EXOTIC FISH SPECIES IN THE MEDITERRANEAN SEA: ANALYSIS OF OCCURRENCE RECORDS

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Abstract

Here we provide a dynamic reconstruction of exotic fish occurrences in the Mediterranean Sea and report on a means in which we are tracking this phenomenon. Data were mainly extracted from published sources, resulting in a total of 2456 geo-referenced observations, from 1896 to March 2013. The database currently includes 85 Lessepsian species, 20 human mediated introductions and 44 recent immigrants from the Atlantic, holds a number of 172 fish taxa, including questionable and cryptogenic species.

Keywords: Species introduction, Fishes, North-Central Mediterranean

Introduction

The current change in the species geographical ranges is one of the most apparent signals of a changing biodiversity worldwide [1]. A spectacular example of this phenomenon is provided by the recent alterations of the Mediterranean marine biota due to the ongoing incoming of species of extra-Mediterranean origin. A major convenient division of these immigrants separates “true” exotic species, introduced outside their dispersal potential, from non-native organisms which have extended their distribution by natural means [2]. The former classification would include Lessepsian species entering through the Suez Canal and other human mediated introductions (for example, ballast water or aquarium escapes). The second type of immigrants is basically represented in the Mediterranean by Atlantic species, entering the Mediterranean through the Straits of Gibraltar. Here we present ‘ORMEF’, a new geo-referenced database, with the aim to provide 1) a dynamic reconstruction of exotic fish occurrences in the Mediterranean Sea, and 2) insights on the methods we have used to detect these species thus far.

Materials and Methods

Data were extracted from a total of 457 published sources, spanning from 1896 to 2013. Presence records were geo-referenced using ArcGIS 9.3 as Geographical Information System (GIS) (Fig. 1). Documentation of biological, ecological, taxonomic information, introduction pathways, bibliographic references and other relevant data for each species was also compiled. The database was here explored to provide synthetic information on the chronology of these sightings and on species spatial dynamics. For insights on how exotic fishes are being monitored in the Mediterranean Sea, we analyzed the whole set of records according to the country and means of detection.

Results and Discussion

The ORMEF database currently includes 2456 geo-referenced observations. Out of these, 2019 were extracted from published presence records, 377 from checklists and 60 from grey literature. Initial analyses consisted of calculations of linear rates of spread for both single species and major pathways of arrival. Spatial patterns are shown for i) Lessepsian species, ii) human mediated introductions other than Lessepsian, and iii) Atlantic species entering through Gibraltar. Professional fishing gears such as trawls and nets have traditionally been important means of recording exotic species, but the recent increasing use of underwater photographs and videos has emerged in the last few years. The uneven geographical allocation of species sightings along the various Mediterranean sectors reflects the unbalanced publishing efforts among different Mediterranean countries, with the greatest gap corresponding to some southern countries, where little published information exists.

Fig. 1. ORMEF (Occurrence Records of Mediterranean Exotic Fishes) Database: Geographical distributions of documented records. First records in the Mediterranean are reported with flags, subsequent records with crosses.

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References