

SEEIC 2022

2ND SOUTHEAST EUROPEAN

ICHTHYOLOGICAL

CONFERENCE

12-15 OCTOBER 2022

SUPETAR - BRAČ ISLAND - CROATIA



BOOK
OF
ABSTRACTS



INSTITUT ZA OCEANOGRAFIJU I RIBARSTVO SPLIT

2nd Southeast European Ichthyological Conference (SEEIC)

12 – 15 October 2022 Supetar (island of Brač)

Croatia



Book of Abstracts



ISBN 978-953-7914-10-3

Fecundity estimation of two Lessepsian migrants, *Pterois miles* and *Etrumeus golanii*, from the Eastern Mediterranean Sea (Aegean Sea, Greece)

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Abstract:

Biological invasions are considered as a global-scale threat, which can lead, among others, to the disruption of food webs, habitat alternation, and are able to negatively impact ecosystem services with a resulting economic loss. Apart from the cornerstone role of climate change to aquatic invasions, a key component that enables the rapid progress of non-indigenous species (NIS) are anthropogenic pressures (e.g., corridors, ballast water, fouling). Since the opening of the Suez Canal, the Mediterranean Sea has received more than 140 fish species of Indo-Pacific origin (i.e., Lessepsian migrants). In order to understand the invasive potential of NIS, their impacts on biodiversity and ecosystem services, as well as the exploration of mitigation measures, knowledge of their biology is a prerequisite. Fecundity, though an important life-history trait in all aspects of fisheries biology and management, has been found as a largely understudied. Towards filling in information gaps, we present results on the fecundity of two wide-spread Lessepsian fish species, the devil firefish, or lionfish, *Pterois miles*, and Golani's round herring *Etrumeus golanii*, from the Eastern Mediterranean (Aegean Sea) in order to explore their reproductive potential effort. For the purposes of estimating fecundity, 14 and 23 individuals of *P. miles* and *E. golanii*, respectively, were examined, using the gravimetric method. Thus, three gonadal subsamples (i.e., anterior, core, posterior) from mature female individuals of each species were used. In specific, our analyses showed that there was not any statistically significant difference between the observed number of oocytes in the three extracted subsamples (ANOVA: $p \gg 0.05$; Tukey's HSD: $p \gg 0.05$). The average and standard error (\pm) of the absolute fecundity (F_{abs}) of *P. miles* and *E. golanii* was estimated at 93623 ± 41222 and 13801 ± 5595 , respectively. The allometric relationship between the F_{abs} and the gonadal weight (GW) was positive and statistically significant for both species (*P. miles*: $F_{abs} = 6836 * GW^{1.083}$, $R^2 = 0.5$, $p < 0.05$; *E. golanii*: $F_{abs} = 2845 * GW^{0.95}$, $R^2 = 0.81$, $p < 0.05$). Moreover, the F_{abs} and total length relationship exhibited an increasing trend until a certain maximum threshold (*P. miles*: 26.4 cm; *E. golanii*: 23.4cm). The aforementioned results can be used for the investigation of the invasive species reproductive dynamics as an intermediary tool for the effective monitoring and successful management of the understudied Lessepsian fish species. This study was undertaken in the frame of the project 4ALIEN: *Biology and the potential economic exploitation of four alien species in the Hellenic Seas*, funded by the NRSF 2017-2020 (MIS (ΟΠΣ): 5049511).

Keywords: Lessepsian species, reproduction, fecundity estimation, Mediterranean fishes.

Type of presentation: Poster