




Article

A Critical Checklist of the Marine Fishes of Malta and Surrounding Waters

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Abstract: A critical review of marine fishes from Malta (Central Mediterranean) recorded up to December 2022 in the technical and semi-popular literature, during the Mediterranean International Trawl Survey (MEDITS), and in commercial fisheries landings data, was undertaken with the main aim of producing a checklist of species whose occurrence in the seas around the Maltese Islands could be authenticated. This review also served to generate two other lists: one of the species whose occurrence around the islands is probable or possible but which require confirmation, and a second list of previously reported species whose occurrence was deemed highly unlikely and which were hence excluded; the reasons for such exclusion are given. A total of 412 species were confirmed as occurring in Maltese waters, 53 species were listed as requiring confirmation, and 78 species were excluded. Of the species whose occurrence around the Maltese Islands was confirmed, 370 were native; 17 were non-established aliens; seven were established aliens; three were non-established Atlantic immigrants; five were established Atlantic immigrants; nine were non-established cryptogenic; and one was an established cryptogenic. The 412 confirmed species from the Maltese Islands represent 54% of the Mediterranean fish species that have been recorded in recently published works. Therefore, considering the geographical location of the islands at the centre of the Mediterranean, they provide a presumed ideal siting for a good representation of the marine ichthyological fauna. The Maltese checklist appears to still be short of many fish species that probably occur locally and have yet to be added to the present confirmed list. Nevertheless, the present review serves as a good indication of the current situation of the Maltese fish fauna, also noting that checklists for the group from neighbouring countries are somewhat outdated and require review and updating.

Keywords: Actinopteri; alien species; Chondrichthyes; Elasmobranchii; faunistics; marine ichthyofauna; Osteichthyes; Petromyzonti



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1. Introduction

Fish, being mostly conspicuous, mobile animals familiar to sea users, coastal dwellers, and casual visitors and, for some species at least, having economic significance, are one of the best-known marine faunal groups. The vast literature on Mediterranean fishes, including those of the central region [1–4], means it is perhaps surprising that despite this good regional information, there is rather limited knowledge on the fishes that occur around the Maltese Islands. However, the available information suggests that the marine ichthyofauna of Maltese waters is very rich and diverse [5]. Very likely, this is partly due to the Islands' geographical location at the centre of the Mediterranean, where there is both a transition in biogeographical characteristics from west to east and changes in these characteristics as a result of the ongoing modifications to Mediterranean hydrological conditions and to ecology resulting from global climate change [6]. The Maltese Islands also have an intermediate position in the latitudinal gradient between the European Mediterranean shores and the North African coast and are, therefore, strongly influenced by north–south

biogeographical changes. Moreover, a high diversity of marine habitats characterizes Maltese marine waters, both inshore and offshore, which also contributes to the high species richness and diversity of the marine fish fauna. On the other hand, non-marine ichthyofauna is almost non-existent. As there are no lakes, rivers, streams, or lagoons on the islands, fish species associated with such habitats are absent, with a single exception, that of *Aphanius fasciatus* (Valenciennes), which occurs permanently in transitional waters with fluctuating salinities [7].

The bulk of the literature on Maltese fishes is popular and semi-popular in nature and, more often than not, deals with the larger inshore and epipelagic species, especially those of the fisheries importance. In some cases, the literature includes species whose occurrence is doubtful on biogeographical grounds or due to difficult taxonomy. There is some literature that approaches the subject more scientifically, focusing on taxonomy and faunistics (e.g., [8,9]) and on ecological aspects (e.g., [10–12]). However, cryptic and deep-water fishes have been mostly neglected. The inclusion of Malta in regional and global checklists and databases (e.g., [13]) is based on the few scientific and technical works that have been published but very often also list species whose area of distribution should include the Maltese Islands, whether they have been actually recorded or not. These and other difficulties are indicated in the brief overview of the published records for Malta that follows.

1.1. Brief Overview of Published Lists of Maltese Fish Fauna

Publications on the ichthyofauna of the Maltese Islands date back to the middle of the 18th Century when Pehr Forsskål produced the earliest known scientific list of Maltese fishes comprising 114 species [14]. During the 19th and 20th centuries, several works were published on the Maltese ichthyofauna, notably by Trapani [15], Gavino Gulia [16,17], Tagliaferro [18], Giovanni Gulia [19–23], and Despott [24,25].

More recently, a seminal work on Maltese ichthyology was the comprehensive illustrated catalogue of local fishes by Guido Lanfranco, published in 1958 and republished in several editions [26–30]; however, the 2009 edition [30] was a simplified version of the 1993 work [29] and did not include new records that were published since the previous edition. In 1996, Gerald H. Jennings published a guide to the fishes of Malta [31]; this volume, illustrated with line drawings, included many previously unrecorded species, which, however, are doubtful at best and are therefore of limited scientific value. Two books that were published at the turn of the last century were *The Fishes of Malta* [32] and *Mediterranean Sea Fishes* (Central Region) [33].

The 21st century saw the publication of a number of ichthyological papers in local and international journals, mostly focused on a particular species or groups of species (e.g., [11,34–37]). A paper on sharks and rays from Maltese waters, published in 2003 [9], was the first comprehensive critical checklist of the local elasmobranch fauna. These and other recent scientific contributions (e.g., [8,38]) comprise a valuable addition to the knowledge of the fishes which are found in Maltese waters, especially considering the recent appearance of a number of Red Sea and Atlantic immigrants, which are attributed to the warming of Mediterranean surface waters. Nevertheless, it is clear that the several doubtful records and other difficulties highlighted above necessitate an in-depth critical review of the Maltese ichthyofauna to screen out those species which do indeed occur from those whose occurrence is not authenticated.

1.2. Fisheries Data—A Valuable Source of Information on Maltese Fish Fauna

An additional source of valuable information on fish fauna is fisheries data, including both fisheries-independent and fisheries-dependent data sources. In the European Union (EU), fisheries resources are managed through the implementation of the Common Fisheries Policy (CFP; Regulation (EU) No 1380/2013). Malta has been collecting fisheries data in line with CFP requirements since joining the EU in 2004, most recently in line with the rules set out in Regulation (EU) 2017/1004 on the collection, management, and use of data in the fisheries sector and support for scientific advice regarding the CFP. Commercial fisheries

data are submitted to the EU's Joint Research Centre (JRC) on an annual basis and analysed by Expert Working Groups (EWGs) of the Scientific, Technical, and Economic Committee for Fisheries (STECF).

The Mediterranean International Trawl Survey (MEDITS) is a mandatory annual bottom trawl survey undertaken by all Mediterranean EU Member States, which collects data on the relative abundance of demersal and benthic species [39,40]. A useful reference that is routinely updated with MEDITS survey results is the 'TM list': a full taxonomic list of all Mediterranean species encountered in the various Geographic Sub-Areas (GSAs), including in waters surrounding the Maltese Islands (GSA 15).

In addition to the EU fisheries data collection provisions, Malta is also subject to the fisheries data collection requirements of the General Fisheries Commission for the Mediterranean (GFCM). Fisheries-related data are collected and transmitted in line with the GFCM Data Collection Reference Framework (DCRF) [41] and made publicly available on the United Nations Food and Agriculture Organisation (FAO) fisheries capture production database. GFCM expert working groups on stock assessment, marine environment, and small-scale and recreational fisheries analyse the data and provide advice to the GFCM Scientific Advisory Committee on Fisheries (SAC).

1.3. Aim of the Present Work

To address the several doubtful records and other difficulties highlighted above, the present work aimed to undertake an in-depth review of the Maltese ichthyofauna in order to screen out those species which do indeed occur around Malta from those whose occurrence is not authenticated. Specifically, the present work comprises a critical review of published records of fish from Maltese waters, from the scientific, technical, and semi-popular literature, as well as species recorded during MEDITS and in commercial fisheries landings data. The main output of the present work is a checklist of species that have been confirmed to occur in Maltese waters. In producing this list, two other lists were generated: one that provides species whose occurrence is probable or possible but for which there are no authenticated records, and a second that lists species whose occurrence is excluded based on presently available scientific knowledge. The most recent authoritative checklist remains that which was made in 1993 by Lanfranco [29]; therefore, the compilation of an updated critical checklist of fish found in Maltese waters is long overdue.

2. Methods

2.1. Study Area

The study area considered in the present review is the marine area around the Maltese archipelago, taken here to be GSA 15 as established by the GFCM in 2009 (Figure 1). Malta is located in the western Ionian Sea, more or less at the centre of the Mediterranean in the biogeographical transition zone between the western and eastern basins [42,43]. The Maltese islands present an obstacle to the general surface water exchange between the western and eastern basins of the Mediterranean, and consequently, the offshore hydrodynamic regime and other physical oceanographic characteristics are quite complex [44,45]. Inshore, there is a predominant southeast current flow that is reinforced by waves generated by the prevailing north-westerly winds [44,46]. As for most of the Mediterranean, Maltese shores are microtidal (maximum tidal range = 0.20 m), with fluctuations in the mean water level of less than 0.5 m and mainly arising from differences in atmospheric pressure [47].

Values of the sea surface temperature around the Maltese Islands typically range between 15 °C and 25 °C. However, the mean sea temperature increased by 1.9 °C during the period 1978–2020, with high values reaching 30 °C [48,49] (Malta International Airport Met Office, personal communication, 6 December 2022). Inshore salinity normally ranges between 37.1 and 37.8 ppt but may fluctuate widely in very sheltered bays and inlets and in semi-enclosed creeks [50]. Maltese coastal waters are generally oligotrophic, with levels of dissolved nitrate and phosphate not exceeding 20 µg at N/L and 0.3 µg at P/L, respectively [50].

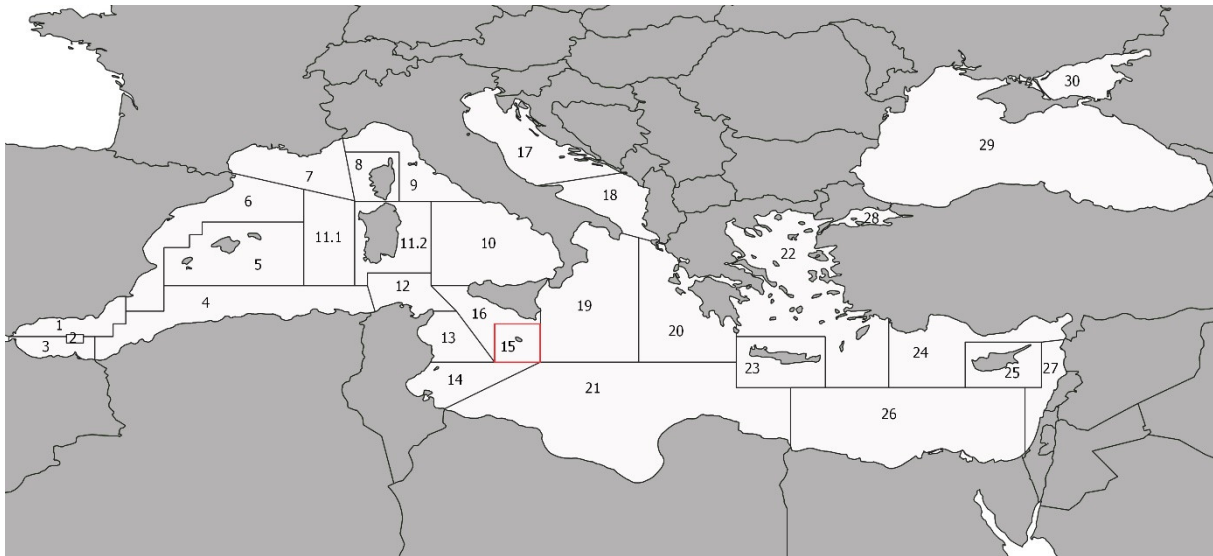


Figure 1. Map of the Mediterranean Sea indicating the boundaries of the Geographic Sub-Areas (GSAs) established by the General Fisheries Commission for the Mediterranean in 2009; the study area considered in the present work (GSA 15) is shown in red.

To the north and northeast of Malta, the seabed between the Maltese Islands and southern Sicily is a vast shallow continental shelf whose depth does not exceed 200 m, with a few banks rising close to the surface, while to the southwest of Malta, bathyal depths are present relatively close to the coast since the islands are situated on the north-eastern flank of the Malta Graben: the deepest trough of the Pantelleria Rift system. The southwestern coast of the islands is characterised mainly by high cliffs, while the north-eastern coast is characterised by gently sloping shores [51].

The main habitat types in Maltese shallow (0–45 m) coastal areas are typical of the Mediterranean and include rocky shores and shallow (usually down to a depth of around 6 m) rocky infralittoral areas, which in places are covered with accumulations of boulders and/or of pebbles and cobbles, and sandy bottoms that in many places support extensive *Posidonia oceanica* seagrass beds down to a depth of around 45 m [52]. Extensive rocky reefs occur in several places at a depth of between 0 m and 100 m, some of which—particularly ones located several kilometres offshore—have a high ecological value in terms of habitats for fish, including species of commercial importance. Where rocky reefs are absent, the seabed within the 6–100 m depth range mainly comprises bare fine sands, which may support rhodolith beds that, in places, form a maerl bottom [53,54]. Remote operated vehicle (ROV) surveys of deep-sea (200–1000 m) areas around the Maltese Islands have indicated the presence of highly diverse habitats that include extensive rocky areas dominated by living cold-water scleractinian and gorgonian coral assemblages, a sub-fossil lithistid sponge reef, deep-water caves, and vast expanses of soft-bottoms that support a high species richness and abundance of echinoderms and crustaceans [55].

2.2. Review

A checklist of species that have been reported to occur in Maltese waters in December 2022 was compiled by critically reviewing the compilations by Lanfranco (1993), Jennings (1996), Falzon (1999), Farrugia Randon & Sammut (1999), Sammut (2001), Schembri et al. (2003), and Ragonese et al. (2013) [9,12,29,31–33,56]. Although the relevant pre-1950 literature [15–25,57] provides much useful information, the taxonomy used is outdated, not only because of changes in generic and specific allocation due to better phylogenetic knowledge and the rules of taxonomy, but also because of misidentifications and what are now known to be distinct species previously lumped together under one name. Guido Lanfranco resolved this old nomenclature to the extent possible and included records from the

historical literature in his catalogues [26–29]. We, therefore, do not repeat historical records here and consider the fishes reported in Lanfranco’s earliest catalogue and subsequently.

The present authors also consulted the scientific literature dealing with records from GSA 15; data from the annual Mediterranean International Trawl Survey submitted by the Maltese fisheries authorities as required by EU fisheries data collection regulations [58,59]; and commercial fisheries landings data [60,61]. The online database ‘Fishbase’ [13] was consulted, especially on aspects of the distribution of species, and the FAO species catalogues and guides (available from the FAO FishFinder website) were consulted on aspects of species taxonomy and distribution. The nomenclature and classification of species follow the World Register of Marine Species (WORMS) (online at <https://www.marinespecies.org/> (accessed on 19 December 2022)).

All species recorded from Maltese waters through these multiple data sources were then reviewed in order to classify the species into three categories: ones that are confirmed as occurring in Maltese waters, ones that may occur but whose presence requires confirmation, and those that should be excluded (Figure 2). Species records supported by actual specimens or authenticated in the scientific literature were accepted as ‘occurring’ and were included in the ‘confirmed’ list for Malta. Since Lanfranco (1993) personally verified most of the records listed in his work [29], his records were accepted as being authenticated by him except in cases where the author himself expressed doubt or in the case of species that were subsequently shown to present taxonomic problems. Where necessary, a brief explanatory note was included next to the species. For species that are historically known to have occurred but for which no recent records are available, the note ‘occurred historically but there are no recent records’ was included. For ones whose genus is known but where the species identity is doubtful, an explanatory note concerning this difficulty was included. Species commonly recorded during MEDITS in Maltese waters (GSA 15) as well as from neighbouring areas (namely, GSAs 13, 14, 16, 19, or 21; see Figure 1) were also included in the ‘confirmed’ list, even if no specimens or images were available.

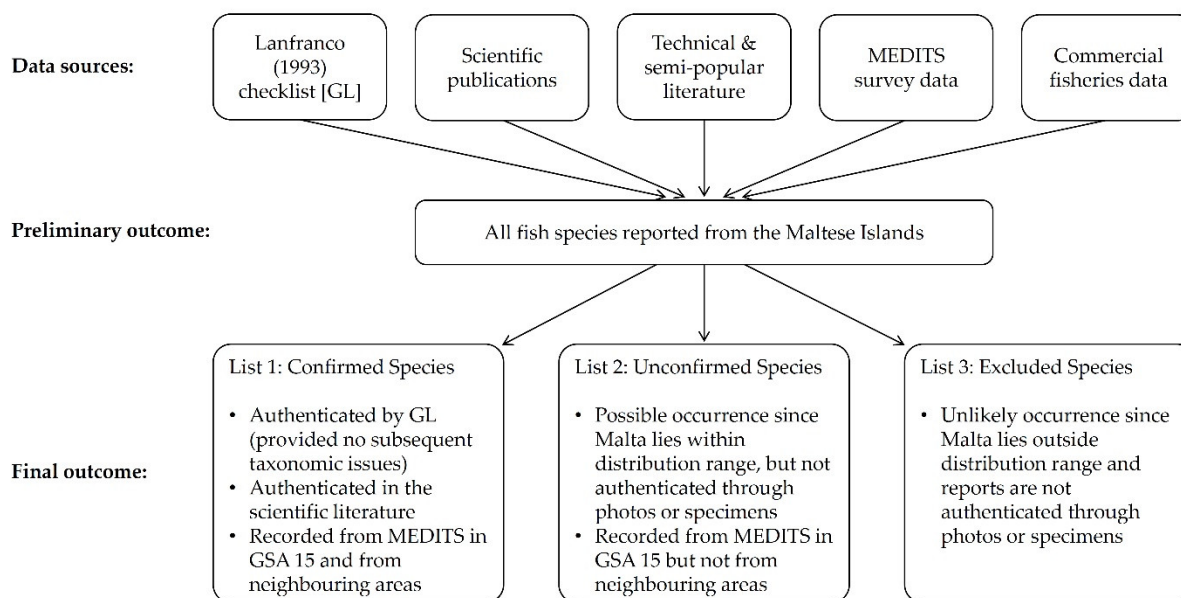


Figure 2. Schematic figure detailing the process used to compile the critical checklist of marine fishes recorded from Maltese waters.

Alien or other newcomer species with records from Maltese waters authenticated in the scientific literature were included as confirmed in the checklist (List A1 in Appendix A), together with an indication of their origin (Atlantic immigrant, cryptogenic, or alien) and current status (established or non-established). ‘Atlantic immigrants’ were taken to include vagrant or range-expanding species arriving in Malta autonomously; ‘alien’ species were

taken as those whose presence in the Mediterranean was directly or indirectly attributable to human activities; the term ‘cryptogenic’ is used when there was doubt regarding the origin of a species, particularly for Eastern Atlantic species that are only known from single records. Species were assigned to these categories according to the criteria of Evans et al. [62].

Species were considered ‘unconfirmed’ if Malta lay within their distribution range, but their presence in Maltese waters was not authenticated through a photograph or specimen. Species that were only recorded in Maltese waters during MEDITS but not from neighbouring areas and which were not supported by actual specimens were also included in the ‘unconfirmed’ list (List A2 in Appendix A) if their presence in Malta was deemed possible based on their geographic distribution. All other species for which Malta was not in the area of occurrence and records of which were neither supported by actual specimens nor by reports in the scientific literature were considered not to be present and listed as ‘excluded’ in a separate list (List A3 in Appendix A). In all cases, justification notes for treating a species as ‘unconfirmed’ or ‘excluded’ were included in the respective lists.

Commercial fisheries landings data were also reviewed to identify any additional species recorded from Maltese waters that had not already been listed based on the scientific literature or MEDITS data. Two sources of data were used for this: (i) transversal fisheries data (i.e., data on fishing effort, weight, and value of landings) for the years 2008–2020 published by the 2021 STECF EWG on the Annual Economic Report on the EU fishing fleet [61], and (ii) the FAO GFCM (Mediterranean and Black Sea) Capture Production database for the years 1970–2019 [60]. Species with rare landings records (i.e., restricted to three years or less), with no preserved specimens, and with records lacking morphometric measurements or meristic counts were also assigned to the ‘excluded’ list.

3. Results

One species from the Petromyzonti, 62 species from the Elasmobranchii, and 349 species from the Actinopteri, were confirmed to occur or to have occurred in Maltese waters, such that the current total number of marine fish species recorded from Malta stands at 412 (see Figure 3 and List A1 in Appendix A). Of the Elasmobranchii, six species (see List A1 in Appendix A) are indicated as having occurred historically but for which no recent records are available, and one species (*Squalus* sp.) requires confirmation of identity and could possibly have been a new species. All the recorded Elasmobranchii species are native to the Mediterranean. Of the Actinopteri, the genus *Sphyræna* Artedi is present as two species, one of which is confirmed to be *S. viridensis* Cuvier but the other species requires confirmation of identity; the only occurring species of *Elops* Linnaeus requires confirmation of identity; *Pagrus caeruleostictus* (Valenciennes) is the confirmed species rather than *Evynnis ehrenbergi* (Valenciennes) which is reported as *P. ehrenbergi* in the literature [32,33]; a species from the genus *Sargocentron* Fowler requires confirmation of identity. Several of the Actinopteri are non-native species, 17 are non-established aliens, seven are established aliens, three are non-established Atlantic immigrants, five are established Atlantic immigrants, nine are non-established cryptogenic, and one is an established cryptogenic.

Seven species from the Elasmobranchii and 46 from the Actinopteri, i.e., a total of 53 fish, were assigned to the list of species whose occurrence around the Maltese Islands requires confirmation (List A2 in Appendix A). Brief justification notes for including these species in this list are given. The species requiring confirmation are mostly the Carcharinidae (5 species), Gobiidae (10 species), and Myctophidae (10 species).

Five species from the Elasmobranchii and 73 from the Actinopteri, i.e., a total of 78 fish, were assigned to the list of species whose occurrence around the Maltese Islands is excluded (List A3 in Appendix A). Brief explanatory notes that establish the fact that these species do not occur locally are given. The group with the greatest number of excluded species (20) is the family Gobiidae.

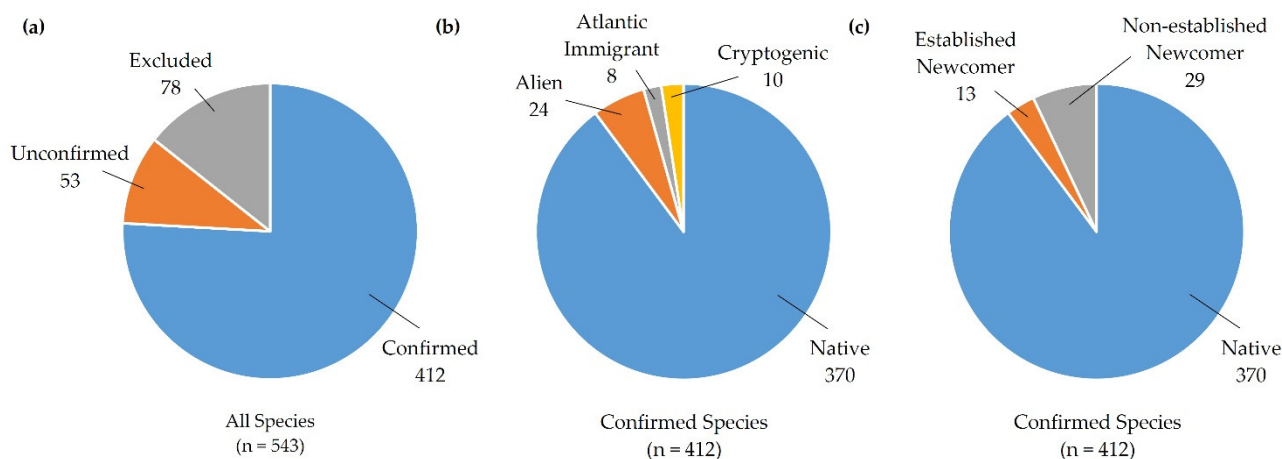


Figure 3. Categorization of fish species recorded from Maltese waters. (a) Number of fish species that are confirmed as occurring in Maltese waters, that may occur but are unconfirmed, and that should be excluded from the checklist of Maltese fish fauna; (b) Number of native and newcomer species confirmed as occurring in Maltese waters, with newcomers classified according to origin; (c) Number of native and newcomer species confirmed as occurring in Maltese waters, with newcomers classified according to origin establishment status.

4. Discussion

The scientific, technical, and semi-popular literature and fisheries data include some 543 fish species occurring in Maltese waters; however, the present confirmed list comprises only 412 species. The critical analyses undertaken as part of the present work have removed 78 species as unlikely to occur. Some of these were recorded as a result of misidentification resulting from similarities with conspecifics, while others have been erroneously recorded without plausible justification, including some which are not even known to occur in the Mediterranean Sea. An appreciable number of species (53) may or may not occur, and their occurrence, therefore, requires confirmation or otherwise through future work. Undoubtedly, there will be a transfer of species from the ‘unconfirmed’ list to the confirmed one, thereby expanding the checklist of fishes from Maltese waters. Such additions to the Maltese checklist are predicted to result from new records of fishes from deep waters, species for which to date no specimen has yet been available for proper identification, and newly recorded non-native species, which up to 2021 have reached a total of 168 for the Mediterranean [63].

Lanfranco’s checklist of Maltese fish species [29], which the present authors deemed the most reliable of all the locally published lists, includes 288 species that are confirmed through the present work. The 124 species added to the confirmed list through the present work mostly comprise native Mediterranean fishes that were recorded from Malta subsequent to the publication of Lanfranco’s 1993 work, although 32 of them are non-native and cryptogenic species, and eight are recent Atlantic immigrants. Amongst the 42 newcomer species included in the present confirmed list, only *Alepes djedaba* Forsskål and *Stephanolepis diaspros* Fraser-Brunner were recorded by Lanfranco (1993) [29]; the rest are all more recent additions to the Maltese ichthyofauna.

In their evidence-based checklist, Kovačić et al. listed a total of 759 fish species from the Mediterranean Sea [63]. The 412 confirmed species from the present work represent 54% of the Mediterranean marine fish species recorded by Kovačić et al. [63]. The total number of fish species that were confirmed as occurring in Maltese waters was broadly similar to that recorded from other sub-regions of the Mediterranean in recent checklists: Albania—262 species, Libya—304, Egyptian Mediterranean—364, Lebanon—376, northern Tyrrhenian Sea—426, Turkish Levantine Sea—441, Adriatic Sea—444, southern Tyrrhenian Sea—447, Turkish Aegean Sea—449, Ligurian Sea—454, Israel—469, Spanish Mediterranean—498 [64–72].

The Mediterranean checklist by Kovačić et al. [63] indicates that the highest number of species among the Elasmobranchii are from the Carcharhinidae (44 species), Rajidae (19 species), and Dasyatidae (7 species). The number of species from the Carcharhinidae reported by these workers far exceeds that recorded by the present work (two species), but, on the other hand, the number of species recorded by the same authors for the Rajidae and Dasyatidae species is, arguably, close to those from the present checklist; fourteen and three species, respectively. For the Actinopteri, Kovačić et al. [63] indicated that the greatest number of species were from the Gobiidae (74 species), Sparidae (32 species), Blenniidae (24 species), Labridae (22 species), Carangidae (21 species) and Serranidae (21 species). For this Class, the number of species recorded from the present work is not much different for the Sparidae (24 species), Blenniidae (17 species), Labridae (17 species), Carangidae (15 species), and Serranidae (15 species). However, for the Maltese Gobiidae, the number of confirmed species from Malta is much lower (21 species). It appears, therefore, that the occurrence of species that are an important component of the local fisheries sector has been well reported, while information on species that are not landed by fishers, such as Carcharhinidae and Gobiidae, is lacking due to the unavailability of specimens. This reflects the difficulty of confirming the identity of species when actual specimens are unavailable; identification based on indirect information (imagery, observations made by third parties, etc.) often leads to erroneous identification. Even for species that are quite common in the fisheries sector, such as the barracudas, unavailability of specimens has resulted in uncertainty as to which species occur. The Blenniidae are an exception to this, as it seems that most Mediterranean species from this group have been recorded from Malta; this can be attributed to the particular effort expended by Falzon [56] in surveying fishes from this family around the Maltese Islands.

The present critical review has resulted in the most extensive list of Maltese fishes published to date. An assessment of the Maltese fish fauna within the context of biogeographical affinities was beyond the scope of the present study, although the present authors intend to follow on this in separate future work. Three lists, one with 412 confirmed species, a second with 53 species that require confirmation, and a third comprising 78 species that are deemed not to occur in Maltese coastal waters, have been generated.

These lists are expected to be useful for local conservation and fishery management by contributing data on the distribution of fish at the Mediterranean regional level. The checklists are useful tools for fisheries scientists when compiling and checking data from fisheries surveys and catch monitoring, for instance, during the annual review of the MEDITS TM list. The lists also highlight gaps in knowledge that need to be addressed and, as such, can be used as a starting point for future research. For example, the collection of samples for some of the more commonly encountered unconfirmed species, such as Myctophidae and Sphyraenidae, during MEDITS surveys and fish market monitoring could be prioritized.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

List A1. Species confirmed as occurring in Maltese waters

Species that are considered to be newcomers (alien, Atlantic immigrant, or cryptogenic) are annotated, accordingly, together with their establishment status. Species that are not annotated as such are considered to be native.

Class Petromyzonti

Order Petromyzontiformes

Family Petromyzontidae

Petromyzon marinus Linnaeus, 1758 [29,32,33]

Occurred historically but there are no recent records.

Class Elasmobranchii

Order Hexanchiformes

Family Hexanchidae

Heptranchias perlo (Bonnaterre, 1788) [9,12,29,31–33,58,59]

Hexanchus griseus (Bonnaterre, 1788) [9,12,29,31–33,58,59]

Order Lamniformes

Family Odontaspidae

Odontaspis ferox (Risso, 1810) [9,29,31–33]

Family Lamnidae

Carcharias taurus Rafinesque, 1810 [9,29,32,33]

Occurred historically but there are no recent records [9]

Charcharodon charcharias (Linnaeus, 1758) [9,29,31–33]

Isurus oxyrinchus Rafinesque, 1810 [9,29,32,33]

Lamna nasus (Bonnaterre, 1788) [29,32,33]

Family Cetorhinidae

Cetorhinus maximus (Gunnerus, 1765) [29,32,33]

Family Alopiidae

Alopias superciliosus Lowe, 1841 [9]

Alopias vulpinus (Bonnaterre, 1788) [9,29,31–33]

Order Carcharhiniformes

Family Pentanchidae

Galeus melastomus Rafinesque, 1810 [12,29,31,32,59,59]

Family Scyliorhinidae

Scyliorhinus canicula (Linnaeus, 1758) [9,12,29,31–33,58,59]

Scyliorhinus stellaris (Linnaeus, 1758) [9,12,29,31–33,58,59]

Family Triakidae

Galeorhinus galeus (Linnaeus, 1758) [9,12,29,32,33]

Occurred historically but there are no recent records [9]

Mustelus asterias Cloquet, 1819 [9,12,29,32,33,58,59]

Mustelus mustelus (Linnaeus, 1758) [9,12,29,32,33,58,59]

Mustelus punctulatus Risso, 1827 [9,58,59]

Family Carcharhinidae

Carcharhinus obscurus (Lesueur, 1818) [9,73]

Prionace glauca (Linnaeus, 1758) [9,29,32,33]

Family Sphyrnidae

Sphyrna zygaena (Linnaeus, 1758) [9,29,32,33]

Order Squaliformes

Family Dalatiidae

Dalatias licha (Bonnaterre, 1788) [9,12,29,32,33,58,59]

Family Etmopteridae

Etmopterus spinax (Linnaeus, 1758) [9,12,29,31–33,58,59]

Family Somniosidae

Somniosus rostratus (Risso, 1827) [74]

Family Oxynotidae

Oxynotus centrina (Linnaeus, 1758) [9,12,29,32,33,58,59]

Family Centrophoridae

Centrophorus granulosus (Bloch & Schneider, 1801) [9,12,29,31–33,58,59]

Centrophorus uyato (Rafinesque, 1810) [9,29,31–33,58,59]

Family Squalidae

Squalus acanthias Linnaeus, 1758 [9,29,31–33,58,59]

Squalus blainville (Risso, 1827) [9,12,29,31–33,58,59]

Squalus sp. Linnaeus, 1758 [75]

The presence of a species of *Squalus* that is genetically distinct from both *S. blainville* and the morphologically similar *S. megalops* was confirmed by Ferrari et al. [75]. However, the exact identity of this species has not been established; this may represent a new species that has not yet been formally described.

Order Echinorhiniformes

Family Echinorhinidae

Echinorhinus brucus (Bonnaterre, 1788) [9,29,31–33]

Order Squatiniformes

Family Squatinidae

Squatina aculeata Cuvier, 1829 [9,58,59,76]

Squatina oculata Bonaparte, 1840 [9,12,29,31–33,58,59]

Squatina squatina (Linnaeus, 1758) [9,12,29,31–33,58,59]

Order Rhinopristiformes

Family Pristidae

Pristis pristis (Linnaeus, 1758) [29,32,33]

Occurred historically but there are no recent records [9]

Family Rhinobatidae

Glaucostegus cemiculus Geoffroy Saint-Hilaire, 1817 [29,32,33]

Occurred historically but there are no recent records [9]

Rhinobatos rhinobatos (Linnaeus, 1758) [29,31–33]

Occurred historically but there are no recent records [9]

Order Torpediniformes

Family Torpedinidae

Tetronarce nobiliana Bonaparte, 1835 [29,31–33,58,59]

Torpedo marmorata Risso, 1810 [9,29,31–33,58,59]

Torpedo torpedo (Linnaeus, 1758) [29,31–33]

Order Rajiformes

Family Rajidae

Dipturus batis (Linnaeus, 1758) [29,31–33]

Dipturus oxyrinchus (Linnaeus, 1758) [9,29,32,33,58,59]

Leucoraja circularis (Couch, 1838) [31,58,59]

Leucoraja fullonica (Linnaeus, 1758) [29,31–33,58,59]

Leucoraja melitensis (Clark, 1926) [9,29,32,33,58,59]

Raja asterias Delaroche, 1809 [9,29,31–33,58,59]

Raja brachyura Lafont, 1871 [31,58,59]
Raja clavata Linnaeus, 1758 [9,29,31–33,58,59]
Raja miraletus Linnaeus, 1758 [9,29,31–33,58,59]
Raja montagui Fowler, 1910 [9,58,59]
Raja polystigma Regan, 1923 [31,58,59]
Raja radula Delaroché, 1809 [9,29,31–33,58,59]
Raja undulata Lacepède, 1802 [58,59]
Rostroraja alba (Lacepède, 1803) [9,31–33,58,59]

Order Myliobatiformes

Family Dasyatidae

Bathytoshia centroura (Mitchill, 1815) [9,29,31–33,58,59]
Dasyatis pastinaca (Linnaeus, 1758) [9,29,31–33,58,59]
Pteroplatytrygon violacea (Bonaparte, 1832) [29,31–33,77]

Family Gymnuridae

Gymnura altavela (Linnaeus, 1758) [9,29,31–33]

Family Myliobatidae

Aetomylaeus bovinus (Geoffroy Saint-Hilaire, 1817) [9,29,31–33,58,59]
Mobula mobular (Bonnaterre, 1788) [9,29,31–33]
Myliobatis aquila (Linnaeus, 1758) [9,29,31–33,58,59]
Rhinoptera marginata (Geoffroy Saint-Hilaire, 1817) [9,29]

Order Chimaeriformes

Family Chimaeridae

Chimaera monstrosa Linnaeus, 1758 [12,29,31–33,58,59]

Class Actinopteri

Subclass Chondrostei

Order Acipenseriformes

Family Acipenseridae

Acipenser sturio Linnaeus, 1758 [29,31–33]

Subclass Teleostei

Order Acanthuriformes

Family Acanthuridae

Acanthurus chirurgus (Bloch, 1787) [78]: non-established alien
Acanthurus coeruleus Bloch & Schneider, 1801 [37]: non-established alien
Acanthurus monroviae Steindachner, 1876 [79]: established Atlantic immigrant
Naso annulatus (Quoy & Gaimard, 1825) [80]: non-established alien

Family Caproidae

Capros aper (Linnaeus, 1758) [29,31–33,58,59]

Family Chaetodontidae

Heniochus intermedius Steindachner, 1893 [37]: non-established alien

Family Lobotidae

Lobotes surinamensis (Bloch, 1790) [31,81]

Family Luvariidae

Luvarus imperialis Rafinesque, 1810 [29,31–33]

Family Pomacanthidae

Holacanthus africanus Cadenat, 1951 [82]: non-established alien
Holacanthus ciliaris (Linnaeus, 1758) [83]: non-established cryptogenic
Pomacanthus maculosus (Forsskål, 1775) [84]: non-established alien

Family Scatophagidae

Scatophagus argus (Linnaeus, 1766) [85]: non-established alien

Family Siganidae

Siganus luridus (Rüppell, 1829) [31,34,86]: established alien

Order Acropomatiformes

Family Epigonidae

Epigonus constanciae (Giglioli, 1880) [58,59]

Epigonus denticulatus Dieuzeide, 1950 [58,59]

Epigonus telescopus (Risso, 1810) [31,34,58,59]

Family Polyprionidae

Polyprion americanus (Bloch & Schneider, 1801) [29,31–33]

Order Anguilliformes

Family Anguillidae

Anguilla anguilla Linnaeus, 1758 [29,31–33]

Family Chlopsidae

Chlopsis bicolor Rafinesque, 1810 [87]

Family Congridae

Ariosoma balearicum (Delaro, 1809) [29,31–33]

Conger conger (Linnaeus, 1758) [29,31–33,58,59]

Gnathophis mystax (Delaroche, 1809) [58,59]

Family Muraenidae

Enchelycore anatina (Lowe, 1838) [88]: non-established Atlantic immigrant

Gymnothorax unicolor (Delaroche, 1809) [29,32,33]

Muraena helena Linnaeus, 1758 [29,31–33,58,59]

Family Nettastomatidae

Facciolella oxyrhynchus (Bellotti, 1833) [58,59]

Nettastoma melanurum Rafinesque, 1810 [29,31–33,58,59]

Family Ophichthidae

Apterichtus caecus (Linnaeus, 1758) [29,32,33]

Dalophis imberbis (Delaroche, 1809) [29,31–33,58,59]

Echelus myrus (Linnaeus, 1758) [29,32,33,58,59]

Ophichthus rufus (Rafinesque, 1810) [29,32,33,58,59]

Ophisurus serpens (Linnaeus, 1758) [29,31–33]

Order Atheriniformes

Family Atherinidae

Atherina boyeri Risso, 1810 [29,31–33]

Atherina hepsetus Linnaeus, 1758 [29,31–33]

Order Aulopiformes

Family Aulopidae

Aulopus filamentosus (Bloch, 1792) [29,58,59]

Family Chlorophthalmidae

Chlorophthalmus agassizi Bonaparte, 1840 [29,32,33,58,59]

Family Ipnopidae

Bathypterois mediterraneus Bauchot, 1962 [58,59]

Some authors regard *B. mediterraneus* as a junior synonym of *B. dubius* (e.g., [89]), but since both taxa are currently considered to be valid by FishBase, we consider all *Bathypterois* recorded in Maltese waters to be *B. mediterraneus*; the Atlantic species (*B. dubius*) is likely to be mostly limited to the westernmost Mediterranean.

Family Paralepididae

Lestidiops sphyrenoides (Risso, 1820) [29,31]

Paralepis coregonoides Risso, 1820 [29,31]

Sudis hyalina Rafinesque, 1810 [29,31,58,59]

Family Synodontidae

Synodus saurus (Linnaeus, 1758) [29,31–33,58,59]

Order Beloniformes

Family Belonidae

Ablennes hians (Valenciennes, 1846) [90]: non-established cryptogenic

Belone belone (Linnaeus, 1761) [29,31–33]

Tylosurus acus (Lacepède, 1803) [29,31–33]

Family Exocoetidae

Cheilopogon heterurus (Rafinesque, 1810) [29,31–33]

Hirundichthys rondeletii (Valenciennes, 1847) [29,31–33]

Family Scomberesocidae

Scomberesox saurus (Walbaum, 1792) [29,31–33]

Order Beryciformes**Family Trachichthyidae**

Hoplostethus mediterraneus Cuvier, 1829 [29,31–33,58,59]

Order Blenniiformes**Family Blennidae**

Aidablennius sphyinx (Valenciennes, 1836) [29,31–33,56]

Coryphoblennius galerita (Linnaeus, 1758) [56]

Blennius ocellaris Linnaeus, 1758 [29,31–33,58,59]

Lipophrys trigloides (Valenciennes, 1836) [29,31–33,56]

Microlipophrys canevae (Vinciguerra, 1880) [56]

Microlipophrys dalmatinus (Steindachner & Kolombatovic, 1883) [35]

Microlipophrys nigriceps (Vinciguerra, 1883) [91]

Ophioblennius atlanticus (Valenciennes, 1836) [92]: non-established cryptogenic

Parablennius gattorugine (Linnaeus, 1758) [29,31–33,56,93]

Parablennius incognitus (Bath, 1968) [29,32,33,56,94]

Parablennius pilicornis (Cuvier 1829) [56]

Parablennius rouxi (Cocco, 1833) [31,56]

Parablennius sanguinolentus (Pallas, 1814) [29,31–33,56]

Parablennius tentacularis (Brünnich, 1768) [29,31–33]

Parablennius zvonimiri (Kolombatovic, 1892) [29,31–33,56]

Salaria pavo (Risso, 1810) [29,31–33,56]

Scartella cristata (Linnaeus, 1758) [29,56,94]

Family Clinidae

Clinitrachus argentatus (Risso, 1810) [29,31–33,56]

Family Tripterygiidae

Tripterygion delaisi Cadenat & Blache, 1970 [56]

Tripterygion melanurum Guichenot, 1850 [31–33,56]

Tripterygion tripteronotum (Risso, 1810) [29,31–33,56]

Order Callionymiformes**Family Callionymidae**

Callionymus lyra Linnaeus, 1758 [29,31–33]

Callionymus maculatus Rafinesque, 1810 [29,31–33,58,59]

Callionymus pusillus Delaroche, 1809 [29,31–33]

Callionymus risso Lesueur, 1814 [29,31–33]

Synchiropus phaeton (Günther, 1861) [58,59]

Order Carangiformes**Family Carangidae**

Alectis alexandrina (Geoffroy Saint-Hilaire, 1817) [29,32,33]

Alepes djedaba (Forsskål, 1775) [29,32,33]: established alien

Campogramma glaycos (Lacepède, 1801) [29,31–33]

Caranx crysos (Mitchill, 1815) [29,31–33]

Caranx rhonchus Geoffroy Saint-Hilaire, 1817 [29,31–33]

Lichia amia (Linnaeus, 1758) [29,31–33]

Naucrates ductor (Linnaeus, 1758) [29,31–33]

Pseudocaranx dentex (Bloch & Schneider, 1801) [29,31–33]

Selene dorsalis (Gill, 1863) [94]: non-established cryptogenic

Seriola dumerili (Risso, 1810) [29,31–33]

Seriola fasciata (Bloch, 1793) [95,96]: established Atlantic immigrant

Trachinotus ovatus (Linnaeus, 1758) [29,31–33]

Trachurus mediterraneus (Steindachner, 1868) [29,31–33,58,59]

Trachurus picturatus (Bowdich, 1825) [29,31–33,58,59]

Trachurus trachurus (Linnaeus, 1758) [29,31–33,58,59]

Family Coryphaenidae

Coryphaena equiselis Linnaeus, 1758 [29,31–33]

Coryphaena hippurus Linnaeus, 1758 [29,31–33]

Family Echeneidae

Echeneis naucrates Linnaeus, 1758 [29,31–33]

Remora remora (Linnaeus, 1758) [29,31–33]

Family Istiophoridae

Tetrapturus belone Rafinesque, 1810 [29,31–33]

Family Xiphiidae

Xiphias gladius Linnaeus, 1758 [29,31–33]

Order Carangaria (*incertae sedis*)

Family Sphyraenidae

Sphyraena viridensis (Cuvier 1829) [11,97]

As stated in FishBase, most published records do not separate this species from *S. sphyraena*, and past records of *S. sphyraena* from Malta should be attributed to *S. viridensis*.

Sphyraena sp./spp. Artedi, 1793

At least one other species of *Sphyraena* occurs in Maltese waters, but the identity of this/these species requires confirmation. See additional notes on unconfirmed Sphyraenidae in List 2.

Order Centrarchiformes

Family Oplegnathidae

Oplegnathus fasciatus (Temminck & Schlegel, 1844) [98]; non-established alien

Family Kyphosidae

Kyphosus vaigiensis (Quoy & Gaimard, 1825) [99]; non-established cryptogenic

Order Clupeiformes

Family Clupeidae

Alosa fallax (Lacepède, 1803) [29,31–33]

Sardina pilchardus (Walbaum, 1792) [29,31–33,58,59]

Sardinella aurita Valenciennes, 1847 [29,31–33,58,59]

Sardinella maderensis (Lowe, 1838) [29,31–33]

Sprattus sprattus (Linnaeus, 1758) [29,31–33]

Family Engraulidae

Engraulis encrasicolus (Linnaeus, 1758) [29,31–33,58,59]

Order Cyprinodontiformes

Family Cyprinodontidae

Aphanius fasciatus (Valenciennes, 1821) [29,31–33]

Order Elopiformes

Family Elopidae

Elops sp. Linnaeus, 1766 [100]: non-established alien

A substantiated record of an individual belonging to this genus confirms its presence in Maltese waters; however, the exact identity of the species has not been established.

Order Eupercaria (*incertae sedis*)

Family Callanthiidae

Callanthias ruber (Rafinesque, 1810) [29,31–33,58,59]

Family Cepolidae

Cepola macrophthalmia (Linnaeus, 1758) [58,59]

Family Haemulidae

Pomadasys incisus (Bowdich, 1825) [101]

Family Labridae

Acantholabrus palloni (Risso, 1810) [29,31–33,58,59]

Coris julis (Linnaeus, 1758) [29,32,33,58,59]

Labrus merula Linnaeus, 1758 [29,31–33]

Labrus viridis Linnaeus, 1758 [29,31–33,58,59]

Pteragogus trispilus Randall, 2013 [102]: non-established alien

Lappanella fasciata (Cocco, 1833) [29,31–33]

Symphodus cinereus (Bonnaterre, 1788) [29,31–33,58,59]

Symphodus doderleini Jordan, 1890 [29,31–33]

Symphodus mediterraneus (Linnaeus, 1758) [29,31–33,58,59]

Symphodus melanocercus (Risso, 1810) [29,31–33]

Symphodus melops (Linnaeus, 1758) [29,31–33]

Symphodus ocellatus (Linnaeus, 1758) [29,31–33]

Symphodus roissali (Risso, 1810) [29,31–33]

Symphodus rostratus (Bloch, 1791) [29,31–33]

Symphodus tinca (Linnaeus, 1758) [29,31–33]

Thalassoma pavo (Linnaeus, 1758) [29,31–33]

Xyrichtys novacula (Linnaeus, 1758) [29,31–33]

Family Lutjanidae

Lutjanus argentimaculatus (Forsskål, 1775) [103]: non-established alien

Lutjanus fulviflamma (Forsskål, 1775) [104]: non-established alien

Family Moronidae

Dicentrarchus labrax (Linnaeus, 1758) [29,31–33]

Dicentrarchus punctatus (Bloch, 1792) [29,31–33]

Family Scaridae

Sparisoma cretense (Linnaeus, 1758) [29,31–33]

Family Sciaenidae

Argyrosomus regius (Asso, 1801) [29,31]

Sciaena umbra Linnaeus, 1758 [29,31–33,58,59]

Umbrina canariensis Valenciennes, 1843 [58,59]

Umbrina cirrosa (Linnaeus, 1758) [29,31–33]

Family Sparidae

Boops boops (Linnaeus, 1758) [29,31–33,58,59]

Centracanthus cirrus Rafinesque, 1810 [29,31–33,58,59]

Dentex dentex (Linnaeus, 1758) [29,31–33,58,59]

Dentex gibbosus (Rafinesque, 1810) [29,31–33,58,59]

Dentex macrophthalmus (Bloch, 1791) [29,31–33,58,59]

Diplodus annularis (Linnaeus, 1758) [29,31–33]

Diplodus cervinus (Lowe, 1838) [29,31–33]

Diplodus puntazzo (Walbaum, 1792) [29,31–33,58,59]

Diplodus sargus (Linnaeus, 1758) [29,31–33,58,59]

Diplodus vulgaris (Geoffroy Saint-Hilaire, 1817) [29,31–33,58,59]

Lithognathus mormyrus (Linnaeus, 1758) [29,31–33]

Oblada melanurus (Linnaeus, 1758) [29,31–33]

Pagellus acarne (Risso, 1827) [29,31–33,58,59]

Pagellus bogaraveo (Brünnich, 1768) [29,31–33,58,59]

Pagellus erythrinus (Linnaeus, 1758) [29,31–33,58,59]

Pagrus auriga Valenciennes, 1843) [29,31–33]

Pagrus caeruleostictus (Valenciennes, 1830) [29]

Very likely, the “*Pagrus ehrenbergi* (Valenciennes)” recorded by Farrugia Randon and Sammut [32] and Sammut [33] refer to this species since this name has in the past been misapplied to the present species.

Pagrus pagrus (Linnaeus, 1758) [29,31–33,58,59]

Sarpa salpa (Linnaeus, 1758) [29,31–33]
Sparus aurata Linnaeus, 1758 [29,31–33]
Spicara flexuosa Rafinesque, 1810 [29,32,58,59]
Spicara maena (Linnaeus, 1758) [29,32,58,59]
Spicara smaris (Linnaeus, 1758) [29,31–33,58,59]
Spondylisoma cantharus (Linnaeus, 1758) [29,31–33,58,59]

Order Gadiformes

Family Gadidae

Gadiculus argenteus Guichenot, 1850 [29,31–33,58,59]
Micromesistius poutassou (Risso, 1827) [29,31–33,58,59]
Trisopterus capelanus (Linnaeus, 1758) [29,31–33,58,59]

Family Lotidae

Gaidropsarus granti (Regan, 1903) [87,105]: established cryptogenic
Gaidropsarus mediterraneus (Linnaeus, 1758) [29,31–33,58,59]
Gaidropsarus vulgaris (Cloquet, 1824) [29,31–33]
Molva dypterygia (Pennant, 1784) [29,31–33,58,59]
Molva molva (Linnaeus, 1758) [58,59]

Family Macrouridae

Coelorinchus caelorinchus (Risso, 1810) [31,58,59]
Hymenocephalus italicus Giglioli, 1884 [31,58,59]
Nezumia aequalis (Günther, 1878) [31,58,59]
Nezumia sclerorhynchus (Valenciennes, 1838) [58,59]

Family Merlucciidae

Merluccius merluccius (Linnaeus, 1758) [29,31–33,58,59]

Family Moridae

Gadella maraldi (Risso, 1810) [32,33,58,59]
Mora moro (Risso, 1810) [29,31–33,58,59]

Family Phycidae

Phycis blennoides (Brünnich, 1768) [29,31–33,58,59]
Phycis phycis (Linnaeus, 1766) [29,31–33,58,59]

Order Gobiesociformes

Family Gobiesocidae

Apletodon incognitus Hofrichter & Patzner, 1997 [8]
Diplecogaster bimaculata (Bonnaterre, 1788) [29,31–33]
Gouania willdenowi (Risso, 1810) [8]
Lepadogaster candolii Risso, 1810 [29,31–33]
Lepadogaster lepadogaster (Bonnaterre, 1788) [29,31–33]
Opeatogenys gracilis (Canestrini, 1864) [8]

Order Gobiiformes

Family Gobiidae

Chromogobius zebratus (Kolombatovic, 1891) [8,31]
Crystallogobius linearis (Düben, 1845) [8,31–33]
Deltentosteus quadrimaculatus (Valenciennes, 1837) [29,31–33,58,59]
Gobius ater Bellotti, 1888 [8,31]
Gobius cobitis Pallas, 1814 [29,31–33]
Gobius couchi Miller & El-Tawil, 1974 [106]
Gobius cruentatus Gmelin, 1789 [29,31–33]
Gobius fallax Sarato, 1889 [8]
Gobius gasteveni Iller, 1974 [8]
Gobius geniporus Valenciennes, 1837 [29,31–33,93]
Gobius incognitus Kovačić & Šanda, 2016 [107]
Gobius niger Linnaeus, 1758 [29,31–33]
Gobius paganellus Linnaeus, 1758 [29,31–33]

Gobius roulei de Buen, 1928 [8]
Lebetus guilleti (Le Danois, 1913) [8]
Lesueurigobius suerii (Risso 1820) [32,33,58,59]

Confirmed based on MEDITS [58,59] records since fresh specimens are distinctive.

Millerigobius microcephalus (Kolombatovic, 1891) [106]
Odondebuena balearica (Pellegrin & Fage, 1907) [8,31]
Pomatoschistus marmoratus (Risso, 1810) [31–33,108]
Speleogobius llorisi Kovačić, Ordines & Schliewen, 2016 [8]
Thorogobius ephippiatus (Lowe, 1839) [32,87]
Vanneaugobius dollfusi Brownell, 1978 [8]
Zebrus zebrus (Risso, 1827) [31,106]

Order Holocentriformes

Family Holocentridae

Holocentrus adscensionis (Osbeck, 1765) [109]; non-established cryptogenic
Sargocentron sp. (Cuvier, 1829) [31,110]; non-established cryptogenic

Jennings [31] recorded *Sargocentron ruber* [sic!], presumably referring to *Sargocentron rubrum* (Forsskål, 1775), but this was not supported by a photograph or specimen. A substantiated record of an individual belonging to this genus by Deidun et al. [110] confirms its presence in Maltese waters; however, the exact identity of the species has not been established.

Order Kurtiformes

Family Apogonidae

Apogon imberbis (Linnaeus, 1758) [29,31–33,58,59]

Order Lampriformes

Family Lophotidae

Lophotus lacepede Giorna, 1809 [29]

Family Regalecidae

Regalecus glesne Ascanius, 1772 [29,31]

Family Trachipteridae

Trachipterus trachipterus (Gmelin, 1789) [29,31–33]

Zu cristatus (Bonelli, 1819) [29,32,33]

Order Lophiiformes

Family Lophidae

Lophius budegassa Spinola, 1807 [29,31–33,58,59]

Lophius piscatorius Linnaeus, 1758 [29,31–33,58,59]

Order Mugiliformes

Family Mugilidae

Chelon labrosus (Risso, 1827) [29,31–33]

Liza aurata (Risso, 1810) [29,31–33]

Liza ramada (Risso, 1827) [29,31–33]

Liza saliens (Risso, 1810) [29,31–33]

Mugil cephalus Linnaeus, 1758 [29,31–33]

Oedalechilus labeo (Cuvier, 1829) [29,31–33]

Order Mulliformes

Family Mullidae

Mullus barbatus Linnaeus, 1758 [29,31–33,58,59]

Mullus surmuletus Linnaeus, 1758 [29,31–33,58,59]

Upeneus pori Ben-Tuvia & Golani, 1989 [111]: established alien

Order Myctophiformes

Family Myctophidae

Diaphus metopoclampus (Cocco, 1829) [58,59]

Diaphus rafinesquii (Cocco, 1838) [58,59]

Electrona risso (Cocco, 1829) [29,31,112]
Lampanyctus crocodilus (Risso, 1810) [58,59]
Lobianchia gemellari (Cocco, 1838) [58,59]
Notoscopelus elongatus (Costa, 1844) [58,59]

Order Notacanthiformes

Family Notacanthidae

Notacanthus bonaparte Risso, 1840 [58,59]

Order Ophidiiformes

Family Bythitidae

Grammonus ater (Risso, 1810) [87]

Family Carapidae

Carapus acus (Brünnich, 1768) [29,31–33,58,59]

Echiodon dentatus (Cuvier, 1829) [31,58,59]

Family Ophidiidae

Benthocometes robustus (Goode & Bean, 1886) [58,59]

Ophidion barbatum Linnaeus, 1758 [29,31–33,58,59]

Parophidion vassali (Risso, 1810) [29,31–33]

Order Osmeriformes

Family Argentinidae

Argentina sphyraena Linnaeus, 1758 [29,31–33,58,59]

Glossanodon leioglossus (Valenciennes, 1848) [58,59]

Order Ovalentaria (*incertae sedis*)

Family Pomacentridae

Abudefduf hoefleri (Steindachner, 1881) [113]: non-established cryptogenic

Abudefduf saxatilis (Linnaeus, 1758) [114,115]: established Atlantic immigrant

Abudefduf vaigiensis (Quoy & Gaimard, 1825) [115]: established alien

Chromis chromis (Linnaeus, 1758) [29,31–33,58,59]

Chrysiptera hemicyanea (Weber, 1913) [116]: non-established alien

Stegastes variabilis (Castelnau, 1855) [117]: non-established alien

Order Perciformes

Family Ammodytidae

Gymnammodytes cicerelus (Rafinesque, 1810) [29,31–33]

Family Serranidae

Anthias anthias (Linnaeus, 1758) [29,31–33,58,59]

Cephalopholis hemistiktos (Rüppell, 1830) [96] (misidentified) [118,119]: non-established alien

Cephalopholis nigri (Gunther, 1859) [120]: non-established cryptogenic

Cephalopholis taeniops (Valenciennes, 1828) [119–121]: established Atlantic immigrant

Epinephelus aeneus (Geoffroy Saint-Hilaire, 1817) [29,31–33,58,59]

Epinephelus caninus (Valenciennes, 1843) [29,31–33]

Epinephelus costae (Steindachner, 1878) [including records of its synonym *Epinephelus alexandrinus* (non Valenciennes, 1828) misapplied] [31,58,59]

Epinephelus malabaricus (Bloch & Schneider, 1801) [121]: non-established alien

Epinephelus marginatus (Lowe, 1834) [29,31–33,58,59]

Hyporthodus haifensis (Ben Tuvia, 1953) [122–124]

Paranthias cf. fuscifer (Valenciennes, 1828) [125]: non-established alien

Mycteroperca rubra (Bloch, 1793) [29,31–33]

Serranus cabrilla (Linnaeus, 1758) [29,31–33,58,59]

Serranus hepatus (Linnaeus, 1758) [29,31–33,58,59]

Serranus scriba (Linnaeus, 1758) [29,31–33]

Family Stromateidae

Stromateus fiatola Linnaeus, 1758 [29,31–33]

Family Trachinidae

Echiichthys vipera (Cuvier, 1829) [29,31–33]

Trachinus araneus Cuvier, 1829 [29,31–33]

Trachinus draco Linnaeus, 1758 [29,31–33,58,59]

Trachinus radiatus Cuvier, 1829 [29,31–33,58,59]

Family Uranoscopidae

Uranoscopus scaber Linnaeus, 1758 [29,31–33,58,59]

Order Pleuronectiformes

Family Bothidae

Arnoglossus rueppellii (Cocco, 1844) [29,31–33,58,59]

Arnoglossus imperialis (Rafinesque, 1810) [29,31–33,58,59]

Arnoglossus kessleri Schmidt, 1915 [29,32,33]

Arnoglossus laterna (Walbaum, 1792) [29,31–33,58,59]

Arnoglossus thori Kyle, 1913 [29,31–33,58,59]

Bothus podas (Delaroche, 1809) [29,31–33,58,59]

Family Cithariidae

Citharus linguatula (Linnaeus, 1758) [29,31–33,58,59]

Family Cynoglossidae

Symphurus ligulatus (Cocco, 1844) [58,59]

Symphurus nigrescens (Rafinesque, 1810) [58,59]

Family Scophthalmidae

Lepidorhombus boscii (Risso, 1810) [31,58,59]

Lepidorhombus whiffiagonis (Walbaum, 1792) [31,58,59]

Scophthalmus maximus (Linnaeus, 1758) [29,31–33]

Scophthalmus rhombus (Linnaeus, 1758) [29,31–33]

Family Soleidae

Bathysolea profundicola (Vaillant, 1888) [58,59]

Buglossidium luteum (Risso, 1810) [29,31–33]

Dicologlossa cuneata (Moreau, 1881) [58,59]

Microchirus ocellatus (Linnaeus, 1758) [29,31–33,58,59]

Microchirus variegatus (Donovan, 1808) [29,31–33,58,59]

Monochirus hispidus Rafinesque, 1814 [29,31–33,58,59]

Pegusa impar (Bennett, 1831) [29,32,33]

Pegusa lascaris (Risso, 1810) [31,58,59]

Solea solea (Linnaeus, 1758) [29,31–33,58,59]

Synapturichthys kleinii (Risso, 1827) [29,31–33]

Order Scombriformes

Family Bramidae

Brama brama (Bonaterre, 1788) [29,31–33,58,59]

Family Centrolophidae

Centrolophus niger (Gmelin, 1789) [29,31–33,58,59]

Schedophilus ovalis (Cuvier, 1833) [29,31–33]

Family Gempylidae

Ruvettus pretiosus Cocco, 1833 [29,31–33,77]

Family Nomeidae

Cubiceps gracilis (Lowe, 1843) [58,59]

Psenes pellucidus Lütken, 1880 [103]: non-established Atlantic immigrant

Family Pomatomidae

Pomatomus saltatrix (Linnaeus, 1766) [29,31–33]

Family Scombridae

Auxis rochei (Risso, 1810) [29,31–33]

Euthynnus alletteratus (Rafinesque, 1810) [29,31–33]

Katsuwonus pelamis (Linnaeus, 1758) [29,31–33]

Orcynopsis unicolor (Geoffroy Saint-Hilaire, 1817) [29,31–33]

Sarda sarda (Bloch, 1793) [29,31–33]

Scomber colias Gmelin, 1789 [58,59]

Scomber scombrus Linnaeus, 1758 [29,31–33,58,59] [Additionally, recorded as *Scomber japonicus*; see List 3]

Thunnus albacares (Bonnaterre, 1788) [126]: non-established Atlantic immigrant

Thunnus alalunga (Bonnaterre, 1788) [29,31–33]

Thunnus thynnus (Linnaeus, 1758) [29,31–33]

Family Trichiuridae

Lepidopus caudatus (Euphrasen, 1788) [58,59]

Trichiurus lepturus Linnaeus, 1758 [29,31–33]

Order Scorpaeniformes

Family Dactylopteridae

Dactylopterus volitans (Linnaeus, 1758) [29,31–33,58,59]

Family Peristediidae

Peristedion cataphractum (Linnaeus, 1758) [29,31–33,58,59]

Family Scorpaenidae

Pontinus kuhlii (Bowdich, 1825) [36]

Scorpaena elongata Cadenat, 1943 [31,58,59]

Scorpaena maderensis Valenciennes, 1833 [29,31–33,127]

Scorpaena notata Rafinesque, 1810 [29,31–33,58,59]

Scorpaena porcus Linnaeus, 1758 [29,31–33,58,59]

Scorpaena scrofa Linnaeus, 1758 [29,31–33,58,59]

Family Sebastidae

Helicolenus dactylopterus (Delaroche, 1809) [29,31–33,58,59]

Family Triglidae

Chelidonichthys cuculus (Linnaeus, 1758) [29,31–33,58,59]

Chelidonichthys lastoviza (Bonnaterre, 1788) [29,31–33,58,59]

Chelidonichthys lucerna (Linnaeus, 1758) [29,31–33,58,59]

Chelidonichthys obscurus (Walbaum, 1792) [29,31–33,58,59]

Eutrigla gurnardus (Linnaeus, 1758) [29,31–33,58,59]

Lepidotrigla cavillone (Lacepède, 1801) [29,31–33,58,59]

Lepidotrigla dieuzeidei Blanc & Hureau, 1973 [58,59]

Trigla lyra Linnaeus, 1758 [29,31–33,58,59]

Order Stomiiformes

Family Sternoptychidae

Argyrolepecus hemigymnus Cocco, 1829 [58,59]

Family Stomiidae

Chauliodus sloani Bloch & Schneider, 1801 [58,59]

Maurollicus muelleri (Gmelin, 1789) [31,58,59]

Stomias boa (Risso, 1810) [31,58,59]

Order Syngnathiformes

Family Centriscidae

Macroramphosus scolopax (Linnaeus, 1758) [29,31–33,58,59]

Family Fistulariidae

Fistularia commersonii Rüppell, 1838 [58,59,128]: established alien

Family Syngnathidae

Hippocampus guttulatus Cuvier, 1829 [29,31–33]

Hippocampus hippocampus (Linnaeus, 1758) [29,31–33]

Nerophis maculatus Rafinesque, 1810 [29,31–33]

Nerophis ophidion (Linnaeus, 1758) [29,31–33]

Syngnathus abaster Risso, 1827 [29,31–33]

Syngnathus acus Linnaeus, 1758 [29,31–33,58,59]

Syngnathus phlegon Risso, 1827 [29,31–33]

Syngnathus typhle Linnaeus, 1758 [29,31–33]

Order Tetraodontiformes

Family Balistidae

Balistes capriscus Gmelin, 1789 [including records of its synonym *B. carolinensis*] [29,31–33]

Family Molidae

Mola mola (Linnaeus, 1758) [29,31–33]

Ranzania laevis (Pennant, 1776) [29,31–33]

Family Monacanthidae

Stephanolepis diaspros Fraser-Brunner, 1940 [29,129]: established alien

Family Tetraodontidae

Lagocephalus lagocephalus (Linnaeus, 1758) [29,31–33]

Lagocephalus scleratus (Gmelin, 1789) [130]; established alien

Spherooides pachygaster (Müller & Troschel, 1848) [128,131]: established Atlantic immigrant

Order Zeiformes**Family Zeidae**

Zeus faber Linnaeus, 1758 [29,32,33,58,59]

List A2. Species recorded from Maltese waters whose presence requires confirmation.

Notes

1. Malta is in the area of occurrence of the species as reported in the Fishbase distribution map; however, none of the records from Malta (GSA15) are supported by an actual specimen, and a detailed morphological examination is needed to confirm species identity.
2. Recorded from MEDITS surveys in neighbouring GSAs 13, 14, 16, 19, or 21 (see April 2019 MEDITS TM list).
3. No records from MEDITS surveys in neighbouring GSAs 13, 14, 16, 19, or 21 (see April 2019 MEDITS TM list).
4. No confirmed record from MEDITS in the Mediterranean Sea.
5. Fishbase lists this species as “questionable” for Malta, giving Whitehead et al. [132] as a reference. Although Whitehead et al. [132] do not specifically mention Malta, and there are no confirmed records from Maltese waters, its occurrence here is considered possible given the records from neighbouring GSAs (Note 2).
6. The only record from Malta is that by Jennings [31]. Although this is considered an unreliable source (see Methods), there are records of this species from neighbouring GSAs (Note 2), so its occurrence in Maltese waters is considered possible.

Class Elasmobranchii**Order Carcharhiniformes****Family Carcharhinidae**

Carcharhinus altimus (Springer, 1950) Landings data [60,61] (Notes 1, 4)

Reported in Maltese 2018 commercial fishery landings data. Although this could be a misidentification, there are sporadic records from the Mediterranean, including from Italy (Calabria) and Turkey [133], so its occurrence in Maltese waters is possible.

Carcharhinus brachyurus (Günther, 1870) [9] (Notes 1, 4)

Carcharhinus brevipinna (Müller & Henle, 1839) [9,29,32,33] (Notes 1, 4)

Carcharhinus limbatus (Valenciennes, 1839) [9,29,32,33] (Notes 1, 4)

Carcharhinus plumbeus (Nardo, 1927) [9,29,32,33] (Notes 1, 4)

Members of the genus *Carcharhinus* are very difficult to tell apart due to overlapping characteristics and, therefore, easily confused with one another. The presence of each of these four species, therefore, requires confirmation. According to Schembri et al. [9], *C. brachyurus*, *C. brevipinna*, and *C. plumbeus* are all likely to occasionally occur in Maltese waters, while *C. limbatus* is less likely due to the absence of confirmed records from elsewhere in the Sicilian Channel.

Family Centrophoridae

Centroscymnus coelolepis Barbosa du Bocage & de Brito Capello, 1864 [31] (Notes 1, 4)

Fishbase lists this species as “questionable” for Malta, giving Compagno [134] as a reference even though this author does not specifically mention Malta. A finding of this species from Maltese waters was reported in the local press, but no scientific article has been published. In the absence of authenticated records from Maltese waters, the presence of this species must be considered unconfirmed.

Order Myliobatiformes

Family Dasyatidae

Dasyatis tortonesei Capape, 1975 [58,59] (Notes 1, 3)

Class Actinopteri

Subclass Teleostei

Order Acropomatiformes

Family Epigonidae

Microichthys coccoi Rüppell, 1852 [31] (Notes 1, 2, 6)

Order Alepocephaliformes

Family Alepocephalidae

Alepocephalus rostratus Risso, 1820 [31] (Notes 1, 2, 6)

Order Anguilliformes

Family Nemichthyidae

Nemichthys scolopaceus Richardson, 1848 [31] (Notes 1, 2, 6)

Order Atheriniformes

Family Atherinidae

Atherina presbyter (Cuvier, 1829) [31–33] (Notes 1, 4)

Order Aulopiformes

Family Evermannellidae

Evermannella balbo (Risso, 1820) (Notes 1, 2, 5)

Order Blenniformes

Family Blennidae

Salaria basilisca (Valenciennes, 1836) [31–33] (Notes 1, 4)

Reported as frequent by Jennings [33] but most probably misidentified for *Lipophrys pavo*.

Order Carangaria (*incertae sedis*)

Family Sphyraenidae

Sphyraena chrysotaenia Klunzinger, 1884 [29] (Note 3)

In view of the confused taxonomy as discussed by Kiparissis et al. [135], and the new genetic and morphological data provided by these authors, the locally occurring *Sphyraena* previously attributed to *S. chrysotaenia* needs to be re-evaluated morphologically and genetically to establish its exact identity. In addition, *S. chrysotaenia* is considered a junior synonym of *S. pinguis* Günther, 1874 by some authors (e.g., [63]) but retained as a valid species in FishBase [13].

Sphyraena sphyraena (Linnaeus, 1758) [29,31–33] (Notes 1, 2)

As indicated in FishBase [13], most published records do not separate this species from *S. viridensis* (Cuvier 1829), and records of *S. sphyraena* from Malta by past authors probably refer to *S. viridensis*. Specimens were not preserved, and no morphometric measurements or meristic counts were taken; thus, the presence of this species in Maltese waters requires confirmation.

Order Clupeiformes

Family Clupeidae

Alosa alosa (Linnaeus, 1758) (Notes 1, 3)

This species is often confused with *Alosa fallax*, and its presence in Maltese coastal waters, therefore, requires confirmation.

Order Eupercaria incertae sedis**Family Labridae**

Ctenolabrus rupestris (Linnaeus, 1758) [31–33] (Notes 1, 3)

Labrus mixtus Linnaeus, 1758 GJ (Notes 1, 2)

Family Sparidae

Dentex maroccanus Valenciennes, 1830 [31,58,59] (Notes 1, 3)

Evygnnis ehrenbergii (Valenciennes, 1830) [31–33] (Note 4)

Records from Malta are indicated as ‘questionable’ in Fishbase. Probably the fish referred to as “*Pagrus ehrenbergi* (Valenciennes)” by Farrugia Randon & Sammut [32], and Sammut [33] are actually *Pagrus coeruleostrictus*; Jennings [31] gives “*Pagrus ehrenbergi* V. (syn. *Sparus spinifer* Forskal)” which is confusing since *Sparus spinifer* (now *Argyrops spinifer* (Forsskål, 1775)) is not a synonym of *Evygnnis ehrenbergii*.

Order Gadiiformes**Family Macrouridae**

Coelorinchus occa (Goode & Bean, 1885) [58,59] (Notes 1, 3)

Gaidropsarus biscayensis (Collett, 1890) [31] (Notes 1, 2)

Family Trachyrincidae

Trachyrincus scabrurus (Rafinesque, 1810) [31] (Notes 1, 2, 6)

Order Gobiesociformes**Family Gobiesocidae**

Aphia minuta (Risso, 1810) [29,31–33] (Notes 1, 2)

Commonly reported in fishery catches (Malta commercial fishery landings data) and, therefore, likely occurs in Maltese waters [8], but records have not been supported by actual specimens or expert identifications, so at present should be regarded as unconfirmed.

Arctozenus risso (Bonaparte, 1840) (Notes 1, 2, 5)

Opeatogenys gracilis (Canestrini, 1864) [31] (Notes 1, 4, 6)

There are sporadic but widespread records from the Mediterranean, and may, therefore, also occur in Maltese waters.

Order Gobiiformes**Family Gobiidae**

Chromogobius quadrivittatus (Steindachner, 1863) [32] (Notes 1, 2; vide [8])

Deltentosteus collonianus (Risso, 1820) [58,59] (Notes 1, 3; vide [8])

Gobius auratus Risso, 1810 [31–33] (Notes 1, 2; vide [8])

Gobius bucchichi Steindachner, 1870 [29,31–33] (Notes 1, 2; vide [8])

Lesueurigobius friesii (Malm, 1874) [58,59] (Notes 1, 2)

Lesueurigobius sanzi (de Buen, 1918) [58,59] (Notes 1, 2; vide [8])

Pomatoschistus minutus (Pallas, 1770) [29,31–33] (Notes 1, 2; vide [8])

Pomatoschistus norvegicus (Collett, 1902) [31] (Notes 4, 6)

Possibly occurs in Maltese waters given there are records from the Tyrrhenian, Adriatic, and Aegean seas.

Zosterisessor ophiocephalus (Pallas, 1814) [29,31–33] (Notes 1, 3; vide [8])

Order Myctophiformes**Family Myctophidae**

Benthoosema glaciale (Reinhardt, 1837) (Notes 1, 2, 5)

Ceratoscopelus maderensis (Lowe, 1839) (Notes 1, 2, 5)

Diaphus holti Tåning, 1918 (Notes 1, 2, 5)

Gonichthys cocco (Cocco, 1829) (Notes 1, 2, 5)

Hygophum benoiti (Cocco, 1838) (Notes 1, 2, 5)

Hygophum hygomii (Lütken, 1892) (Notes 1, 2, 5)

Lampanyctus pusillus (Johnson, 1890) (Notes 1, 2, 5)

Lobianchia dofleini (Zugmayer, 1911) (Notes 1, 2, 5)

Myctophum punctatum Rafinesque, 1810 [58,59] (Notes 1, 2, 5)

Symbolophorus veranyi (Moreau, 1888) (Notes 1, 2, 5)

Order Ophidiiformes

Family Ophidiidae

Ophidion rochei Müller, 1845 [29,32,33] (Notes 1, 3)

Lanfranco (1993) [29] states that “further investigation may prove that it may also be present”, but this species was then omitted from Lanfranco (2009) [30].

Order Perciformes

Family Scorpaenidae

Pterois miles (Bennett, 1828) [136] (Note 3)

Ulman et al. [136] record *P. miles* from Malta, citing Kletou et al. [137] and Dimitriadis et al. [138], but neither of these papers actually records the species from Malta. The origin of the ‘record’ from Malta appears to be a 2016 press release by the Conservation Biology Research Group at the Department of Biology of the University of Malta that reports the collection of a “lionfish” (without specifying the species) during research by the Group. This press release was carried out by several local newspapers and also in the official University of Malta newsletter ‘Newspoint’. Although the possible occurrence of lionfish in Malta generated a lot of press, no scientific article has yet been published, and the original record has not been supported by any data on the collected fish or a photograph. For these reasons, *Pterois miles* require confirmation.

Scorpaena loppei Cadenat, 1943 [58,59] (Notes 1, 2)

Order Pleuronectiformes

Family Pleuronectidae

Platichthys flesus (Linnaeus, 1758) [29,31–33] (Notes 1, 3)

Fishbase indicates the record from Malta as ‘questionable’, while Lanfranco (1993) suggests previous records of this species were made outside Maltese waters.

Family Soleidae

Bathysolea profundicola (Vaillant, 1888) [58,59] (Notes 1, 3)

Dicologlossa cuneata (Moreau, 1881) [58,59] (Notes 1, 2)

Order Stomiformes

Family Gonostomatidae

Gonostoma denudatum Rafinesque, 1810 (Notes 1, 3, 6)

Family Phosichthyidae

Vinciguerria attenuata (Cocco, 1838) (Notes 1, 3, 6)

List A3. Species to be excluded from the checklist of Maltese fish fauna.

Notes

1. Malta (GSA15) is in an area of occurrence for the species as reported in the Fishbase distribution map, but in the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.
2. Malta is not in an area of occurrence for the species as reported in the Fishbase distribution map. In the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.
3. Recorded from MEDITS surveys in neighbouring GSAs 13, 14, 16, 19, or 21 (see April 2019 MEDITS TM list).
4. No records from MEDITS surveys in neighbouring GSAs 13, 14, 16, 19, or 21 (see April 2019 MEDITS TM list).
5. No confirmed record from MEDITS in the Mediterranean Sea.
6. Fishbase lists this species as “questionable” for Malta, giving Whitehead et al. [132] as a reference. However, Whitehead et al. [132] do not specifically mention Malta, and there are no

records from neighbouring GSAs (Notes 4 or 5). This species is therefore excluded from the present checklist.

7. The only record from Malta is that by Jennings [31], which is considered an unreliable source (see Methods), and there are no records from neighbouring GSAs (Notes 4 or 5). This species is therefore excluded from the present checklist.

Class Petromyzonti

Order Petromyzontiformes

Family Petromyzontidae

Lampetra fluviatilis (Linnaeus, 1758) [32,33] (Notes 2, 5)

Class Elasmobranchii

Order Carcharhiniformes

Family Carcharhinidae

Carcharhinus melanopterus (Quoy & Gaimard, 1824) [9,29,32,33] (Notes 2, 5)

This species has been reported as a Lessepsian immigrant in the Mediterranean Sea, but it can be confused with other species of requiem sharks; Serena [139] states that its presence in the Mediterranean is anecdotal, and there are no specimens from this sea.

Family Pentanchidae

Galeus atlanticus (Vaillant, 1888) [58,59] (Note 4)

A single individual of this species was recorded during the 2010 GSA15 MEDITS survey, but the specimen was not preserved, and no morphometric measurements or meristic counts were taken. Since this species has never been previously or subsequently recorded from the central Mediterranean and the only other MEDITS records are from GSA 1 (Northern Alboran Sea) and GSA 2 (Alboran Island), it is likely that the 2010 specimen was misidentified.

Family Sphyrnidae

Sphyrna tudes (Valenciennes, 1822) [9,29,32,33] (Notes 1, 5)

Given the very confused taxonomic history of this species, including the attribution of this name to more than one species (see [134]), the identity of previous records from Malta cannot be ascertained, and this species is therefore excluded from the present checklist.

Order Rajiformes

Family Rajidae

Leucoraja naevus (Müller & Henle, 1841) [9,31–33] (Notes 1, 4)

Order Myliobatiformes

Family Dasyatidae

Himantura uarnak (Gmelin, 1789) Landings data [60,61] (Notes 2, 5)

This Lessepsian immigrant was recorded in Maltese 2019 commercial fishery landings data, but the specimens were not preserved, and no morphometric measurements or meristic counts were taken. Since the current distribution of this species in the Mediterranean appears to be confined to the Levantine Sea, it is likely that the landed specimens were misidentified.

Class Actinopteri

Subclass Chondrostei

Order Acipenseriformes

Family Acipenseridae

Huso huso (Linnaeus, 1758) [31] (Notes 2, 5, 7)

Subclass Teleostei

Order Acanthuriformes

Family Pomacanthidae

Pomacanthus asfur (Forsskål, 1775) [140] (Notes 1, 5; vide [141])

Family Siganidae

Siganus rivulatus Forsskål & Niebuhr, 1775 [29,31–33] (Notes 2, 4; vide [86])

Order Anguilliformes

Family Ophichthidae

Apterichtus anguiformis (Peters, 1877) (Notes 1, 5, 6)

Order Atheriniformes

Family Atherinidae

Atherinomorus lacunosus (Forster, 1801) [31] (Notes 2, 5, 7)

Order Aulopiformes

Family Lestidiidae

Lestidiops pseudosphyraenoides (Ege, 1918) (Notes 1, 5, 6)

Family Synodontidae

Saurida undosquamis (Richardson, 1848) [31–33] (Notes 2, 4, 7)

Order Batrachoidiformes

Family Batrachoididae

Halobatrachus didactylus (Bloch & Schneider, 1801) (Notes 1, 5, 6)

Order Beloniformes

Family Hemiramphidae

Hemiramphus far (Forsskål, 1775) [31] (Notes 2, 5, 7)

Order Beryciformes

Family Berycidae

Beryx decadactylus Cuvier, 1829 [31] (Notes 1, 5, 7)

Family Trachichthyidae

Hoplostethus atlanticus Collett, 1889 [31] (Notes 2, 5, 7)

Order Blenniiformes

Family Blenniidae

Microlipophrys adriaticus (Steindachner & Kolombatovic, 1883) [31] (Notes 2, 4, 7)

Microlipophrys canevae (Vinciguerra, 1880) [31] (Notes 1, 5, 7)

Lipophrys pholis (Linnaeus, 1758) [32,33] (Notes 2, 5)

The record from Malta is indicated on Fishbase as a misidentification (see also [29]).

Order Callionymiformes

Family Callionymidae

Callionymus reticulatus Valenciennes, 1837 [31] (Notes 2, 5, 7)

Order Carangiformes

Family Carangidae

Caranx hippos (Linnaeus, 1766) [31] (Notes 1, 5, 7)

Seriola carpenteri (Mather, 1971) [142] (Notes 2, 5)

Malta is in proximity to Italy, where this species occurs as an Atlantic immigrant. A total of 148 specimens of *Seriola carpenteri* were caught 42 nautical miles east of Lampedusa in 1997 [142]. The reproductive conditions of these specimens suggest that this species was established in this area. Given the close proximity of the capture area to the Maltese Islands, this species was included in inventories of newcomer fish in Maltese waters with a 'Questionable' status [38,128]. In the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.

Family Istiophoridae

Istiophorus albicans (Latreille, 1804) (Notes 1, 5)

Fishbase lists this species as "questionable" for Malta, giving Nakamura [143] as a reference. However, Nakamura [143] does not specifically mention Malta. In the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.

Kajikia albida (Poey, 1860) [including its synonym *Tetrapterus albidus* Poey, 1860] [31–33] (Notes 1, 5)

The record from Malta is indicated on Fishbase as a misidentification (see also [29]).

Order Clupeiformes

Family Clupeidae

Clupea harengus Linnaeus, 1758 Landings data [60,61] (Notes 2, 5)

Recorded in Maltese 2012 and 2016 commercial fishery landings data, but the specimens were not preserved, and no morphometric measurements or meristic counts were taken. Since this species is not known to occur in the Mediterranean Sea, it is likely that the landed specimens were misidentified.

Family Dussumieriidae

Etrumeus golanii (DiBattista Randall & Bowen, 2012) [144] (Note 4)

This species was recorded off Lampedusa in 2005 [144] (as *Etrumeus teres*) and, given the proximity of the Maltese Islands, it was included in inventories of newcomer fish in Maltese waters with a 'Questionable' status [38,128]. In the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.

Order Eupercaria (*incertae sedis*)

Family Haemulidae

Parapristipoma octolineatum (Valenciennes, 1833) [58,59] (Notes 1, 4)

A single individual of this species was recorded during the 2013 GSA 15 MEDITS survey, but the specimen was not preserved, and no morphometric measurements or meristic counts were taken. There are no other MEDITS records, and it is likely that the 2013 specimen was misidentified.

Family Labridae

Labrus bergylta (Ascanius, 1767) [31–33] (Notes 2, 5)

Records from the Mediterranean are questionable, and the record from Malta is indicated in Fishbase as a misidentification (see also [29]).

Symphodus bailloni (Valenciennes, 1839) [31] (Notes 1, 5, 7)

Family Priacanthidae

Priacanthus hamrur (Forsskål, 1775) [31] (Notes 2, 5, 7)

Order Gadiformes

Family Gadidae

Gadus morhua Linnaeus, 1758 Landings data [60,61] (Notes 2, 5)

Recorded in Maltese 2008 commercial fishery landings data, but the specimens were not preserved, and no morphometric measurements or meristic counts were taken. Since this species is not known to occur in the central Mediterranean Sea, it is likely that the landed specimens were misidentified.

Merlangius merlangus (Linnaeus, 1758) [31] (Notes 1, 4, 7)

Trisopterus luscus (Linnaeus, 1758) [31] (Notes 1, 4, 7)

Family Moridae

Lepidion lepidion (Risso, 1810) [31] (Notes 1, 4, 7)

Physiculus dalwigki Kaup, 1858 [31] (Notes 1, 4, 7)

Order Gobiesociformes

Family Gobiesocidae

Apletodon dentatus (Facciola, 1887) [31] (Notes 1, 5, 7)

Gouania willdenowi (Risso, 1810) [31] (Notes 1, 4, 7)

Order Gobiiformes

Family Gobiidae

Buenia jeffreysii (Günther, 1867) [31] (Notes 2, 5, 7)

Corcyrogobius liechtensteini (Kolombatovic, 1891) [31] (Notes 5, 7)

Didogobius bentuvii Miller, 1966 [31] (Notes 5, 7)

Gobius fallax Sarato, 1889 [31] (Notes 1, 4, 7)

Gobius scriptus Fage 1907 [31] (Notes 1, 5, 7)

Recorded by Jennings [31] as its synonym *Gobius schmidti*. This is a doubtful species and probably simply a juvenile form of *Gobius cruentatus* Gmelin, 1789, whose presence in Maltese waters is confirmed (List 1).

Gobius vittatus Vinciguerra, 1883 [31] (Notes 1, 4, 7)

Lebetus scorpioides (Collett, 1874) [31] (Notes 2, 5, 7)

Mesogobius batrachocephalus (Pallas, 1814) [31] (Notes 5, 7)

Neogobius fluviatilis (Pallas, 1814) [31] (Notes 5, 7)

Neogobius melanostomus (Pallas, 1814) [31] (Notes 2, 5, 7)

Knipowitschia panizzae (Verga, 1841) [31] (Notes 5, 7)

Pomatoschistus flavescens (Fabricius, 1779) [31] (Notes 5, 7)

Pomatoschistus lozanoi (de Buen, 1923) [31] (Notes 2, 5, 7)

Pomatoschistus microps (Krøyer, 1838) [33] (Notes 1, 4)

Fishbase indicates that the record from Malta is a misidentification.

Pomatoschistus quagga (Heckel, 1837) [31] (Notes 2, 5, 7)

Pomatoschistus knerii (Steindachner, 1861) [31] (Notes 2, 5, 7)

Pomatoschistus pictus (Malm, 1865) [31] (Notes 2, 5, 7)

Pomatoschistus tortonesei Miller, 1969 [31] (Notes 5, 7)

Pseudaphya ferreri (de Buen & Fage, 1908) [including its synonym *Pseudaphya pelagica* de Buen, 1931] [31] (Notes 1, 4, 7)

Thorogobius macrolepis (Lolombatovic, 1891) [31] (Notes 5, 7)

Order Mulliformes

Family Mullidae

Parupeneus barberinus (Lacepède, 1801) [including its synonym *Pseudopeneus barberinus* (Lacepède, 1801) [29,31–33] (Notes 2, 5; vide [38])

Upeneus asymmetricus Lachner, 1954 [31] (Notes 2, 5, 7)

Order Perciformes

Family Ammodytidae

Ammodytes tobianus Linnaeus, 1758 [32,33] (Notes 2, 5)

This species occurs in the Mediterranean, but records of it are from the northern and western areas. According to Lanfranco [29], records of this species from Maltese waters should be attributed to *Gymnamodytes cicerelus*.

Family Gasterosteidae

Gasterosteus aculeatus Linnaeus, 1758 (Notes 1, 5)

Lanfranco (1993) states this species “should not form part of our fauna”. No Sticklebacks are known locally from fresh or brackish waters, and this species is excluded from the present checklist.

Family Trachinidae

Trachinus lineolatus Fischer, 1885 Landings data [60,61] (Notes 2, 5)

Recorded in Maltese 2018 and 2019 commercial fishery landings data, but the specimens were not preserved, and no morphometric measurements or meristic counts were taken. Since this species is not known to occur in the Mediterranean Sea, it is likely that the landed specimens were misidentified.

Order Pleuronectiformes

Family Psettodidae

Psettodes belcheri Bennett, 1831 [29] (Notes 2, 5)

Lanfranco [29] noted this eastern Atlantic species in a local fish market but indicated it was most likely imported by Italian fishers.

Family Soleidae

Pegusa nasuta (Pallas, 1814) [31] (Notes 5, 7)

Order Scombriformes

Family Centrolophidae

Schedophilus medusophagus (Cocco, 1839) [31,145] (Notes 1, 3)

Neither Mifsud [145] nor Jennings [31] provides any evidence that this species occurs in Maltese waters, while Lanfranco [29] explicitly indicates that previous records of this species from Malta were a misidentification of *Schedophilus ovalis*.

Family Scombridae

Auxis thazard (Lacepède, 1800) Landings data [60,61] (Notes 1, 5)

There are numerous records in Maltese commercial fishery landings data, including for 2015, 2016, and 2018. In the past, *Auxis rochei* and *Auxis thazard* were considered to be the same species, and specimens were often recorded under the name *A. thazard*. Records of *A. thazard* from most Mediterranean countries are considered misidentifications by FishBase and should refer to *A. rochei* instead.

Scomber japonicus Houttuyn, 1782 [29,31–33,58,59] (Notes 2, 5)

In the past, *Scomber colias* and *Scomber japonicus* were considered to be the same species, and the Mediterranean *S. colias* was often recorded under the name *S. japonicus*. The most recent genetic analysis based on the entire mitogenome has shown conclusively that *S. colias* and *S. japonicus* are distinct species, and the latter, therefore, does not occur in the Mediterranean [146]. Records from the Mediterranean are, therefore, a misidentification (FishBase).

Acanthocybium solandri (Cuvier, 1832) (Notes 1, 5)

Recorded from Malta in Fishbase based on Collette and Nauen [147]. However, Collette and Nauen [147] do not specifically mention Malta. In the absence of authenticated records from Maltese waters, this species is excluded from the present checklist.

Family Scopthalmidae

Zeugopterus regius (Bonnaterre, 1788) [31] (Notes 1, 4, 7)

Family Serranidae

Epinephelus coioides (Hamilton, 1822) [148] (Notes 2, 5)

Recorded from Malta by Dragičević et al. [148] based on a photograph of a specimen caught in Maltese waters. In the absence of a specimen, these authors identified the species based on its livery but then commented that the close similarity in livery between *E. coioides*, *Epinephelus spilotoceps*, and *Cephalopholis niger* [sic!] means that the identification as *E. coioides* is only tentative. In effect, the livery of the specimen matches very well that of *Cephalopholis nigri*, whose presence in Maltese waters had already been confirmed through genetic analysis [120]. Given the questionable taxonomic identification, *Epinephelus coioides* are excluded from the present checklist.

Family Tetragonuridae

Tetragonurus cuvieri Risso, 1810 [31] (Notes 1, 5, 7)

Order Stomiformes**Family Gonostomatidae**

Cyclothone pygmaea Jespersen & Tåning, 1926 (Notes 1, 4, 6)

Family Phosichthyidae

Vinciguerria poweriae (Cocco, 1838) (Notes 1, 4, 6)

Order Syngnathiformes**Family Syngnathidae**

Syngnathus taenionotus Canestrini 1871 [31] (Notes 4, 7)

Syngnathus tenuirostris Rathke, 1837 [29,32,33] (Notes 2, 3)

According to Lanfranco [29], reports of this species probably refer to *Syngnathus typhle*. In our view, they are more likely to refer to *Syngnathus acus*. Either way, past records of *S. tenuirostris* from Malta are most likely a misidentification since this species is not known to occur in the central Mediterranean.

Order Tetraodontiformes

Family Diodontidae*Diodon hystrix* Linnaeus, 1758 [31] (Notes 2, 5, 7)**Family Tetraodontidae***Arothron hispidus* (Linnaeus, 1758) [31] (Notes 2, 5, 7)**References**

- Colloca, F.; Cardinale, M.; Belluscio, A.; Ardizzone, G. Pattern of distribution and diversity of demersal assemblages in the central Mediterranean Sea. *Estuar. Coast. Shelf. Sci.* **2003**, *56*, 469–480. [CrossRef]
- La Mesa, M.; Arneri, E.; Caputo, V.; Iglesias, M. The transparent goby, *Aphia minuta*: Review of biology and fisheries of a paedomorphic European fish. *Rev. Fish. Biol. Fish.* **2005**, *15*, 89–109. [CrossRef]
- Busalacchi, B.; Rinelli, P.; De Domenico, F.; Profeta, A.; Perdichizzi, F.; Bottari, T. Analysis of demersal fish assemblages off the Southern Tyrrhenian Sea (central Mediterranean). *Hydrobiologia* **2010**, *654*, 111–124. [CrossRef]
- Maiorano, P.; Sion, L.; Carlucci, R.; Capezzuto, F.; Giove, A.; Costantino, G.; Panza, M.; D’Onghia, G.; Tursi, A. The demersal faunal assemblage of the north-western Ionian Sea (central Mediterranean): Current knowledge and perspectives. *Chem. Ecol.* **2010**, *26*, 219–240. [CrossRef]
- Granger, V.; Fromentin, J.M.; Bez, N.; Relini, G.; Meynard, C.N.; Gaertner, J.C.; Maiorano, P.; Ruiz, C.G.; Follesa, C.; Gristina, M.; et al. Large-scale spatio-temporal monitoring highlights hotspots of demersal fish diversity in the Mediterranean Sea. *Prog. Oceanogr.* **2015**, *130*, 65–74. [CrossRef]
- Bianchi, C.N.; Morri, M. Global sea warming and “tropicalization” of the Mediterranean Sea: Biogeographic and ecological aspects. *Biogeographia* **2003**, *24*, 319–328. [CrossRef]
- Deidun, A.; Arcidiacono, I.; Tigano, C.; Schembri, P.J. Present distribution of the threatened killifish *Aphanius fasciatus* (Actinopterygii, Cyprinodontidae) in the Maltese Islands. *Cent. Mediterr. Nat.* **2002**, *3*, 177–180.
- Kovačić, M.; Schembri, P. Twelve new records of gobies and clingfishes (Pisces: Teleostei) significantly increase small benthic fish diversity of Maltese waters. *Mediterr. Mar. Sci.* **2019**, *20*, 287–296. [CrossRef]
- Schembri, T.; Ferguson, I.K.; Schembri, P.J. Revision of the records of shark and ray species from the Maltese Islands (Chordata: Chondrichthyes). *Cent. Mediterr. Nat.* **2003**, *4*, 71–104.
- Dimech, M.; Camilleri, M.; Hiddink, J.G.; Kaiser, M.J.; Ragonese, S.; Schembri, P.J. Differences in demersal community structure and biomass size spectra within and outside the Maltese Fishery Management Zone (FMZ). *Sci. Mar.* **2008**, *72*, 669–682. [CrossRef]
- Azzurro, E.; La Mesa, G.; Fanelli, E. The rocky-reef fish assemblages of Malta and Lampedusa islands (Strait of Sicily, Mediterranean Sea): A visual census study in a changing biogeographical sector. *J. Mar. Biol. Assoc. U. K.* **2013**, *93*, 2015–2026. [CrossRef]
- Ragonese, S.; Vitale, S.; Dimech, M.; Mazzola, S. Abundances of demersal sharks and chimaera from scientific surveys in the central Mediterranean Sea. *PLoS ONE* **2013**, *8*, e74865. [CrossRef] [PubMed]
- Froese, R.; Pauly, D. FishBase. [Version 06/2022]. Available online: www.fishbase.org (accessed on 23 August 2022).
- Forsskål, P.; Niebuhr, C. *Descriptiones Animalium, Amphibiorum, Piscium, Insectorum, Vermium; Quae in Itinere Orientali Observavit Petrus Forsskål Prof. Haun*; Post mortem auctoris edidit Carsten Niebuhr. *Adjuncta est Materia Medica Kahirina atque Tabula Maris Rubri Geographica*; Heinneck & Faber: Copenhagen, Denmark, 1775; 164p.
- Trapani, G. *A Catalogue of the Different Kinds of Fishes of Malta and Gozo, with Their Maltese, Latin, Italian, English and French Names as well as Their Season*; The Government Press: Valletta, Malta, 1838; 25p.
- Gulia, G. *Tentamen Ichthyologiae Melitensis Sistens Methodo Naturali Stripum Objectis Nonnullis Observationibus Genera ac Species, a Recentioribus de re Zoologica Scriptoribus Admissas Piscium Insularis Melitae*; Tipographia Anglica: Malta; pp. 1858–1859. viii + 71p.
- Gulia, G. *Pesci di Malta*; Tipografia Anglicana: Malta, 1861; vi + 71p.
- Tagliaferro, N. On the occurrence of *Echeneis naucrates* in Maltese waters. *Mediterr. Nat.* **1893**, *3*, 421.
- Gulia, G. *Prontuario di Storia Naturale Contenente la Nomenclatura Scientifica coi Corrispondenti Vocaboli Italiani ed Inglesi Degli Animali e Delle Painte che sono Conosciuti sotto una Denominazione Maltese*; A. Pugliesevich: Malta; pp. 1889–1890. 71p.
- Gulia, G. *Calendario del pescatore maltese*. In *Guida Generale di Malta e Gozo per l’Anno 1905*; Muscat, G., Ed.; The Malta Herald: Valletta, Malta, 1905; pp. 307–314.
- Gulia, G. Cenni bibliografici sulla fauna vertebrata maltese. *Boll. Soc. Zool. Ital.* **1909**, *10*, 300–318.
- Gulia, G. Sur la découverte de *Cephaloptera* giorno, Risso, dans les eaux maltaises. *Bull. Soc. Zool. Fr.* **1909**, *34*, 7–8.
- Gulia, G. Addition a la fauna ichthyologique maltaise. *Bull. Soc. Zool. Fr.* **1909**, *34*, 191–192.
- Despott, G. *The ichthyology of Malta*; Critien’s Press: San Gwann, Malta, 1919; xi + 60p.
- Despott, G. Ichthyological and carcinological notes. *Arch. Melitense* **1930**, *8*, 42–48.
- Lanfranco, G. *A Complete Guide to the Fishes of Malta*; Department of Information and Tourist Services: Valletta, Malta, 1958; xi + 132p.
- Lanfranco, G. *A Complete Guide to the Fishes of Malta. Revised*; Progress Press: Valletta, Malta, 1965.
- Lanfranco, G. *A Complete Guide to the Fishes of Malta: (Central Mediterranean)*; Progress Press: Valletta, Malta, 1974.
- Lanfranco, G. *The Fishes around Malta (Central Mediterranean)*; Progress Press: Valletta, Malta, 1993; 132p.
- Lanfranco, G. *Il-Hut madwar Malta/The Fish around Malta*; Allied Publications: Valletta, Malta, 2009; 195 + VIII pp.
- Jennings, G. *Maltese Fishes—An Identification Guide*; Calypso Publications: London, UK, 1996; 236 + V pp + annexes.

32. Farrugia Randon, S.; Sammut, R. *Fishes of Maltese Waters*; SRT Press: Qormi, Malta, 1999; 248p.
33. Sammut, R. *Mediterranean Sea Fishes (Central Region)*; SRT Press: Qormi, Malta, 2001; 213p.
34. Borg, J.J. First record of the deep-sea cardinalfish *Epigonus telescopus* (Risso 1810) from Maltese waters (Central Mediterranean) (Pisces, Epigonidae). *Nat. Sicil.* **2009**, *33*, 127–130.
35. Falzon, M.A. *Lipophrys dalmatinus* (Pisces Perciformes Blennidae), a new species for Malta (Central Mediterranean). *Nat. Sicil.* **2009**, *33*, 279–282.
36. Castriota, L.; Deidun, A. First record of *Pontinus kuhlii* in Maltese waters. *Mar. Biodivers. Rec.* **2014**, *7*, e2. [[CrossRef](#)]
37. Evans, J.; Tonna, R.; Schembri, P.J. Portent or accident? Two new records of thermophilic fish from the central Mediterranean. *Bioinvasions Rec.* **2015**, *4*, 299–304. [[CrossRef](#)]
38. Evans, J.; Barbara, J.; Schembri, P.J. Updated review of marine alien species and other ‘newcomers’ recorded from the Maltese Islands (Central Mediterranean). *Mediterr. Mar. Sci.* **2015**, *16*, 225–244. [[CrossRef](#)]
39. MEDITS Handbook. *MEDITS Instruction Manual Version n. 9*; MEDITS Working Group: Genova, Italy, 2017; 106p, Available online: <https://www.sibm.it/MEDITS2011/principaledownload.htm> (accessed on 17 July 2022).
40. Spedicato, M.T.; Massutí, E.; Mérigot, B.; Tserpes, G.; Jadaud, A.; Relini, G. The MEDITS trawl survey specifications in an ecosystem approach to fishery management. *Sci. Mar.* **2019**, *83*, 9–20. [[CrossRef](#)]
41. GFCM. *General Fisheries Commission for the Mediterranean (GFCM) Data Collection Reference Framework (DCRF) v. 22.2*; GFCM: Rome, Italy, 2018; 170p, Available online: <https://www.fao.org/gfcm/data/dcrf/en/> (accessed on 17 July 2022).
42. Bianchi, C.N. Biodiversity issues for the forthcoming tropical Mediterranean Sea. *Hydrobiologia* **2007**, *580*, 7–21. [[CrossRef](#)]
43. Hattab, T.; Albouy, C.; Ben Rais Lasram, F.; Le Loc’h, F.; Guilhaumon, F.; Leprieur, F. A biogeographical regionalization of coastal Mediterranean fishes. *J. Biogeogr.* **2015**, *42*, 1336–1348. [[CrossRef](#)]
44. Drago, A.F.; Sorgente, R.; Ribotti, A. A high resolution hydrodynamic 3-d model simulation of the Malta shelf area. *Ann. Geophys.* **2003**, *21*, 323–344. [[CrossRef](#)]
45. Drago, A.F.; Sorgente, R.; Olita, A. Sea temperature, salinity and total velocity climatological fields for the south-central Mediterranean Sea. GCP/RER/010/ITA/MSM-TD-14. *MedSudMed Tech. Doc.* **2010**, *14*, 1–35.
46. Havard, D.A. Water stratification and circulation around the Maltese Islands. *Rapp. Proces-Verbaux Des Réunions Comm. Int. Pour L’exploration Sci. De La Mer Méditerranée* **1979**, *25/26*, 7.
47. Drago, A.F.; Xuereb, A. *Tide tables 1993. Grand Harbour, Malta*; Malta Maritime Authority and Malta Council for Science and Technology: Marsa, Malta, 1993.
48. Galdies, C. *The State of the Climate 2022—A Multidecadal Report and Assessment of Malta’s Climate*; National Statistics Office: Valletta, Malta, 2022; 38p.
49. Drago, A.F. *Sea Temperature Soars beyond 30 °C Newspot*; University of Malta: Msida, Malta, 2017. Available online: <https://www.um.edu.mt/newspot/news/features/2017/08/seatemperaturesoarsbeyond30c> (accessed on 5 December 2022).
50. Axiak, V. *Monitoring Programme for Coastal Waters—Fourth Report June/October/November 2000*; Malta Environment and Planning Authority: Floriana, Malta, 2000; 202p. Available online: <https://era.org.mt/wp-content/uploads/2019/05/MonitoringProgramme-Part1.pdf> (accessed on 5 December 2022).
51. Camilleri, M.; Dimech, M.; Drago, A.; Fiorentino, F.; Fortibuoni, T.; Garofalo, G.; Gristina, M.; Schembri, P.J.; Massa, F.; Coppola, S.; et al. Spatial distribution of demersal fishery resources, environmental factors and fishing activities in GSA 15 (Malta Island). GCP/RER/010/ITA/MSM-TD-13. *MedSudMed Tech. Doc.* **2008**, *13*, 1–97.
52. Borg, J.A.; Micallef, S.A.; Pirota, K.; Schembri, P.J. Baseline marine benthic surveys in the Maltese Islands (Central Mediterranean). In *Proceedings of the Third International Conference on the Mediterranean Coastal Environment, MEDCOAST 97*, Mellieha, Malta, 11–14 November 1997; Qawra, M., Özhan, E., Eds.; MEDCOAST Secretariat, Middle East Technical University: Ankara, Turkey, 1997; Volume 1, pp. 1–8.
53. Borg, J.A.; Howege, H.M.; Lanfranco, E.; Micallef, S.A.; Mifsud, C.; Schembri, P.J. The macrobenthic species of the infralittoral to circalittoral transition zone off the northeastern coast of Malta (Central Mediterranean). *Xjenza* **1998**, *3*, 16–24.
54. Sciberras, M.; Rizzo, M.; Mifsud, J.R.; Camilleri, K.; Borg, J.A.; Lanfranco, E.; Schembri, P.J. Habitat structure and biological characteristics of a maerl bed off the northeastern coast of the Maltese Islands (central Mediterranean). *Mar. Biodivers.* **2009**, *39*, 251–264. [[CrossRef](#)]
55. Evans, J.; Aguilar, R.; Alvarez, H.; Borg, J.A.; Garcia, S.; Knittweis, L.; Schembri, P.J. Recent evidence that the deep sea around Malta is a biodiversity hotspot. *Rapp. Du Congrès De La Comm. Int. Pour L’exploitation Sci. De La Mer Méditerranée* **2016**, *41*, 463.
56. Falzon, M.A. A Survey of Blenniidae, Clinidae, and Tripterygiidae (Pisces) in Maltese waters (Central Mediterranean), including four previously unrecorded species. *Cent. Mediterr. Nat.* **1999**, *3*, 17–22.
57. Clark, R. *Rays and Skates, a Revision of the European Species*; H.M.S.O.: Edinburgh, UK; London, UK, 1926; 66p.
58. MEDITS GSA 15 data. *Mediterranean International Trawl Survey (MEDITS) Geographic Sub-Area 15 dataset provided by the Department of Fisheries and Aquaculture of the Government of Malta on 14 June 2018*.
59. MEDITS TM List. *Mediterranean International Trawl Survey (MEDITS) Taxonomic List of the Mediterranean (version April 2019)*. Available online: <https://www.sibm.it/MEDITS2011/revisionTM2017.htm> (accessed on 16 July 2022).
60. FAO. *General Fisheries Commission for the Mediterranean Sea (GFCM; Mediterranean and Black Sea) Capture Production; Fisheries and Aquaculture Division*: Rome, Italy, 2021. Available online: https://www.fao.org/fishery/en/collection/gfcm_capture?lang=en (accessed on 29 December 2021).

61. STECF EWG 21-08. Scientific, Technical and Economic Committee for Fisheries (STECF) Expert Working Group 21-08—Annual Economic Report on the EU Fishing Fleet II. Electronic Data Annex on EU Fleet Economic and Transversal Data. STECF. 2021. Available online: <https://stecf.jrc.ec.europa.eu/ewg2108> (accessed on 30 January 2022).
62. Evans, J.; Arndt, E.; Schembri, P.J. Atlantic fishes in the Mediterranean: Using biological traits to assess the origin of newcomer fishes. *Mar. Ecol. Prog. Ser.* **2020**, *643*, 133–143. [[CrossRef](#)]
63. Kovačić, M.; Lipej, L.; Dulčić, J.; Iglesias, S.P.; Goren, M. Evidence-based checklist of the Mediterranean Sea fishes. *Zootaxa* **2021**, *4998*, 1–115. [[CrossRef](#)]
64. Soldo, A.; Bakiu, R. Checklist of marine fishes of Albania. *Acta Adriat.* **2021**, *62*, 63–73. [[CrossRef](#)]
65. Elbaraasi, H.; Elabar, B.; Elaabidi, S.; Bashir, A.; Elsilini, O.; Shakman, E.; Azzurro, E. Updated checklist of bony fishes along the Libyan coasts (Southern Mediterranean Sea). *Mediterr. Mar. Sci.* **2019**, *20*, 90–105. [[CrossRef](#)]
66. Akel, E.H.K.; Karachle, P.K. The marine ichthyofauna of Egypt. *Egypt. J. Aquat. Biol. Fish.* **2017**, *21*, 81–116. [[CrossRef](#)]
67. Bitar, G.; Badreddine, A. An updated checklist of the marine fishes in Lebanon. An answer to Bariche and Fricke (2020): “The marine ichthyofauna of Lebanon: An annotated checklist, history, biogeography, and conservation status”. *Zootaxa* **2021**, *5010*, 1. [[CrossRef](#)]
68. Psomadakis, P.N.; Giustino, S.; Vacchi, M. Mediterranean fish biodiversity: An updated inventory with focus on the Ligurian and Tyrrhenian seas. *Zootaxa* **2012**, *3263*, 1–46. [[CrossRef](#)]
69. Bilecenoğlu, M.; Kaya, M.; Cihangir, C.; Çiçek, E. An updated checklist of the marine fishes of Turkey. *Turk. J. Zool.* **2014**, *38*, 901–929. [[CrossRef](#)]
70. Kovačić, M.; Lipej, L.; Dulčić, J. Evidence approach to checklists: Critical revision of the checklist of the Adriatic Sea fishes. *Zootaxa* **2020**, *4767*, 1–55. [[CrossRef](#)]
71. Golani, D. An updated Checklist of the Mediterranean fishes of Israel, with illustrations of recently recorded species and delineation of Lessepsian migrants. *Zootaxa* **2021**, *4956*, 1–108. [[CrossRef](#)] [[PubMed](#)]
72. Báez, J.C.; Rodríguez-Cabello, C.; Bañón, R.; Brito, A.; Falcón, J.M.; Maño, T.; Baro, J.; Macías, D.; Meléndez, M.J.; Camiñas, J.A.; et al. Updating the national checklist of marine fishes in Spanish waters: An approach to priority hotspots and lessons for conservation. *Mediterr. Mar. Sci.* **2019**, *20*, 260–270. [[CrossRef](#)]
73. Fergusson, I.K.; Compagno, L.J.V. Distributional note on the dusky shark *Carcharodon obscurus* in the Central Mediterranean, with a first record from the Maltese Islands. In Proceedings of the Third European Elasmobranch Association Meeting, Boulogne-sur-Mer, Paris, 27–29 May 1999; Séret, B., Sire, J.-Y., Eds.; Société Française d’Ichthyologie & IRD: Paris, France, 2000; pp. 57–65.
74. Vella, A.; Vella, N.; Dent, E. First records of the litle sleeper shark, *Somniosus rostratus*, in Maltese fisheries landings. *Rapp. De La Comm. Int. Epour La Mer Méditerranée* **2013**, *40*, 495.
75. Ferrari, A.; Di Crescenzo, S.; Cariani, A.; Crobe, V.; Benvenuto, A.; Piattoni, F.; Mancusi, C.; Bonnici, L.; Bonello, J.J.; Schembri, P.J.; et al. Puzzling over spurdogs: Molecular taxonomy assessment of the *Squalus* species in the Strait of Sicily. *Eur. Zool. J.* **2021**, *88*, 181–190. [[CrossRef](#)]
76. Zava, B.; Insacco, G.; Deidun, A.; Said, A.; Ben Suissi, J.; Nour, O.M.; Kondylatos, G.; Scannella, D.; Corsini-Foka, M. Records of the critically endangered *Squatina aculeata* and *Squatina oculata* (Elasmobranchii: Squatiniformes: Squatinidae) from the Mediterranean Sea. *Acta Ichthyol. Piscat.* **2022**, *52*, 285–297. [[CrossRef](#)]
77. Burgess, E.; Dimech, M.; Caruana, R.; Darmanin, M.; Raine, H.; Harrison, A.; Schembri, P.J. Non-target by-catch in the Maltese bluefin tuna (*Thunnus thynnus*) longline fishery (Central Mediterranean). *Collect. Vol. Sci. Pap.* **2010**, *65*, 2262–2269.
78. Evans, J.; Tonna, R.; Schembri, P.J. A bevy of surgeons: First record of *Acanthurus chirurgus* (Bloch, 1787) from the central Mediterranean, with notes on other Acanthuridae recorded in the region. *Bioinvasions Rec.* **2017**, *6*, 105–109. [[CrossRef](#)]
79. Langeneck, J.; Boyer, M.; De Cecco, P.G.; Luciani, C.; Marcelli, M.; Vacchi, M. First record of *Acanthurus chirurgus* (Perciformes: Acanthuridae) in the Mediterranean Sea, with some distributional notes on Mediterranean Acanthuridae. *Mediterr. Mar. Sci.* **2015**, *16*, 427–431. [[CrossRef](#)]
80. Nour, O.M.; Al Mabrok, S.A.A.; Zava, B.; Gianguzza, P.; Corsini-Folka, M.; Deidun, A. First record of *Naso annulatus* (Quoy & Gaimard, 1825) and further records of *Scatophagus argus* (Linnaeus, 1766) and *Charybdis (Charybdis) natator* (Herbst, 1794) in the Mediterranean Sea. *Bioinvasions Rec.* **2022**, *11*, 785–795.
81. Deidun, A.; Vella, P.; Sciberras, A.; Sammut, R. New records of *Lobotes surinamensis* in Maltese coastal waters. *Aquat. Invasions* **2010**, *5* (Suppl. S1), S113–S116. [[CrossRef](#)]
82. Deidun, A.; Castriota, L.; Falautano, M.; Maggio, T. Yet another angelfish species for the Mediterranean—The first record of *Holacanthus africanus* Cadenat, 1951 from Maltese waters, Central Mediterranean. *Bioinvasions Rec.* **2017**, *6*, 373–376. [[CrossRef](#)]
83. Deidun, A.; Galdies, J.; Zava, B. A bonanza of angelfish (Perciformes: Pomacanthidae) in the Mediterranean: The second documented record of *Holacanthus ciliaris* (Linnaeus, 1758). *Bioinvasions Rec.* **2020**, *9*, 827–833. [[CrossRef](#)]
84. Evans, J.; Schembri, P.J. First record of the yellowbar angelfish *Pomacanthus maculosus* (Forsskål, 1775) in the central Mediterranean (Maltese Islands). *J. Appl. Ichthyol.* **2016**, *32*, 1226–1228. [[CrossRef](#)]
85. Zammit, E.; Schembri, P.J. An overlooked and unexpected introduction? Occurrence of the spotted scat *Scatophagus argus* (Linnaeus, 1766) (Osteichthyes: Scatophagidae) in the Maltese Islands. *Aquat. Invasions* **2011**, *6* (Suppl. S1), S79–S83. [[CrossRef](#)]
86. Schembri, P.J.; Deidun, A.; Falzon, M.A. One *Siganus* or two? On the occurrence of *Siganus luridus* and *Siganus rivulatus* in the Maltese Islands. *Mar. Biodivers. Rec.* **2012**, *5*, e71. [[CrossRef](#)]

87. Borg, J.A.; Evans, J.; Knittweis, L.; Schembri, P.J. New and interesting records of marine fishes (Actinopterygii) from the Maltese Islands (central Mediterranean). *Acta Ichthyol. Piscat.* **2022**, *52*, 215–221. [[CrossRef](#)]
88. Deidun, A.; Watson, D.; Castriota, L.; Mazza, G.; Pasolli, L. First record of the fangtooth moray, *Enchelycore anatina* (Actinopterygii: Anguilliformes: Muraenidae) from Maltese waters, Central Mediterranean. *Acta Ichthyol. Piscat.* **2015**, *45*, 315–317. [[CrossRef](#)]
89. Quéro, J.-C.; Ribes, V. Populations Nord-Atlantiques et Méditerranéenne de *Bathypterois dubius* (Aulopiformes: Ipnopidae). *Cybium* **1999**, *23*, 200–204.
90. Deidun, A.; Zava, B.; Corsini-Foka, M.; Galdies, J.; Di Natale, A.; Collette, B.B. First record of the flat needlefish, *Ablennes hians* (Belonidae) in central Mediterranean waters (Western Ionian Sea). *Ann. Ser. Hist. Nat.* **2021**, *31*, 9–16. [[CrossRef](#)]
91. Falzon, D.; Falzon, V. First records of black-headed blenny *Microlipophrys nigriceps* (Osteichthyes Perciformes Blenniidae) in Malta. *Nat. Sicil.* **2013**, *37*, 581–586.
92. Falzon, M.A. First record of the redlip blenny *Ophioblennius atlanticus* (Osteichthyes: Blenniidae) in the Mediterranean. *Mar. Biodivers. Rec.* **2015**, *8*, e80. [[CrossRef](#)]
93. Cilia, J.L. On some previously unrecorded Blenniidae and Gobiidae from Maltese Waters (Pisces—Osteichthyes—Perciformes). *Cent. Mediterr. Nat.* **1990**, *2*, 5–13.
94. Vella, P.; Deidun, A. First record of *Selene dorsalis* (Osteichthyes: Carangidae) in the Mediterranean Sea, from coastal waters off the Maltese Islands. *Mar. Biodivers. Rec.* **2009**, *2*, e125. [[CrossRef](#)]
95. Andaloro, F.; Falautano, M.; Sinopoli, M.; Passarelli, F.M.; Pipitone, C.; Addis, P.; Cau, A.; Castriota, L. The lesser amberjack *Seriola fasciata* (Perciformes: Carangidae) in the Mediterranean: A recent colonist? *Cybium* **2005**, *29*, 141–145. [[CrossRef](#)]
96. Deidun, A.; Castriota, L.; Arrigo, S. A tale of two Atlantic fish migrants: Records of the lesser amberjack *Seriola fasciata* and the African hind *Cephalopholis taeniops* from the Maltese Islands. *J. Black Sea Mediterr. Environ.* **2011**, *17*, 223–233.
97. Azzurro, E.; Matiddi, M.; Fanelli, E.; Guidetti, P.; Mesa, G.L.; Scarpato, A.; Axiak, V. Sewage pollution impact on Mediterranean rocky-reef fish assemblages. *Mar. Environ. Res.* **2010**, *69*, 390–397. [[CrossRef](#)]
98. Schembri, P.J.; Bodilis, P.; Evans, J.; Francour, P. Occurrence of *Oplegnathus fasciatus* (Temminck et Schlegel, 1844) (Actinopterygii: Perciformes: Oplegnathidae) in Malta (Central Mediterranean). *Acta Ichthyol. Piscat.* **2010**, *40*, 101–104. [[CrossRef](#)]
99. Vella, N.; Vella, A.; Agius Darmanin, S. The first record of the lowfin chub *Kyphosus vaigiensis* (Quoy & Gaimard, 1825) from Malta. *J. Black Sea Mediterr. Environ.* **2016**, *22*, 175–181.
100. Deidun, A.; Zava, B. Far from home... the first documented capture of the genus *Elops* (Actinopterygii, Elopidae) from the Mediterranean. *Bioinvasions Rec.* **2020**, *9*, 223–227. [[CrossRef](#)]
101. Fiorentino, F.; Camilleri, M.; Gancitano, S.; Zaccaria, M.; Morizzo, G. On the presence of *Pomadasyss incisus*, Bowdich, 1825 (Osteichthyes, Haemulidae) in Maltese coastal waters (Strait of Sicily-Central Mediterranean). *Biol. Mar. Mediterr.* **2005**, *12*, 514–516.
102. Tiralongo, F.; Akyol, O.; Al Mabruk, S.A.; Battaglia, P.; Beton, D.; Bitlis, B.; Borg, J.A.; Bouchoucha, M.; Çinar, M.E.; Crocetta, F.; et al. New Alien Mediterranean Biodiversity Records (August 2022). *Mediterr. Mar. Sci.* **2022**, *23*, 725–747. [[CrossRef](#)]
103. Deidun, A.; Zava, B.; Corsini-Foka, M. Distribution extension of *Lutjanus argentimaculatus* (Lutjanidae) and *Psenes pellucidus* (Nomeidae) to the waters of Malta, Central Mediterranean Sea. *Ann. Ser. Hist. Nat.* **2022**, *32*, 49–58. [[CrossRef](#)]
104. Vella, A.; Vella, N.; Agius Darmanin, S. First record of *Lutjanus fulviflamma* (Osteichthyes: Lutjanidae) in the Mediterranean Sea. *J. Black Sea Mediterr. Environ.* **2015**, *21*, 307–315.
105. Tsagarakis, K.; Darmanin, S.A.; Al Mabruk, S.; Auriemma, R.; Azzurro, E.; Badouvas, N.; Bakiu, R.; Bariche, M.; Battaglia, P.; Betti, F.; et al. New records of rare species in the Mediterranean Sea (October 2021). *Mediterr. Mar. Sci.* **2021**, *22*, 627–652. [[CrossRef](#)]
106. Kovačić, M.; Bonello, J.J.; Evans, J. Three new records of Gobiidae from Malta with morphology, colouration and identification of the smallest known juveniles of two small gobiid species. *Cybium* **2013**, *37*, 233–239.
107. Kovačić, M.; Kovtun, O.A. The first record of *Gobius incognitus* (Actinopterygii: Gobiiformes: Gobiidae) from Malta. *Acta Adriat.* **2022**, *63*, 53–58. [[CrossRef](#)]
108. Kovačić, M.; Falzon, M.A. The first confirmed record of *Pomatoschistus marmoratus* (Risso, 1810) (Actinopterygii: Gobiiformes: Gobiidae) from Malta. *Acta Adriat.* **2022**, *63*, 225–230. [[CrossRef](#)]
109. Vella, A.; Vella, N.; Agius Darmanin, S. The first record of the longjaw squirrelfish, *Holocentrus adscensionis* (Osbeck, 1765) (Holocentriformes: Holocentridae), in the Mediterranean Sea. *Nat. Eng. Sci.* **2016**, *1*, 78–85. [[CrossRef](#)]
110. Deidun, A.; Attard, S.; Camilleri, M.; Vella Gaffiero, J.; Hampson, D.; Said, A.; Azzurro, E.; Goren, M. The first record of the *Sargocentron* genus from the Maltese Islands (Central Mediterranean)—Who will unravel the current conundrum? *Bioinvasions Rec.* **2016**, *5*, 123–126. [[CrossRef](#)]
111. Falzon, M.A. First record of Por's Goatfish *Upeneus Pori* (Actinopteri Mulliformes Mullidae) from Malta (Central Mediterranean). *Nat. Sicil.* **2021**, *45*, 103–108.
112. Cuttitta, A.; Arigo, A.; Basilone, G.; Bonanno, A.; Buscaino, G.; Rollandi, L.; Garcia Lafuente, J.; Garcia, A.; Mazzola, S.; Patti, B. Mesopelagic fish larvae species in the Strait of Sicily and their relationships to main oceanographic events. *Hydrobiologia* **2004**, *527*, 177–182. [[CrossRef](#)]
113. Vella, A.; Vella, N.; Agius Darmanin, S. The first record of the African Sergeant, *Abudefduf hoefleri* (Perciformes: Pomacentridae), in the Mediterranean Sea. *Mar. Biodivers. Rec.* **2016**, *9*, 15. [[CrossRef](#)]
114. Deidun, A.; Castriota, L. First record of *Abudefduf cfr saxatilis* Linnaeus, 1758 (Perciformes: Pomacentridae) from the Maltese Islands (Central Mediterranean). *Bioinvasions Rec.* **2014**, *3*, 53–56. [[CrossRef](#)]

115. Vella, A.; Agius Darmanin, S.; Vella, N. The first records of Indo-Pacific sergeant *Abudefduf vaigiensis* (Quoy & Gaimard, 1825) and further notes on the occurrence of sergeant major *A. saxatilis* (Linnaeus, 1758) in Malta: Expanding populations of an invasive genus in the Mediterranean Sea. *J. Black Sea Mediterr. Environ.* **2016**, *22*, 1–15.
116. Deidun, A.; De Castro, D.; Bariche, M. First record of the azure demoiselle, *Chrysiptera hemicyanea* (Actinopterygii: Perciformes: Pomacentridae), in the Mediterranean Sea. *Acta Ichthyol. Piscat.* **2018**, *48*, 87–91. [[CrossRef](#)]
117. Vella, A.; Agius Darmanin, S.; Vella, N. Morphological and genetic barcoding study confirming the first *Stegastes variabilis* (Castelnau, 1855) report in the Mediterranean Sea. *Mediterr. Mar. Sci.* **2015**, *16*, 609–612. [[CrossRef](#)]
118. Louisy, P. *Europe and Mediterranean Marine Fish Identification Guide*; Les Éditions Eugen Ulmer: Paris, France, 2015; 512p.
119. Evans, J.; Schembri, P.J. On the occurrence of *Cephalopholis hemistiktos* and *C. taeniops* (Actinopterygii, Perciformes, Serranidae) in Malta, with corrections of previous misidentifications. *Acta Ichthyol. Piscat.* **2017**, *47*, 197–200. [[CrossRef](#)]
120. Vella, N.; Vella, A.; Agius Darmanin, S. Morphological and genetic analyses of the first record of the Niger Hind, *Cephalopholis nigri* (Perciformes: Serranidae), in the Mediterranean Sea and of the African Hind, *Cephalopholis taeniops*, in Malta. *Mar. Biodivers. Rec.* **2016**, *9*, 99. [[CrossRef](#)]
121. Schembri, P.J.; Tonna, R. Occurrence of the Malabar grouper *Epinephelus malabaricus* (Bloch & Schneider, 1801) (Actinopterygii, Perciformes, Serranidae), in the Maltese Islands. *Aquat. Invasions* **2011**, *6* (Suppl. S1), S129–S132. [[CrossRef](#)]
122. Deidun, A.; Andaloro, F.; Bavestrello, G.; Canese, S.; Consoli, P.; Micallef, A.; Romeo, T.; Bo, M. First characterisation of a *Leiopathes glaberrima* (Cnidaria: Anthozoa: Antipatharia) forest in Maltese exploited fishing grounds. *Ital. J. Zool.* **2014**, *82*, 271–280.
123. Vella, A.; Vella, N. Genetic barcoding and preliminary phylogenetic analysis of Serranidae species from Maltese coastal waters, with a perspective on their Mediterranean phylogeography. *Nat. Eng. Sci.* **2016**, *1*, 66–77. [[CrossRef](#)]
124. Vella, N.; Vella, A. Characterization of the complete mitogenome of Haifa grouper, *Hyporthodus haifensis* (Perciformes: Serranidae), and its phylogenetic position within Epinephelini. *Mitochondrial DNA B* **2021**, *6*, 1287–1289. [[CrossRef](#)]
125. Evans, J.; Borg, J.A.; Schembri, P.J. First record of *Paranthias cf. furcifer* (Actinopterygii: Perciformes: Serranidae) from the central Mediterranean, with notes on the identification of marine species from imagery. *Acta Ichthyol. Piscat.* **2020**, *50*, 489–492. [[CrossRef](#)]
126. Evans, J.; Cassar, J.; Schembri, P.J. The Yellowfin Tuna *Thunnus albacares* as a vagrant in the Mediterranean Sea. *J. Appl. Ichthyol.* **2021**, *37*, 968–970. [[CrossRef](#)]
127. Falzon, M.A. First records of *Scorpaena maderensis* (Pisces Scorpaeniformes Scorpaenidae) in inshore Maltese waters. *Nat. Sicil.* **2011**, *35*, 419–423.
128. Sciberras, M.; Schembri, P.J. A critical review of records of alien marine species from the Maltese Islands and surrounding waters (Central Mediterranean). *Mediterr. Mar. Sci.* **2007**, *8*, 41–66. [[CrossRef](#)]
129. Deidun, A.; Castriota, L.; Falautano, M.; Maraventano, G.; Prazzi, E.; Andaloro, F. Documenting the occurrence of the Lessepsian fish *Stephanolepis diaspros* within the Strait of Sicily, Central Mediterranean. *J. Black Sea Mediterr. Environ.* **2015**, *21*, 1–11.
130. Deidun, A.; Fenech-Farrugia, A.; Castriota, L.; Falautana, M.; Azzurro, E.; Andaloro, F. First record of the silver-cheeked toadfish *Lagocephalus scleratus* (Gmelin, 1789) from Malta. *Bioinvasions Rec.* **2015**, *4*, 139–142. [[CrossRef](#)]
131. Visentin, M.; Borg, J.J. Rinvenimento di *Sphoeroides pachygaster* (Müller et Troschel, 1848) (Pisces Tetraodontidae) in Calabria e a Malta. *Nat. Sicil.* **2014**, *38*, 89–92.
132. Whitehead, P.J.P.; Bauchot, M.-L.; Hureau, J.C.; Nielsen, J.; Tortonese, E. *Fishes of the North-eastern Atlantic and the Mediterranean, Volumes 1–3*; Unesco: Paris, France, 1986; 1473p.
133. Ayas, D.; Ciftci, N.; Yalcin, E.; Akbora, H.D.; Bakan, M.; Erguden, D. First record of the big nose shark, *Carcharhinus altimus* (Springer, 1950) from Mersin Bay. *Int. J. Fish Aquat. Stud.* **2020**, *8*, 132–136.
134. Compagno, L.J.V. *FAO Species Catalogue Vol. 4. Sharks of the World. An Annotated and Illustrated Catalogue of Shark Species Known to Date. Part 1—Hexanchiformes to Lamniformes*; FAO Fisheries Synopsis No. 125, Vol. 4, Pt. 1; FAO: Rome, Italy, 1984; 249p.
135. Kiparissis, S.; Tsaparis, D.; Peristeraki, P.; Giannakaki, A.; Kosoglou, G.; Metaxakis, M.; Tserpes, G. The yellowstripe barracuda *Sphyrna chrysaena* (Kluzinger, 1884) in Crete (GSA 23, eastern Mediterranean): First genetically verified records and highlighted issues on the lessepsian barracudas nomenclature ambiguities. *Bioinvasions Rec.* **2020**, *9*, 814–826. [[CrossRef](#)]
136. Ulman, A.; Harris, H.E.; Doumpas, N.; Akbora, H.D.; Al Mabruk, S.A.A.; Azzurro, E.; Bariche, M.; Çiçek, B.A.; Deidun, A.; Demirel, N.; et al. Low pufferfish and lionfish predation in their native and invaded ranges suggests human control mechanisms may be necessary to control their Mediterranean abundances. *Front. Mar. Sci.* **2021**, *8*, 670413. [[CrossRef](#)]
137. Kletou, K.; Hall-Spencer, J.; Kleitou, P. A lionfish (*Pterois miles*) invasion has begun in the Mediterranean Sea. *Mar. Biodivers. Rec.* **2016**, *9*, 46. [[CrossRef](#)]
138. Dimitriadis, C.; Galanidi, M.; Zenetos, A.; Corsini-Foka, M.; Giovos, I.; Karachle, P.K.; Fournari-Konstantinidou, I.; Kytinou, E.; Issaris, Y.; Azzurro, E.; et al. Updating the occurrences of *Pterois miles* in the Mediterranean Sea, with considerations on thermal boundaries and future range expansion. *Mediterr. Mar. Sci.* **2020**, *21*, 62–69. [[CrossRef](#)]
139. Serena, F. *Field Identification Guide to the Sharks and Rays of the Mediterranean and Black Sea*; FAO: Rome, Italy, 2015; ix + 97p.
140. Karachle, P.; Angelidis, A.; Apostolopoulos, G.; Ayas, D.; Ballesteros, M.; Bonnici, C.; Brodersen, M.M.; Castriota, L.; Chalari, N.; Cottalorda, J.M.; et al. New Mediterranean Biodiversity Records (March 2016). *Mediterr. Mar. Sci.* **2016**, *17*, 230–252. [[CrossRef](#)]
141. Evans, J.; Schembri, P.J. Not another first: The ‘first’ Mediterranean record of *Pomacanthus asfur* (Forsskål, 1775) is probably based on a misidentification. *Cybium* **2017**, *41*, 75–76.

142. Pizzicori, P.; Castriota, L.; Marino, G.; Andaloro, F. Seriola carpenteri: A new immigrant in the Mediterranean from the Atlantic Ocean. *J. Fish Biol.* **2005**, *57*, 1335–1338. [[CrossRef](#)]
143. Nakamura, I. *FAO Species Catalogue Vol. 5. Billfishes of the World, An Annotated and Illustrated Catalogue of Marlins, Sailfishes, Spearfishes and Swordfishes Known to Date*; FAO Fisheries Synopsis No. 125, Vol 5; FAO: Rome, Italy, 1985; 65p.
144. Falautano, M.; Castriota, L.; Andaloro, F. First record of *Etrumeus teres* (Clupeidae) in the central Mediterranean Sea. *Cybium* **2006**, *30*, 287–288.
145. Mifsud, C. On the occurrence of *Schedophilus ovalis* (Cuvier, 1833) and *S. medusophagus* Cocco, 1839 (Perciformes, Centrolophidae) in Maltese waters. *Cent. Mediterr. Nat.* **2005**, *4*, 141.
146. Catanese, G.; Manchado, M.; Infante, C. Evolutionary relatedness of mackerels of the genus *Scomber* based on complete mitochondrial genomes: Strong support to the recognition of Atlantic *Scomber colias* and Pacific *Scomber japonicus* as distinct species. *Gene* **2010**, *452*, 35–43. [[CrossRef](#)] [[PubMed](#)]
147. Collette, B.; Nauen, C. *FAO Species Catalogue Vol. 2. Scombrids of the World. An Annotated and Illustrated Catalogue of Tunas, Mackerels, Bonitos and Related Species Known to Date*; FAO Fisheries Synopsis No. 125, Vol. 2; FAO: Rome, Italy, 1983; 137p.
148. Dragičević, B.; Anadoli, O.; Angel, D.; Benabdi, M.; Bitar, G.; Castriota, L.; Crocetta, F.; Deidun, A.; Dulčić, J.; Edelist, D.; et al. New Mediterranean Biodiversity Records (December 2019). *Mediterr. Mar. Sci.* **2019**, *20*, 645–656. [[CrossRef](#)]

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