of Agriculture holds a leading position in the Croatian agricultural science by the number of scientists, scientific projects and publications. The scientific research is frequently done in collaboration with other scientists and institutions both in Croatia and abroad. During the recent years, the Faculty has had permanent increase in scientific production, primarily in number of projects awarded, papers published in prestigious scientific journals, and in organization and active participation in scientific conferences and congresses. One of our main objectives in the scientific research is to enable transfer of knowledge and scientific results to the business sector, and to take part in their implementation.

European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC) is a statutory, advisory body of the Food and Agriculture Organization (FAO) of the United Nations. Established in 1957, it is an inter-governmental forum providing advice, delivering effective research and encouraging stakeholder participation on inland fisheries and aquaculture issues across all European countries. Governments, institutions and agencies can benefit from international advice derived from the EIFAAC's network of policymakers, managers, scientists and others working on inland fisheries and aquaculture issues. It is for this reason that EIFAAC and UNIZG-FAZ share common goal in the development of strategies to address threat of aquatic invasive species.

Croatian Biological Society (HBD) is a non-profit legal entity operating on Croatian territory. The association is a direct successor of the Croatian Natural History Society (HPD) established 1885. Given that one of the objectives of HBD's is effect on the protection and preservation of nature, biodiversity and the environment, through the organization FINS Congress, UNIZG-FAZ shares a similar goal.

Biological invasions are recognized as a major threat to biodiversity and their impacts in freshwater environments represent a growing concern. Policy and legislation, citizen awareness and management approaches to deal with introduced aquatic species (IAS) in different countries in the Europe still are various. It is particularly of concern that still in several European countries, legislation and management for IAS entirely missing. Thus, the primary objective of the conference is to share new information's and provide a forum where international scientists, policy makers and stakeholders would be able to encourage the development of the management and policy in this increasingly important area.

Chairperson of FINS II



Assoc. prof. Marina Piria

University of Zagreb, Faculty of Agriculture

Prof. Zoran Grgić, dean

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and threatened fish species. Invasive species degrade ecosystem balance, occupying habitats not otherwise inhabited by native species. Riprap is a specific manmade habitat type, installed to prevent river bank erosion. Cracks and interstitial space within the riprap are inhabited by numerous invasive species, including gobies from the genus *Neogobius*. Many studies have stressed that riprap is a suitable habitat for such species, enabling their longitudinal migration. In 2015, field studies were conducted on the ichthyofauna of the Sava River to collect quantitative data on the composition and abundance of fish species present. The collected data were used to examine the potential of riprap as habitat for invasive species settlement. The research area was divided into three zones based on the presence of rock: riprap 100%, riprap 50% and riprap 0%. To analyse the structure of the fish communities in these habitats, univariate and multivariate statistical methods were applied using the program PERMANOVA + for PRIMER, while graphic analysis was performed using multidimensional scaling (MDS) based on the Bray-Curtis similarity matrix. Statistical analysis showed that all three zones had a similar structure in terms of the number of species present ($p=0.094$). A similar pattern was found in the grouping of zones in the MDS analysis. Considering community structure, invasive species did not dominate in the composition or in abundance. In the findings, gobies were separated based on habitat type, and it was found that the round goby (*Neogobius melanostomus*) was more abundant in riprap habitats, while the monkey goby (*N. fluviatilis*) preferred silty substrates without riprap, with earthen river banks. It was also found that an increased abundance of round goby was associated with the abundance of other species, for which it likely serves as a food source, particularly the burbot (*Lota lota*). Future surveys of the riprap zones are necessary to obtain a more complete overview of the manner of spread of invasive species and to prevent their detrimental impacts.

Keywords: *Neogobius melanostomus*, Sava River, Riprap, invasive species

Feeding habits of the invasive non-native black bullhead *Ameiurus melas* in Lake Sava (Serbia)

Milica Jaćimović^{1*}, Jasmina Krpo-Četković², Mirjana Lenhardt³, Aleksandar Hegediš^{1,2}

¹ Institute for Multidisciplinary Research, University of Belgrade, Group for Ichthyology and Aquaculture, Department of Natural Resources and Environmental Sciences, Kneza Višeslava 1, 11030 Belgrade, Serbia

² Faculty of Biology, University of Belgrade, Chair of Animal Ecology and Zoogeography, Studentski trg 16, 11000 Belgrade, Serbia

³ Institute for Biological Research "Siniša Stanković", University of Belgrade, Department of Hydroecology and Water Protection, Bulevar Despota Stefana 142, 11060 Belgrade, Serbia

*corresponding author, e-mail: mpucar@imsi.rs

Abstract

The black bullhead (*Ameiurus melas* Rafinesque, 1820) is one of the most abundant and successful non-native fish species in European freshwaters. Recent studies indicate that it is also one of the most dominant invasive fish species in Serbian waters.

The aim of this research was to determine feeding habits of the black bullhead in Lake Sava, as it is known that this species may negatively affect the native fauna through predation or competition for food/space.

Black bullhead samples were collected monthly from 2009 to 2012, for four days in a row. Gastro-intestinal contents were analyzed in 2349 specimens. The analysis was done macroscopically, where possible, or under a binocular microscope. Prey categories were identified to the lowest possible taxonomic level. For the diet analysis, we used the following indices: the vacuity index, frequency of occurrence, numerical abundance, and prominence value. In addition, the seasonal trophic niche breadth was calculated according to the Shannon's diversity index.

Vacuity index ranged between 72.86% and 100%. The diet spectrum consisted of 14 different prey categories from five groups: Mollusca, Crustacea, Insecta, Teleostei, and plants. Fish were the main prey in all seasons, followed by aquatic invertebrates. Plant material and terrestrial insects were used as food in relatively small quantities. Fish-egg predation was also detected. Our research confirmed that this species is an opportunistic generalist, foraging on the most abundant and available prey. Ontogenetic diet shift was also detected. The lowest value of trophic diversity was found in the largest black bullheads, while the highest was found in the medium sized individuals. The widest niche breadth was recorded in the spring of 2011.

Keywords: black bullhead, feeding habits, gastro-intestinal content, opportunistic generalist, ontogenetic diet shift

The effects of gonopod removal on survival and mating ability of males in the invasive crayfish, *Procambarus clarkii*: preliminary results

Iva Johović^{1*}, Alberto Francesco Inghilesi², Felicita Scapini¹, Elena Tricarico¹

¹Department of Biology, University of Florence, Via Romana 17, 50125, Firenze, Italy

²NEMO, Nature and Environment Management Operators s.r.l., Piazza M. D'Azeglio 11, 50121 Firenze, Italy

*corresponding author, e-mail: iva.johovic@gmail.com

Abstract

The Sterile Male Release Technique (SMRT) has been successfully used to control populations of pest species for more than a half of century. This technique is based on rearing or capturing, sterilizing and releasing large numbers of males into the wild to mate with females, which will then produce non-viable eggs. This species-specific technique provides also one really important additional advantage that makes it stand out when compared to others: it works even at low densities, since sterile specimens may seek and mate with fertile individuals. Even though the original idea was developed to control economically important insect species, it was later applied to control some aquatic species as well. Up to now, only ionizing irradiation was investigated for production of sterile males on the red swamp crayfish, *Procambarus clarkii* populations and the highest dose that was found to not compromise the survival or mating ability of males, 40 Gy, determined a 57% reduction in offspring production. Manual removal of gonopods, specialized pleopods in males for sperm transferring, has never been investigated on *P. clarkii* and the purpose of our study here is to see its potential for a subsequent application as a part of the SMRT. A preliminary study (Stebbing et al. 2014) done on signal crayfish *Pacifastacus leniusculus*, has shown that the removal of the gonopods did not impact males' ability to compete with native males in finding a mate allowing them to mate as per normal. However, the technique significantly impaired spermatophore deposition causing 100% male sterilization. This study aims to analyze the effect of gonopod removal on the survival and mating ability of *P. clarkii* males in the lab. After randomly choosing the same number of sexually responsive males for treatment and control, they were both paired with sexually responsive females and their behavior was recorded and analysed. Preliminary results of this study are presented here.

Keywords: *Procambarus clarkii*, invasive crayfish, control, Sterile Male Release Technique, gonopods

Interactions of native and non-native fishes in eutrophic lakes Bara and Jamarice in Croatia

Momotaz Khanom^{1,2}, Tea Tomljanović^{1*}, Maria Špoljar³, Daniel Matulić¹, Tomislav Treer¹

¹University of Zagreb, Faculty of Agriculture, Department of Fisheries, Beekeeping, Game Management and Special Zoology, Svetošimunska 25, 10 000 Zagreb, Croatia