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Abstract

Acoustic Telemetry Unravels Movements and Habitat Use Patterns of Juvenile Meagre (*A. regius*) in the Tagus Estuary †

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Abstract: The meagre is among the largest *Sciaenidae* in the world (max: 230 cm, 103 kg), with a wide distribution range encompassing the NE and CE Atlantic Ocean and the Mediterranean Sea. The life cycle in Atlantic waters includes migratory movements from feeding and overwintering areas at sea to spawning and nursery areas in estuaries and coastal waters. However, significant spawning aggregations are only observed in five locations, among which is the Tagus estuary (Portugal). The meagre fishery that takes place within the Tagus estuary is significant, accounting for approximately two-thirds of Portuguese meagre catches. Despite its economic relevance, the meagre movements in that region remain largely unknown. The existence of a target fishery inside the estuary alongside a lack of routine biological data collection targeting the species and incipient fisheries control in the area, highlight an urgency to adopt innovative methodologies to unravel meagre migrations and its use of critical areas. We present the first insights of movement patterns and habitat use in the Tagus estuary using acoustic biotelemetry data collected between 2019 and 2021. The acoustic receiver array obtained a total of 142.183 registers from a total of 34 individuals tagged. From the tagged specimens, 33% revisited the Tagus estuary in subsequent years at least once, during the spring and summer, and 49% remained in the Tagus at least until autumn. Further analysis was conducted with juveniles tracked over 3 years to identify critical nursery areas using dynamic Brownian bridge movement models (utilization distribution estimations). The effects of abiotic conditions on the meagre behaviour were assessed using in situ sensor data (e.g., temperature and salinity) and other environmental predictors (e.g., photoperiod and tide cycle) and an explanatory model was developed that helps to understand the use of the Tagus estuary by juveniles. The information collected will be discussed in light of possible applications to promote sustainable management of meagre fisheries in the Tagus estuary and adjacent coastal areas.

Keywords: Tagus estuary; nursery habitat; site fidelity; acoustic biotelemetry; habitat use

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