



## Fishes in Lagoons and Estuaries in the Mediterranean. 2: Sedentary Fish

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The Mediterranean basin is an intercontinental region that includes the Mediterranean Sea with its islands and continental shores near the coast of South Europe, West Asia and North Africa. The Mediterranean Sea is a mid-latitude semi-enclosed sea that has significant biodiversity (TANHUA et al. 2013). COLL et al. (2010) and IUCN (2019) have stated that this sea is a hotspot for marine biodiversity and contains about 7% of the world's marine fish species. According to recent reports by FROESE & PAULY (2019), so far about 770 fish species have been recorded from the Mediterranean basin, indicating high species diversity in the area.

The estuaries and lagoons are the most productive ecosystems in the world (NOAA 2018). These ecosystems have a relative paucity of fish species due to their unique characteristics in terms of temperature and salinity. In fact, only species that can adapt to specific environmental conditions are able to live in these habitats. So far, various studies have been carried out on fish biodiversity in lagoons and estuaries in the Mediterranean basin. Considering the importance of lagoon-estuary species in the Mediterranean, this article aims to review the book entitled *Fishes in the Lagoons and Estuaries in the Mediterranean 2: Sedentary Fish* authored by Mohamed Hichem Kara and Jean-Pierre Quignard. This book has been published by John Wiley & Sons, Inc. in 2019. It examines families and species of fish in the lagoons and estuaries in the Mediterranean basin. It can provide useful information on the biological and ecological characteristics of Mediterranean fish species. This information can be used for habitat management and conservation of fish species in the Mediterranean basin. Here, we briefly review the chapters of this book.

The introductory section of the book explores various topics including habitat disparity, adaptation, evolution, benefits and threats. Chapters 1–8 discuss different families of fish in the Mediterranean Basin: Atherinidae, Blenniidae, Cyprinodontidae, Gasterosteidae, Gobiidae, Labridae, Poeciliidae and Syngnathidae. At the beginning of each chapter, important aspects of each family such as morphological characteristics, biogeography, biodiversity, habitat, ecology, systematics, phylogeny and palaeontology are discussed. The authors have also examined systematic issues, morphological characteristics, distribution, ecology, feeding and reproductive behaviour, economic importance and conservation status of each fish species. The list of the genera and the species with conservation status according to IUCN Mediterranean Red List is provided in Table 1.

Based on the obtained information, most of the lagoon-estuary species belong to the families Atherinidae, Syngnathidae, Blenniidae and Gobiidae. Examination of the conservation status of fish species indicates that one of them (*Pomatoschistus microps*) is classified as Critically Endangered (CR) by IUCN Mediterranean Red List. Two endemic species (*Aphanius iberus* and *Pomatoschistus tortonesei*) are in danger of extinction. In addition, several other species are near to extinction: *Hippocampus guttulatus*, *H. hippocampus*, *Syngnathus taenionotus*, *S. tenuirostris*, *S. typhle* and *S. acus* (ABDUL-MALAK et al. 2011). Researchers state that climate change, coastal development, overfishing, pollution and habitat destruction are the most important factors in declining of fish populations and their extinction in marine ecosystems such as the Mediterranean Sea (RADKHAH & EAGDERI 2019).

**Table 1.** List of fish genera and species in estuaries and lagoons of the Mediterranean basin (LC: Least Concern, NT: Near Threatened, EN: Endangered, CR: Critically Endangered, DD: Data Deficient)

Family	Genus	Species	Conservation Status
Atherinidae	<i>Atherina</i> Linnaeus, 1758	<i>Atherina (Hepsetia) lagunae</i>	LC
Blenniidae	<i>Salaria</i> Forsskål, 1775	<i>Salaria pavo</i>	LC
Cyprinodontidae	<i>Aphanius</i> Nardo, 1827	<i>Aphanius dispar</i>	LC
		<i>Aphanius fasciatus</i>	LC
		<i>Aphanius iberus</i>	EN
Gasterosteidae	<i>Gasterosteus</i> Linnaeus, 1758	<i>Gasterosteus aculeatus</i>	LC
Gobiidae	<i>Gobius</i> Linnaeus, 1758	<i>Gobius cobitis</i>	LC
		<i>Gobius niger</i>	LC
		<i>Gobius paganellus</i>	LC
	<i>Knipowitschia</i> Iljin, 1927	<i>Knipowitschia panizzeae</i>	LC
	<i>Pomatoschistus</i> Gill, 1864	<i>Pomatoschistus canestrinii</i>	LC
		<i>Pomatoschistus marmoratus</i>	LC
		<i>Pomatoschistus microps</i>	CR
<i>Pomatoschistus tortonesei</i>		EN	
<i>Zosterisessor</i> Whitley, 1935	<i>Zosterisessor ophiocephalus</i>	LC	
Labridae	<i>Symphodus</i> Rafinesque, 1810	<i>Symphodus cinereus</i>	LC
Poeciliidae	<i>Gambusia</i> Poey, 1855	<i>Gambusia holbrooki</i>	LC
Syngnathidae	<i>Hippocampus</i> Rafinesque, 1810	<i>Hippocampus guttulatus</i>	NT
		<i>Hippocampus hippocampus</i>	NT
	<i>Nerophis</i> Rafinesque, 1810	<i>Nerophis ophidion</i>	LC
	<i>Syngnathus</i> Linnaeus, 1758	<i>Syngnathus abaster</i>	DD
		<i>Syngnathus acus</i>	NT
		<i>Syngnathus taenionotus</i>	NT
		<i>Syngnathus tenuirostris</i>	NT
<i>Syngnathus typhle</i>	NT		

The current book has important and considerable features that should be mentioned here:

- Use of new, up-to-date and valid references. The information presented in the book is particularly up-to-date on taxonomic data of species and is based on recent reports. The reviews have shown that over 1200 scientific works have been used to provide this book.
- Use of appropriate figures and diagrams.
- Expert and experienced authors. Mohamed Hichem Kara and Jean-Pierre Quignard are experienced ichthyologists who have done various scientific works on the Mediterranean so far. In addition, they are also members of the French Ichthyological Society.
- Use of simple and fluent language that attract the attention of different readers.

Although this book has some useful features, we can provide comments to authors to improve its content for future edits. We suggest providing pictures of fish species and their habitats. Certainly, the presentation of these pictures in the book can be very interesting and useful for readers.

The current book can be used by ichthyologists, ecologists, biologists and fisheries managers as a valid reference for identifying of fish species in the Mediterranean basin. We recommend this book to be distributed in the Mediterranean countries as it will be useful for the conservation of endangered fish species.

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