Alien Species Threat across Marine Protected Areas of Turkey—An Updated Inventory

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Abstract: This study presents the first comprehensive assessment of alien species occurrences within the selected 11 Marine Protected Areas (MPAs) located on the Aegean and Levantine coasts of Turkey. The inventory includes a total of 289 species belonging to 15 phyla, in which lowest and highest diversities were observed in Saros Bay MPA (27 species, northern Aegean Sea) and Fethiye-Göcek Bay MPA (150 species, northwest Levantine Sea), respectively. Alien species distributions that were revealed in protected areas located in the southern Aegean and Levantine Seas were 56.9% similar (based on presence vs. absence data), while northern Aegean sites formed another distinct group. According to the breakdown of major phyla through the entire study areas, Mollusca had the highest alien diversity (22.1% of alien species), followed by Actinopterygii (19.0%), Arthropoda (15.2%) and Annelida (13.5%). Casual aliens were represented by very low proportions in each MPA, proving that most species were already established in the region, with a significant proportion of invasive species. Regardless of the localities, the majority of the species originated from the Red Sea, whose primary pathway of introduction is the corridor, the Suez Canal. In the absence of effective management actions against bioinvasions, MPAs located along the Turkish coastline do not currently seem to provide any protection, revealing a large conservation gap to be filled.

Keywords: invasive alien species; marine protected areas; eastern Mediterranean Sea

1. Introduction

In the Mediterranean Sea, Marine Protected Areas (MPAs) are described as clearly defined marine geographical spaces (including subtidal, intertidal and supratidal ecosystems, together with coastal lakes/lagoons connected permanently or temporarily to the sea), which are recognized, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with its associated ecosystem services and cultural values [1]. As clearly implied by this broad generic term, MPAs are the most effective conservation tool in the key management of marine ecosystem alterations around the world [2], by maintaining natural ecological processes, increasing ecosystem resilience, preserving genetic diversity, ensuring the sustainable utilization of species and ecosystems, restoring the biomass and structure of species assemblages, and providing socio-economic benefits [3–5]. These advantages, however, can only be noticeable in appropriately sited, strongly protected and effectively managed MPAs [3], which prominently protect natural habitats and species from multiple local human stressors, e.g., overexploitation of living resources and habitat destruction [6]. The recent assessments of the development of MPAs in the Mediterranean Sea during the last decade show progress towards the increased protection of marine and coastal areas; however, results are not encouraging and effectiveness of management measures are still a matter of concern [7]. Currently, 9.7% of the Mediterranean Sea is designated as MPAs, but only a small portion are associated with a properly implemented management plan and few countries have fulfilled the designated
target of 10% by 2020, pointed out both in the UN Sustainable Development Goal 14 and Aichi target 11 (Convention on Biological Diversity) [8].

MPAs appear to be quite vulnerable when the enormous impacts of global-scale stressors such as climate change, pollution and biological invasions are taken into consideration [9]. The latter phenomenon is of special importance throughout the Mediterranean Sea, since the basin is among the most ecologically altered marine regions globally, representing a hotspot of biological invasions [10,11]. Human-mediated alien species introductions are regarded as one of the main causes of drastic biodiversity changes in the region, causing a troublesome problem because of the unprecedented rate of their invasion, and the irreversible impacts they pose on local ecosystems, human health and the socio-economy [12,13], and so their impact on protected areas could thus be much more severe [14,15]. Despite the widespread theory that MPAs are resistant to invasion owing to their high species diversity and putative abundance of predators, competitors and parasites of alien species, this hypothesis is not fully supported and marine reserves may even promote the introduction of alien species [10,16]. Through the wealth of research carried out so far, very few attempts have been made to clarify the status of alien species within coastal protected areas, in which the available information denotes that majority of Mediterranean MPAs are at a high risk of invasion [17] and their boundaries offer almost no protection from many high-impact invasive species [18].

Biodiversity and ecosystem conservation in Turkey is ensured by protected areas dispersed in 15 different categories (National Parks, Special Environment Protection Areas, Strict Nature Reserves, etc.), managed officially by two governmental bodies (Ministry of Agriculture and Forestry and Ministry of Environment and Urbanization). Currently, about 6.8% of Turkey’s marine areas are nominally protected, which is significantly lower than the reported regional and global figures [8,19]. As with most parts of the Mediterranean Sea, alien and invasive species inventories specifically concentrated on MPAs are scarce in Turkey, where existing information is provided by a series of government-funded projects in the early 2000s [20–22], clearly outdated and seeking critical revisions. In order to promote the development of coordinated efforts and management measures throughout the Mediterranean Sea, a basin-specific action plan concerning species introductions and invasive species was recently published [23]. Considering the knowledge gaps to be filled on various issues, contracting countries are recommended to give national priority to take all necessary actions (scientific research and monitoring, national impact assessments, etc.) for improving the available knowledge, and conducting baseline and monitoring studies to obtain reliable data on the distribution of marine alien species. Conforming to the existing international commitments, Turkey has recently set its first national objective through the National Biodiversity Action Plan 2018–2028 [24] to determine the pressures and threats to biodiversity and ecosystems, including mitigating the impacts of alien species.

The success of the regulation of the prevention and management of invasive species relies heavily on the compilation of alien species inventories [25], which provide early warning of potentially invasive species, both within a country and for neighboring countries, and constitute an important tool for the implementation of relevant policies [26,27]. It is imperative that such inventories remain current and updated regularly by accurate scientific information, since the alien status of several species is constantly changing based on genetic studies, taxonomic revisions and biogeographic reviews [28]. Owing to the large knowledge gap regarding alien species occurrences through the MPAs in Turkey, we carried out a critical revision of their distribution, origin and modes of introduction, which are policy-relevant attributes of the utmost importance. No marine area in the world is immune to invasions and no action can be taken without such core biodiversity data. This is the first comprehensive treatment of alien taxa inhabiting MPAs in Turkey, which provides a scientific basis for further management actions and the effective allocation of resources.
2. Materials and Methods

Selection of the study sites was made according to their marine terrain coverage. Among the existing coastal and marine protected areas in Turkey, only those with over 40 km² of marine space were considered, including 7 MPAs in the Aegean Sea and 4 in the Levantine Sea (Table 1, Figure 1). Despite its huge area of nearly 11,000 km², the Finike Seamounts special environment protection area (northwest Levant) was omitted from the analyses, since the area was characterized by unique habitats (i.e., mud volcanoes) hosting deep sea species and currently no data on the existence of any alien species were available.

Table 1. General information on studied MPAs of Turkey (NP: national park, SEPA: special environmental protection area).

| MPA Name              | Protection Status | Year Founded | Surface Area (km²) | Marine Coverage (km²) | Coastal Length (km) |
|-----------------------|-------------------|--------------|--------------------|-----------------------|---------------------|
| **Aegean Sea**        |                   |              |                    |                        |                     |
| 1. Saros Bay          | SEPA              | 2010         | 730                | 538                   | 62                  |
| 2. Ayvalik Islands    | NP                | 1995         | 180                | 142                   | 110                 |
| 3. Foça               | SEPA              | 1990         | 71                 | 52                    | 28                  |
| 4. Karaburun-Ildır Bay| SEPA              | 2019         | 947                | 502                   | 127                 |
| 5. Gökova Bay         | SEPA              | 1988         | 1093               | 820                   | 193                 |
| 6. Datça-Bozburun     | SEPA              | 1990         | 1444               | 737                   | 417                 |
| **Peninsula**         |                   |              |                    |                        |                     |
| 7. Köyceğiz-Dalyan    | SEPA              | 1988         | 461                | 41                    | 26                  |
| **Levantine Sea**     |                   |              |                    |                        |                     |
| 8. Fethiye-Göcek Bay  | SEPA              | 1988         | 805                | 339                   | 196                 |
| 9. Patara             | SEPA              | 1990         | 197                | 45                    | 23                  |
| 10. Kaş-Kekova        | SEPA              | 1990         | 258                | 158                   | 81                  |
| 11. Göksu Delta       | SEPA              | 1990         | 229                | 98                    | 35                  |

Figure 1. Geographical location of the studied MPAs (description of numerals as in Table 1).

In order to determine marine faunal hotspots in Turkey, species occurrence records (comprising all extant taxa) associated with accurate locality information and/or exact coordinates were plotted on a map where the Turkish coasts were divided into equivalent squares of 15 × 15 km², which were then entered into an Excel file for further analysis (for full account see [29]). Initial entries were based on governmental marine biodiversity studies conducted at 8 MPAs [20–22,30–33], with a number of alien taxa as follows: Saros Bay (5 sp.), Ayvalik Islands (5 sp.), Foça (1 sp.), Gökova Bay (26 sp.), Datça-Bozburun Peninsula (33 sp.), Köyceğiz-Dalyan (10 sp.), Fethiye-Göcek Bay (93 sp.), Kaş-Kekova (71 sp.); no baseline inventory was available for Karaburun-Ildır, Patara and Göksu Delta.
An updated version of this file (including floral elements) focusing solely on alien taxa was used in a recent comprehensive inventory [12], which formed the core data of the present study. For better presenting the distributional patterns of alien species, we also included previously unpublished observations (not new for the country or the region but overlooked occurrences in corresponding MPAs). The presence vs. absence matrix was used to reveal similarities within the MPAs, using cluster analysis with a group average sorting performed with the PRIMER 5.2 software [34].

The terminology of alien species followed [10], referring to species introduced by human activities, while species undergoing climate-shifted range expansions, without human-assisted spread, were not considered to be alien. Species that formed self-maintaining populations with at least two records in the area (three records for fish) spread over time and space, were classified as established species, while those having been recorded only once (no more than twice for fish) with no evidence of self-sustaining populations were classified as casual species [12]. Established aliens whose populations had proliferated and rapidly expanded their distributional range by overcoming biotic and abiotic barriers in the region were treated as invasive species [35]. Only primary pathways were considered in the classification of the pathways for the alien species introductions to Turkey (corridor via the Suez Canal, ships and aquaculture). Cryptogenic (species with no definite evidence of their native or introduced status) and questionable species were all left out of the inventory. Origins of each species were examined under 12 categories (IP: Indo-Pacific, RS: Red Sea, AT: Atlantic, NA: North Atlantic, WA: Western Atlantic, ST: Subtropical Atlantic/Pacific, IO: Indian Ocean, PG: Persian Gulf, PO: Pacific Ocean, TA: Tropical Atlantic, CT: Circumtropical, Unk: Unknown).

3. Results

The alien species inventory of Turkish MPAs included a total of 289 species belonging to 15 phyla, the majority of which had established successfully breeding populations throughout the study sites (61.6%) and a significant portion displayed an invasive character (29.4%) (Appendix A). Mollusca ranked first in terms of the number of alien species (64 sp.), followed by Chordata (55 sp.), Arthropoda (44 sp.) and Annelida (39 sp.). Percentage distribution of alien species phyla in each MPA is presented in Table 2.

| Phyla          | Saros | Ayvalık | Foça | Karaburun | Gökova | Datça | Köyceğiz | Fethiye | Patara | Kaş | Göksu |
|----------------|-------|---------|------|-----------|--------|-------|----------|---------|--------|-----|-------|
| Ochrophyta     | 11.1  | 20.0    | 3.1  | 8.2       | 2.3    | 2.8   | 2.0      | 3.2     | 2.1    | 2.2 |
| Chlorophyta    | 7.4   | 8.6     | 6.3  | 4.1       | 2.3    | 1.9   | 1.4      | 2.0     | 4.3    | 2.1 |
| Rhodophyta     | 14.8  | 11.4    | 6.3  | 12.3      | 5.8    | 4.7   | 5.3      | 8.6     | 5.6    | 5.1 |
| Tracheophyta   | 2.9   | 3.1     | 1.4  | 1.2       | 0.9    | 1.4   | 0.7      | 1.1     | 0.7    |     |
| Foraminifera   | 18.5  | 17.1    | 19.2 | 1.2       | 12.3   | 4.7   | 4.3      | 2.0     | 0.7    | 0.7 |
| Cnidaria       | 2.3   | 4.7     | 4.3  | 2.0       | 2.0    | 0.7   | 0.7      |         |       |     |
| Ctenophora     | 3.7   | 1.2     | 1.2  | 0.9       | 0.7    |       |          |         |       |     |
| Sipuncula      | 3.1   | 1.4     | 1.2  | 0.9       | 0.7    |       |          |         |       |     |
| Annelida       | 7.4   | 20.0    | 34.4 | 19.2      | 14.0   | 12.3  | 14.5     | 18.0    | 8.6    | 13.2 |
| Arthropoda     | 18.5  | 5.7     | 3.1  | 12.3      | 17.4   | 10.4  | 10.1     | 16.7    | 10.8   | 13.9 |
| Mollusca       | 7.4   | 3.1     | 6.8  | 9.3       | 12.3   | 13.0  | 16.7     | 8.6     | 16.0   | 30.4 |
| Bryozoa        | 2.7   | 2.7     | 3.1  | 6.8       | 9.3    | 12.3  | 13.0     | 16.7    | 8.6    | 16.0 |
| Echinoidea     | 2.3   | 1.9     | 2.9  | 2.0       | 1.1    | 1.4   | 0.7      |         |       |     |
| Tunicata       | 6.3   | 2.8     | 1.4  | 5.3       | 2.2    | 1.4   | 0.7      |         |       |     |
| Chordata       | 11.1  | 14.3    | 31.3 | 12.3      | 39.5   | 32.1  | 50.7     | 25.3    | 37.6   | 27.1 |

There were significant differences in local alien biodiversity, with a clear decreasing pattern in a clockwise direction from Levantine towards the northern Aegean Sea coasts. The cluster analysis showed that MPAs were clearly separated into two groups (northern Aegean Sea areas vs. southern Aegean Sea and Levant Sea combined) at 30.0% similarity, which split further at 46.0% and 56.9% similarities (Figure 2). The numbers of taxa were typically higher in Levantine localities (ranging from 93 to 150 sp.), gradually decreasing to...
69–106 sp. in the southern Aegean Sea and the minimum values were observed northwards, at values between 27 to 73 sp.

![Figure 2. Group average sorting dendrogram of Turkish MPAs based on binary data (presence and absence) of alien taxa.](image2)

It is striking that the number of casual aliens is quite low throughout the entire study area (none in Foça and Köyceğiz-Dalyan, ranging from 1.2% to 6.9% elsewhere), where the great majority of the species are either characterized by successfully breeding established populations or possess an invasive character (Figure 3). The proportion of invasive taxa ranged from 37.0% (Göksu Delta) to 62.3% (Köyceğiz-Dalyan), displaying a large-scale impact regardless of their occurrence localities. The two invasive fish, *Lagocephalus sceleratus* (Gmelin, 1789) and *Siganus rivulatus* (Forsskål, 1775) were present in each of the MPAs, while some other noxious species, such as *Caulerpa cylindracea* (Sonder, 1845) (Chlorophyta), *Asparagopsis armata* (Harvey, 1855) (Rhodophyta), *Leodice antennata* (Savigny, 1820) (Annelida), etc., were absent in just a few sites.

![Figure 3. Establishment success of alien taxa in MPAs.](image3)
According to their origins, there was a very pronounced dominance of Red Sea originated species (201 sp., out of 289 sp.), while the contribution of rest of the categories was set at low levels (Figure 4). This was an expected result, since Turkey was geographically located close to the Red Sea, which explained why corridors (Suez Canal) were the main vector of the species introductions (Figure 5). Ship-transferred species were higher in proportion at the north Aegean MPAs (Saros Bay, Ayvalık Islands, Foça and Karaburun-Ildir, ranging between 28.1–48.1%), significantly reducing to levels of 8.7–18.0% in the rest of the coastal areas. Saros Bay was the only locality that shipping-oriented introductions outnumbered Suez Canal introductions (13 sp. vs. 9 sp., respectively); the latter vector was dominant elsewhere. Aquaculture was the least impacting vector and only four such species were present in MPAs (for example, the Pacific Ocean originated invasive bivalve *Ruditapes philippinarum* (Adams & Reeve, 1850)).

![Figure 4. Origins of alien taxa in MPAs. For ease of interpretation, low contributing origins were grouped: red group, RS: Red Sea; black group, PG: Persian Gulf, IO: Indian Ocean, IP: Indo-Pacific, PO: Pacific Ocean; blue group, AT: Atlantic, TA: Tropical Atlantic, NA: North Atlantic, WA: Western Atlantic; yellow group (others), ST: Subtropical Atlantic/Pacific, CT: Circumtropical; grey group, species with currently unknown origin).](image-url)
4. Discussion

The present inventory revealed that (i) existing MPAs were exposed to different levels of alien biota impact, with a clear decreasing trend from the Levantine coasts to the northernmost regions of the Aegean Sea; (ii) the Suez Canal was the most important vector for species introductions, and was also responsible for the existence of the huge proportion of Red Sea-originated biota; and (iii) the high rates of established aliens and invasive species were obvious in every MPA. These results were in accordance with the general trends observed for the alien biota of the entire coast of Turkey during the last decade [12,35]. The low number of species determined in the northern Aegean protected areas should be carefully monitored, since they may be related to lower research efforts, in comparison to the northern Levantine coasts. The significant taxonomic similarity we found between the southern Aegean and Levantine MPAs was an issue to be taken seriously and may have indicated an ongoing biotic homogenization event, although concrete data for proving this phenomenon are currently lacking. It is a known fact that species invasions and extinctions lead to a decrease in β-diversity, by increasing the genetic, taxonomic or functional similarity of two or more locations over time [36].

When Mediterranean Sea coastal countries were taken into consideration, more alien taxa were recorded along the Turkish coastline than anywhere else. For example, the reported diversity was 452 sp. in Israel [37], 265 sp. in Italy [38], 214 sp. in Greece [39], 136 sp. in Tunisia [40] and 73 sp. in Libya [41]. Receiving 185 new alien species introductions just during the last decade, the immense impact of bioinvasions to the Turkish marine realm reflected the diversity estimates, now reaching to 539 species, 404 of which were established in the region [12]. Thus, it was not surprising that there was a high number of alien species (289 sp.) throughout Turkish MPAs, which we believe was merely an underestimation and could certainly be increased by further research. The relevant data are currently incomparable to any other regional datasets, due to the lack of country-based comprehensive alien species checklists, which focus on their presence in protected areas of the Mediterranean Sea. As previously outlined, Mediterranean MPAs face common challenges including a lack of baseline information and the inefficient reporting of biological invasions [10,18,42], constituting crucial data to draw robust conclusions in the effective management of protected sites [14,43].
No control of alien species is feasible that would not also harm other components of the biota once an invasion process is underway [10,44], thus the objective highlighted in the Convention on Biological Diversity (CBD) at art. 8(h), calling for contracting parties “as far as possible and as appropriate, (to) prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species” can only be partially fulfilled, especially by the eastern Mediterranean countries where the existing invasion process is unique. By ratifying and signing the “International Convention for the Control and Management of Ship’s Ballast Water and Sediments” in 2014, Turkey took an important step that could considerably decrease risks of ship-borne introductions, but the troublesome vector, the Suez Canal, remains wide open, unquestioningly destroying the strength of the proposed eradication measures. The first ever government-supported incentive notification on the bounty hunting of the noxious *Lagocephalus scleratus* along Turkish coasts (for a price of EUR 0.5 per each captured individual) ended with little success, where only 46,000 individuals were eradicated out of the targeted 1 million fish [12]. Although *L. scleratus* fishery was also conducted within the existing MPAs, the captured quantities in each site have not been announced yet. The above-mentioned notification has been updated recently (official gazette no. 31524, dated 27 June 2021), now encouraging the capture of all Tetraodontids inhabiting Turkey (native pufferfish were incomprehensibly included as well) from now until the end of 2023. There are also efforts to cull and create consumption demand to decrease the population trend of *Pterois miles* in the Kaş-Kekova region [45], though currently no official announcement has been made.

MPAs alone are unlikely to be sufficient in preventing biological invasions in the Mediterranean Sea, as evidenced from results of several recent studies [46–49]. On the contrary, the Red Sea invaders, which came from a highly competitive environment, find a suitable feeding and shelter ground in the Mediterranean MPAs, whereby they increase their population sizes enormously and utilize the areas as stepping stones in their distribution expansions [16]. Therefore, alien species’ harvesting should be promoted in MPAs where they benefit from fishing bans and restrictions that apply within the MPAs. Considering the highly connected nature of the Mediterranean Sea, a basin-wide ecosystem-based policy on bioinvasions is required [10]. The effective management of the Suez Canal is of utmost importance, and an issue which all Mediterranean countries have failed to put on their conservation agendas so far, highlighting the urgent need of international cooperation in the management of alien species [12].

In terms of their resilience to invasive species, an unmanaged MPA is no different from an unprotected coastal area, reflecting the current situation we are experiencing in Turkey. The drastic impact of invaders are therefore the expected and inevitable result of numerous “lacks”, including a lack of legal background, lack of marine management plans (available only for Foça, Gökova Bay and Kaş-Kekova with no measures defined against the struggle with aliens), the lack of public/governmental awareness and understanding of the impacts of invasive species, the lack of trained staff devoted to monitor the impacts of alien taxa, the lack of funds to regularly carry out monitoring research (at least for selected invasive species), and the lack of fishery regulations in favor of apex predators, etc.

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**Appendix A**
### Table A1. Alien species inventory of Turkish MPAs. The sorting of the sites follows a counterclockwise direction, from the north Aegean to the northern Levantine Sea. Establishment Success (ES)—C: casual aliens, E: established aliens, Inv: invasive species; Origin (O)—IP: Indo-Pacific, RS: Red Sea, AT: Atlantic, NA: North Atlantic, WA: Western Atlantic, ST: Subtropical Atlantic/Pacific, IO: Indian Ocean, PG: Persian Gulf, PO: Pacific Ocean, TA: Tropical Atlantic, CT: Circumtropical, Unk: Unknown; Pathways (PW)—Aq: aquaculture, S: ships, Su: Suez Canal (corridor).

| Species List                        | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Körçemiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES   | O     | PW |
|------------------------------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|-------|------|-------|-----|
| **Ochrophyta**                     |           |         |      |           |            |       |          |         |        |            |       |      |       |     |
| Botrytella parva (Takamatsu) H.-S.Kim, 1996 | 1         |         |      |           |            |       |          |         |        |            |       | C    | IP    | S   |
| Cladosiphon zosterae (J.Agardh) Kylin, 1940 | 1         | 1       |      |           |            |       |          |         |        |            |       | E    | AT    | S   |
| Cutleria multifida (Turner) Greville, 1830 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      | 1          |       | E    | IP    | Aq  |
| Dictyota cyanoloma Tronholm, De Clerck, Gomez Garreta & Rull Lluch, 2010 | 1         |         |      |           |            |       |          |         |        |            |       | E    | ST    | S   |
| Halothrix lumbricalis (Kützing) Reinke, 1888 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      |            |       | E    | Unk   | S   |
| Pyelia littoralis (Linnaeus) Kjellman, 1872 | 1         | 1       | 1    |           |            |       |          |         |        |            |       | Inv  | RS    | ?Su|
| Sphaerotrichia firma (Gepp) A.D.Zinova, 1940 | 1         |         |      |           |            |       |          |         |        |            |       | E    | Unk   | S   |
| Stypopodium schimperi (Buchinger ex Kützing) Verlaque & Boudouresque, 1991 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      | 1          |       | Inv  | RS    | ?Su|
| **Chlorophyta**                    |           |         |      |           |            |       |          |         |        |            |       |      |       |     |
| Caulerpa cylindracea Sonder, 1845   | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      |            |       | Inv  | RS    | Su  |
| Caulerpa racemosa var. lamourauxii f. requienii (Montagne) Weber-van Bosse, 1898 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      |            |       | E    | RS    | Su  |
| Caulerpa scalpelliformis (R.Brown ex Turner) C. Agardh, 1817 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      |            |       | E    | RS    | Su  |
| Caulerpa taxifolia var. distichophylla (Sonder) Verlaque, Huisman&Procacin, 2013 | 1         |         |      |           |            |       |          |         |        |            |       | Inv  | PO    | S   |
| Codium fragile subsp. fragile (Suringar) Hariot, 1889 | 1         | 1       | 1    | 1         | 1          | 1     | 1        | 1       | 1      |            |       | Inv  | Unk   | S   |
| Codium parvulum (Bory ex Audouin) P.C.Silva, 2003 | 1         |         |      |           |            |       |          |         |        |            |       | E    | RS    | Su  |
| Codium taylorii P.C. Silva, 1960 | 1         |         |      |           |            |       |          |         |        |            |       | E    | IP    | S   |
| Pseudocodium okinawanum E.J.Faye, M.Uchimura & S.Sunimada, 2008 | 1         |         |      |           |            |       |          |         |        |            |       | C    | PO    | S   |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Daşça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|-----------|---------|--------|------------|-------|-----|---|-----|
| **Rhodophyta** |           |         |      |           |            |       |           |         |        |            |       |     |   |     |
| Acanthophora nayadiformis (Delile) Papenfuss, 1968 | 1 | 1 |       |           |            |       |           |         |        |            |       |     |   |     |
| Asparagopsis armata Harvey, 1855 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | Unk | S |     |     |
| Asparagopsis taxiformis (Delile) Trevisan de Saint-Léon, 1845 | 1 |     |     |     |     |     |     |     |     |     | Inv | RS | Su |     |     |
| Bonnemaisonia hamifera Hariot, 1891 | 1 |     |     |     |     |     |     |     |     |     | Inv | IP | ?S |     |     |
| Botryocladia madagascariensis G. Feldmann, 1945 | 1 |     |     |     |     |     |     |     |     |     | Inv | Unk | S |     |     |
| Colaconema codicola (Børgesen) H. Stegenga, J.J. Bolton, & R.J. Anderson, 1997 | 1 |     |     |     |     |     |     |     |     |     | Inv | Unk | S |     |     |
| Ganonema farinosum (Lamouroux) Fan & Wang, 1974 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |     |     |
| Hypnea spinella (C. Agardh) Kützing, 1847 | 1 |     |     |     |     |     |     |     |     |     | E | CT | S |     |     |
| Lophocladia lallemandii (Montagne) Schmitz, 1893 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |     |     |
| Polysiphonia morrowii Harvey, 1857 | 1 |     |     |     |     |     |     |     |     |     | Inv | PO | S |     |     |
| Polysiphonia paniculata Montagne, 1842 | 1 |     |     |     |     |     |     |     |     |     | E | Unk | S |     |     |
| Vertebrata fucoides (Hudson) Kuntze 1891 | 1 | 1 | 1 |     |     |     |     |     |     |     | E | Unk | S |     |     |
| **Tracheophyta** |           |         |      |           |            |       |           |         |        |            |       |     |   |     |
| Halophila stipulacea (Forsskål) Ascherson, 1867 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |     |     |
| **Foraminifera** |           |         |      |           |            |       |           |         |        |            |       |     |   |     |
| Adelosina longirostra (d’Orbigny, 1826) | 1 |     |     |     |     |     |     |     |     |     | C | Unk | S |     |     |
| Amphisorus hemprichii Ehrenberg, 1840 | 1 | 1 | 1 |     |     |     |     |     |     |     | Inv | Unk | ? |     |     |
| Amphistegina lobifera Larsen, 1976 | 1 | 1 | 1 |     |     |     |     |     |     |     | Inv | RS | Su |     |     |
| Articulina alticostata Cushman, 1944 | 1 |     |     |     |     |     |     |     |     |     | E | PO | S |     |     |
| Astacolus insolitus (Schwager, 1866) | 1 |     |     |     |     |     |     |     |     |     | E | PO | S |     |     |
| Bolivina striatula Cushman, 1922 | 1 |     |     |     |     |     |     |     |     |     | E | Unk | ? |     |     |
| Clavulina cf. multicamerata Chapman, 1907 | 1 |     |     |     |     |     |     |     |     |     | E | RS | Su |     |     |
| Species List                                                                 | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|----------------------------------------------------------------------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|-------|-----|---|-----|
| Cornuspiroides striolata (Brady)                                           | 1         | E       | Unk  | S         |             |       |          |         |        |             |       |     |   |     |
| Cyclorbiculina compressa (d'Orbigny, 1839)                                | 1         | C       | Unk  | ?         |             |       |          |         |        |             |       |     |   |     |
| Cymbaloporetta plana (Cushman, 1915)                                       | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Cymbaloporetta squammosa (d'Orbigny, 1839)                                | 1         | 1       | 1    | E         | Unk        | ?     |          |         |        |             |       |     |   |     |
| Entosigmomorphina sp.                                                      | 1         | C       | PO   | S         |             |       |          |         |        |             |       |     |   |     |
| Euthymonacha polita (Chapman, 1904)                                       | 1         | E       | Unk  | S         |             |       |          |         |        |             |       |     |   |     |
| Haddonia sp.                                                               | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Hauerina diversa (Cushman, 1946)                                           | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Heterostegina depressa (d'Orbigny, 1826)                                   | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Irinia diaphana Heron-Allen and Earland, 1914                             | 1         | 1       | 1    | E         | PO         | S     |          |         |        |             |       |     |   |     |
| Milolinella cf. hybrida (Terquem, 1878)                                    | 1         | C       | RS   | Su        |             |       |          |         |        |             |       |     |   |     |
| Nodosiphalmium antillarum (Cushman, 1922)                                  | 1         | E       | RS   | Su        |             |       |          |         |        |             |       |     |   |     |
| Peneroplis arietinus (Batsch, 1791)                                        | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Peneroplis pertusus (Forsskål in Niebuhr, 1775)                           | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Peneroplis planatus (Fichtel & Moll, 1798)                                | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Planogypsina acervalis (Brady, 1884)                                       | 1         | E       | RS   | Su        |             |       |          |         |        |             |       |     |   |     |
| Planogypsina squamiformis (Chapman, 1901)                                  | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Pseudomassilina reticulata (Heron-Allen and Earland, 1915)                | 1         | C       | RS   | Su        |             |       |          |         |        |             |       |     |   |     |
| Pseudonodosaria brevis (d'Orbigny, 1846)                                  | 1         | C       | PO   | S         |             |       |          |         |        |             |       |     |   |     |
| Pulleniatina obliquiloculata (Parker & Jones, 1862)                        | 1         | C       | PO   | S         |             |       |          |         |        |             |       |     |   |     |
| Pyrgo denticulata (Brady, 1917)                                           | 1         | E       | Unk  | ?         |             |       |          |         |        |             |       |     |   |     |
| Quinqueloculina cf. mosharrafi (Said, 1949)                               | 1         | C       | RS   | Su        |             |       |          |         |        |             |       |     |   |     |
| Schlumbergerina alveoliniformis (Brady, 1879)                             | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
| Sorites orbiculus Ehrenberg, 1839                                         | 1         | 1       | 1    | E         | Unk        | ?     |          |         |        |             |       |     |   |     |
| Sorites variabilis Lacroix, 1941                                          | 1         | 1       | 1    | E         | RS         | Su    |          |         |        |             |       |     |   |     |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Daçta | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|-----|-----------|------------|-------|----------|---------|--------|------------|-------|-----|---|-----|
| Spiroloculina angulata Cushman, 1917 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Triloculina cf. fichteliana d’Orbigny, 1839 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Vaginulinopsis sublegumen Parr, 1950 | 1 | 1 | 1 | 1 | 1 | E | PO | S |
| **Hydrozoa** | | | | | | | | | |
| Clytia linearis (Thorneley, 1900) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Filellum serratum (Clarke, 1879) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Macrohydrea philippina Kirchenpauer, 1872 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Sertularia marginata (Kirchenpauer, 1864) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| **Scyphozoa** | | | | | | | | | | | | | | |
| Cassiopea andromeda (Forskål, 1775) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Phyllorhiza punctata von Lendenfeld, 1884 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Rhopilema nomadica Galil, Spanier & Ferguson, 1990 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| **Ctenophora** | | | | | | | | | | | | | | |
| Mnemiopsis leidyi (Agassiz, 1865) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | NA | S |
| **Sipuncula** | | | | | | | | | | | | | | |
| Aspidosiphon (A.) elegans (Chamisso & Eysenhardt, 1821) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| **Annelida** | | | | | | | | | | | | | | |
| Aricidae bulbosa Hartley, 1984 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Branchiomma bairdi (McIntosh, 1885) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | Unk | ?S |
| Branchiomma lactucaum Grube, 1869 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Ceratoneuria mirabilis Kinberg, 1866 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Chaetozoa corona Berkeley & Berkeley, 1941 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Dormilla similis (Crossland, 1924) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Eurythoe complanata (Pallas, 1766) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | ?RS | ?Su |
| Eusyllis kupferi Langerhans, 1879 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | ?AT | S |
| Exogone africana (Hartmann-Schröder, 1974) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|----------|------------|-------|----------|---------|-------|------------|-------|-----|---|-----|
| Exogone breviantennata Hartmann-Schröder, 1959 | 1 | 1 | E | RS | Su |
| Ficopomatus enigmaticus (Fauvel, 1923) | 1 | | Inv | ST | S |
| Glycine bonhourei Gravier, 1904 | 1 | 1 | E | RS | Su |
| Hydroides dirampha Mörch, 1863 | 1 | | Inv | CT | S |
| Hydroides elegans (Haswell, 1883) | 1 1 1 1 1 | 1 | Inv | CT | S |
| Laonice norgensis Sikorski, 2003 | 1 | | | | |
| Leodice antennata (Savigny, 1820) | 1 1 1 1 1 1 1 1 1 | 1 | Inv | RS | Su |
| Leonastes indicus Kinberg, 1866 | 1 | 1 | Inv | RS | Su |
| Leonastes persicus Wesenberg-Lund, 1949 | 1 1 1 1 | 1 | | | |
| Linopherus canariensis Langerhans, 1881 | 1 | 1 1 | E | RS | Su |
| Loimia medusa (Savigny, 1818) | 1 | | E | RS | ?Su |
| Lumbrineris perkinsi Carrera-Parra, 2001 | 1 1 | 1 | E | RS | ?Su |
| Lysidice collaris Grube, 1870 | 1 | 1 | E | RS | Su |
| Metasychis gotoi (Izuka, 1902) | 1 | | E | RS | Su |
| Notomastus aberans Day, 1957 | 1 1 1 1 1 1 | 1 | 1 | 1 | E | RS | Su |
| Notomastus mossambicus (Thomassin, 1970) | 1 | Inv | RS | Su |
| Palola valida (Gravier, 1900) | 1 | 1 1 1 1 | E | RS | Su |
| Paphilodoce longifrons Ben-Eliahu, 1972 | 1 | 1 | E | RS | Su |
| Pista unibranchia Day, 1963 | 1 1 1 1 1 | 1 | | | |
| Polycirrus tvisti Potts, 1928 | 1 | 1 | E | RS | Su |
| Polydora cornuta Bosc, 1802 | 1 | | Inv | WA | S |
| Prionospio (Minuspio) pulchra Imajima 1990 | 1 | 1 | Inv | IP | S |
| Prionospio (Prionospio) depauperata Imajima, 1990 | 1 | 1 | Inv | PO | S |
| Prionospio (Prionospio) paucipinnulata Blake & Kudenov, 1978 | 1 | | E | PO | S |
| Prionospio (Prionospio) sacciufra Mackie & Hartley, 1990 | 1 1 | 1 | E | RS | Su |
| Pseudonereis anomala Gravier, 1900 | 1 1 1 1 | 1 | 1 | 1 | Inv | RS | Su |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Körceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|-----------|-------|-----|---|-----|
| *Pseudopolydora paucibranchiata* Okuda, 1937 | 1 | Inv | IP | S |
| *Spirorbis marioni* Caullery & Mesnil, 1897 | 1 | E | PO | S |
| *Streblospio gynobranchiata* Rice & Levin, 1998 | 1 | 1 | Inv | WA | S |
| *Syllis ergeni* Çinar, 2005 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| **Cladocera** | | | | | | | | | | | | | | | |
| *Pleopis schmackeri* (Poppe, 1889) | 1 | 1 | 1 | 1 | E | IP | Su/S |
| **Copepoda** | | | | | | | | | | | | | | | |
| *Oithona davisae* Ferrari and Orsi, 1984 | 1 | Inv | PO | S |
| *Paracartia grani* Sars G.O., 1904 | 1 | E | AT | S |
| **Stomatopoda** | | | | | | | | | | | | | | | |
| *Cloroda albiturita* Ahyong & Naiyanetr, 2000 | 1 | E | RS | Su |
| *Eryogosquilla massaevensis* (Kossmann, 1880) | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| **Amphipoda** | | | | | | | | | | | | | | | |
| *Amphithoe bizeli* Özaydınlı and Coleman, 2012 | 1 | E | IP | S |
| *Latiganmaropsis togoensis* (Schellenberg, 1925) | 1 | E | Unk | ?S |
| **Isopoda** | | | | | | | | | | | | | | | |
| *Paracerceis sculpta* Holmes, 1904 | 1 | C | IP | S |
| *Paradella dianae* Menzies, 1962 | 1 | E | Unk | ?S |
| *Sphaeroma walkeri* (Stebbing, 1905) | 1 | 1 | E | RS | Su |
| **Tanaidacea** | | | | | | | | | | | | | | | |
| *Paradoxocephalus intermedius* (Hansen, 1895) | 1 | E | AT | ?S |
| **Cumacea** | | | | | | | | | | | | | | | |
| *Eocuma sarsii* (Kossmann, 1880) | 1 | E | RS | Su |
| **Decapoda** | | | | | | | | | | | | | | | |
| *Alpheus rapacida* de Man, 1908 | 1 | 1 | E | RS | Su |
| *Atergatis roseus* (Rüppell, 1830) | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| *Callinectes sapidus* Rathbun, 1896 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | WA | S |
| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Daşça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|------|-----|---|----|
| Carupa tenuipes Dana, 1851 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Charybdis bellerii (Milne Edwards, 1867) | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Charybdis longicollis Leene, 1938 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Coleusia signata (Paulson, 1875) | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Eucrate crenata de Haan, 1835 | 1 | E | RS | Su |
| Gonionuradens giardi (Nobili, 1905) | 1 | C | IP | S |
| Ixa monodi Holthuis & Gottlieb, 1956 | 1 | 1 | E | RS | Su |
| Leptochela pugnax de Man, 1916 | 1 | 1 | 1 | 1 | E | RS | Su |
| Macrophthalmus indicus Davie, 2012 | 1 | E | RS | Su |
| Matuta victor (Fabricius, 1781) | 1 | E | RS | Su |
| Metapenaeopsis aegyptia Galil & Golani, 1990 | 1 | 1 | E | RS | Su |
| Metapenaeopsis mogiensis consorbrina (Nobili, 1904) | 1 | E | RS | Su |
| Metapenaeus affinis (H. Milne Edwards, 1837) | 1 | E | RS | Su |
| Metapenaeus monoceros (Fabricius, 1798) | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Metapenaeus stebbingi (Nobili, 1904) | 1 | E | RS | Su |
| Micippa thalia (Herbst, 1803) | 1 | E | RS | Su |
| Myra subgranulata Kossmann, 1877 | 1 | 1 | 1 | 1 | E | RS | Su |
| Palamonella rotumana (Borradaile, 1898) | 1 | E | RS | Su |
| Penaeus aztecus Ives, 1891 | 1 | 1 | E | WA | S |
| Penaeus lathor (Burkenroad, 1959) | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Penaeus pulchriceps Stebbing, 1914 (=P. japonicus) | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Penaeus semisulcatus de Haan, 1844 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Percnon gibbesi (H. Milne Edwards, 1853) | 1 | 1 | 1 | 1 | Inv | TA | S |
| Pilumnus minutus De Haan,1835 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Portunus segnis (Forskal, 1775) | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Processa macrodactyla Holthuis, 1952 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Thalamita poissonii (Audouin, 1826) | 1 | 1 | 1 | 1 | Inv | RS | Su |
### Table A1. Cont.

| Species List                                                   | Saros Bay | Ayvalık | Foça   | Karaburun | Gökova Bay | Datça   | Körçeğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|-----------------------------------------------------------------|-----------|---------|--------|-----------|------------|---------|-----------|---------|--------|------------|-------|-----|---|-----|
| *Trachysalambria palaestinensis* Steinitz, 1932                 | 1         | 1       | 1      | 1         | E          | RS      | Su        |         |        |            |       |     |   |     |
| *Urocaridella pulchella* Yokes & Galil, 2006                   | 1         | 1       | E      | RS        | Su         |         |           |         |        |            |       |     |   |     |
| **Gastropoda**                                                 |           |         |        |           |            |         |           |         |        |            |       |     |   |     |
| *Diodora ruppelli* (Sowerby I, G.B., 1835)                     | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Pseudominolia nedyma* (Melville, 1897)                        | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Smaragdia souverbiana* (Montrouzier in Souverbie & Montrouzier, 1863) | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Cerithium perparvulum* (Watson, R.B., 1886)                   | 1         | E       | PO     | S         |            |         |           |         |        |            |       |     |   |     |
| *Cerithium scabridum* Philippi, 1848                           | 1         | 1       | 1      | 1         | 1          | Inv     | RS        | Su      |        |            |       |     |   |     |
| *Rhinoclavis kochi* (Philippi, 1848)                           | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Varicopeza pauxilla* (A. Adams, 1855)                         | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Finella pupoides* Adams, A., 1860                             | 1         | 1       | 1      | 1         | 1          | Inv     | RS        | Su      |        |            |       |     |   |     |
| *Metaxia bacillum* (Issel, 1869)                               | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Viriola buhani* Jousseame, 1884                               | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Cerithiopsis pulvis* Issel, 1869                              | 1         | 1       | 1      | 1         | E          | RS      | Su        |         |        |            |       |     |   |     |
| *Cerithiopsis tentrenois* (Melvill, 1896)                      | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Sticteulima lentiginosa* (Adams, A., 1861)                    | 1         | 1       | 1      | E          | RS         | Su      |           |         |        |            |       |     |   |     |
| *Rissoina ambiguа* (Gould, 1849)                               | 1         | C       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Rissoina bertholleti* Issel, 1869                             | 1         | 1       | E      | RS        | Su         |         |           |         |        |            |       |     |   |     |
| *Conomurex persicus* (Swainson, 1821)                          | 1         | 1       | 1      | 1         | 1          | 1       | Inv       | RS      | PG     | S          |       |     |   |     |
| *Parparadusta gracilis notata* (Gill, 1858)                    | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Ergalatax junionae* Houart, 2008                              | 1         | 1       | 1      | 1         | 1          | 1       | E         | RS      | Su      |            |       |     |   |     |
| *Zafra saviqua* (Moazzo, 1939)                                 | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Zafra selaaphora* (Melvill & Standen, 1901)                   | 1         | 1       | E      | RS        | Su         |         |           |         |        |            |       |     |   |     |
| *Pyrgulina fischeri* Hornung & Mermod, 1925                    | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Pyrgulina pupaeformis* (Souverbie, 1865)                      | 1         | 1       | 1      | E          | RS         | Su      |           |         |        |            |       |     |   |     |
| *Pyrgulina nana* Hornung & Mermod, 1924                        | 1         | C       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Pyrgulina pirinthella* Melvill, 1910                          | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
| *Cingulina isseli* (Tryon, 1886)                               | 1         | E       | RS     | Su        |            |         |           |         |        |            |       |     |   |     |
Table A1. Cont.

| Species List                                      | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Gösü | ES | O | PW |
|--------------------------------------------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|------|-----|--|-----|
| Monotympa fulva (Adams, A., 1853)                | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Monotympa lauta (Adams, A., 1853)                | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Odostomia lorioli (Hornung & Mermod, 1924)      | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Oscilla galilae Bogi, Karhan & Yokeş, 2012      | 1         | C       | IP   | ?S        |            |       |          |         |        |            |      |     |   |     |
| Syrrola fasciata Jickeli, 1882                   |           |         |      |           | 1          | 1     |          |         |        |            |      |     |   |     |
| Syrrola lendix (Adams, A., 1853)                 | 1         | E       | IO   | Su        |            |       |          |         |        |            |      |     |   |     |
| Turbonilla edgarri (Melvill, 1896)               | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Leucotina natalensis Smith, E.A., 1910          | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Bulla arabica Malaquias & Reid, 2008             | 1         | 1       | E    | RS        | Su         |       |          |         |        |            |      |     |   |     |
| Pyrunculus fourrieri (Audouin, 1826)             |           |         |      |           | 1          | 1     |          |         |        |            |      |     |   |     |
| Retusa desgenetti (Audouin, 1826)                |           |         |      |           |            |       |          |         |        |            |      |     |   |     |
| Lamprohannoia cyanomarginata (Heller & Thompson, T.E., 1983) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su | | | | |
| Biure fulvipunctata (Baba, 1938)                 |           |         |      |           | 1          |       |          |         |        |            |      |     |   |     |
| Acteocina mucronata (Philippi, 1849)             | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Mnestia girardi (Audouin, 1826)                  | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Oxynoe viridis (Pease, 1861)                    | 1         | 1       | 1    | E         | IP         | S     |          |         |        |            |      |     |   |     |
| Elysia tomentosa Jensen, 1997                    | 1         | E       |      | IP        | S          |       |          |         |        |            |      |     |   |     |
| Barsatella leachii Blainville, 1817              | 1         | E       | RS   | ?Su       |            |       |          |         |        |            |      |     |   |     |
| Siphoneta geographicca (Adams, A. & Reeve, 1850) |           |         |      |           | 1          |       |          |         |        |            |      |     |   |     |
| Gonobranchus annulatus (Eliot, 1904)             | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
| Hypselodoris infucata Rueppel & Leuckart, 1828  |           |         |      |           | 1          | 1     |          |         |        |            |      |     |   |     |
| Placopumphaeus ocellatus Ruppell & Leuckart, 1828|           |         |      |           |            |       |          |         |        |            |      |     |   |     |
| Bacillia moebii Bergh, 1888                      |           |         |      |           | 1          |       |          |         |        |            |      |     |   |     |
| Coryphellina rubrolineata O’Donoghue, 1929      | 1         | 1       | 1    | 1         | 1          | E     | RS       | Su      |        |            |      |     |   |     |
| Siphonaria crenata Blainville 1827               | 1         | E       | RS   | Su        |            |       |          |         |        |            |      |     |   |     |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|-------|-----|---|----|
| **Bivalvia** |           |         |      |           |            |       |          |         |        |            |       |     |   |    |
| Brachidontes pharaonis (Fischer, P., 1870) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su | | | | |
| Clementia papryacea (Gmelin, 1791) | | | | | | | | | | | | | | | |
| Dendostrea folium (Linnaeus, 1758) | 1 | 1 | | | | | | | | E | IP | ?S | | | |
| Ervilia scaliola Issel, 1869 | | | | | | | | | | C | RS | Su | | | |
| Fulvia fragilis (Forsskål in Niebuhr, 1775) | | | | | | | | | | | | | | |
| Isognomon legumen (Gmelin, 1791) | 1 | | | | | | | | | | | | | |
| Magallana gigas (Thunberg, 1793) | 1 | | | | | | | | | | | | | |
| Mallev regula (Forsskål in Niebuhr, 1775) | 1 | | | | | | | | | | | | | |
| Pinctada indricata radiata (Leach, 1814) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su | | | | |
| Raditapes philippinarum (Adams & Reeve, 1850) | 1 | | | | | | | | | | | | | | Inv | PO | Aq |
| Saccostrea cucullata (Born, 1778) | | | | | | | | | | | | | | E | IP | S |
| Septifer cumingii Récluz, 1849 | 1 | 1 | | | | | | | | E | RS | S | | | |
| Terodothrya dominicensis (Bartsch, 1921) | | | | | | | | | | 1 | E | WA | S | | | |
| **Cephalopoda** |           |         |      |           |            |       |          |         |        |            |       |     |   |    |
| Sepioteuthis lessoniana d’Orbignyi, 1826 | 1 | 1 | | | | | | | | | | | | | |
| **Bryozoa** |           |         |      |           |            |       |          |         |        |            |       |     |   |    |
| Amathia verticillata (delle Chiaje, 1822) | 1 | | | | | | | | | | | | | | Inv | AT | S |
| Celleporaria brunnea (Hincks, 1884) | 1 | | | | | | | | | | | | | | | | |
| **Echinodermata** |           |         |      |           |            |       |          |         |        |            |       |     |   |    |
| Ophiuca sitviæ-giæ (Müller & Troschel, 1842) | 1 | | | | | | | | | | | | | | E | RS | Su |
| Diadema setosum (Leske, 1778) | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | Inv | RS | Su |
| Synaptula reciprocans (Forrskål, 1775) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su | | | | |
| **Tunicata** |           |         |      |           |            |       |          |         |        |            |       |     |   |    |
| Ascidia aspersa (Müller, 1776) | 1 | | | | | | | | | | | | | | E | NA | S |
| Clavelina oblonga Herdman, 1880 | 1 | | | | | | | | | | | | | | E | WA | S |
| Diplomona listerianaæ (Milne Edwards, 1841) | 1 | | | | | | | | | | | | | | E | ?AT | S |
| Microcosmus exasperatus Heller, 1878 | 1 | 1 | | | | | | | | | | | | | | E | RS | Su |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|-------|----|---|-----|
| Phallusia nigra Savignyi, 1816 | 1 | 1 | 1 | 1 | 1 | Inv | WA | ?S |
| Pyura (=Herdmanni) monus (Savigny, 1816) | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Rhodosoma turricum (Savigny, 1816) | 1 | | | | | E | CT | S |
| Styela plicata (Lesueur, 1823) | 1 | 1 | 1 | 1 | Inv | ?AT | S |
| Symplegma brakenhielmi (Michaelsen, 1904) | 1 | | | | | Inv | RS | Su |

**Actinopterygii**

| Acanthopagrus bifasciatus (Forskål, 1775) | 1 | | | | | C | RS | Su |
| Alepes djedaba (Forskål, 1775) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Apogonichthyoides pharaonis (Bellotti, 1874) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Asterinomorus forskalli (Rüppell, 1838) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Bregmaceros nectbanus Whitley, 1941 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Callionymus filamentosus Valenciennes, 1837 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Champsodon nudivittis (Ogilby, 1895) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Chelodipterus nucematriatus (Rüppell, 1838) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Cynoglossus sinusarabici (Chabanaud, 1913) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Diplogrammus randalli Fricke, 1983 | 1 | | | | | C | RS | Su |
| Dussumieria elopsoides Bleeker, 1849 | 1 | | | | | Inv | RS | Su |
| Equulites kloozingeri (Steindacher, 1898) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Equulites popei (Whitley, 1932) | 1 | | | | | Inv | RS | Su |
| Etrumeus golanii DiBatistta, Randall and Bowen, 2012 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Fistularia commersonii (Rüppell, 1835) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Fistularia petimba Lacepède, 1803 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Hazius ingressus Engin, Larson, Irmak, 2018 | 1 | | | | | C | RS | Su |
| Hemiramphus far (Forskål, 1775) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Herklotsichthys punctatus (Rüppell, 1837) | 1 | | | | | E | RS | Su |
| Jaydia queketti (Gilchrist, 1903) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Jaydia smithi Kotthaus, 1970 | 1 | | | | | E | RS | Su |
Table A1. Cont.

| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Daçta | Köyceğiz | Fethiye | Patara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|--------|------------|-------|-----|----|-----|
| Lagocephalus guentheri (Richardson, 1844) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Lagocephalus scleratus (Gmelin, 1789) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Lagocephalus suezensis Clark & Gohar, 1953 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Liza carinata (Valenciennes, 1836) | 1 | E | RS | Su |
| Nemipterus randalli Russell, 1986 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Ostorhinchus fasciatus (White, 1790) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Oxyurichthys petersi (Kunzinger, 1871) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Paranthias furcifer (Valenciennes, 1828) | 1 | C | AT | ? |
| Parexocoetus mento (Valenciennes, 1846) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Parupeneus forskalli (Fourmanoir & Guéhéneuc, 1976) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Pelates quadrilineatus (Bloch, 1790) | 1 | E | RS | Su |
| Pempheris rhomboidea Kossmann & Räuber, 1877 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Petroscirtes ancylostomus Rüppell, 1838 | 1 | E | RS | Su |
| Planiliza haematocheilus (Temminck & Schlegel, 1845) | 1 | 1 | E | PO | Aq |
| Pomadasys stridens (Forsskål, 1775) | 1 | E | RS | Su |
| Prionanthias sagittarius Starnes, 1988 | 1 | C | RS | Su |
| Pterygoglossus trispilus Randall, 2013 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Pterois miles (Bennett, 1828) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Sargocentron rubrum (Forsskål, 1775) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Saurida lessepsianus (Russell, Golani and Tikochinski, 2015) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Scarus ghoubat Forsskål, 1775 | 1 | C | RS | Su |
| Scomberomorus commerson Lacepède, 1800 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| Siganus luridus (Rüppell, 1829) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Siganus rivulatus Forsskal, 1775 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| Sillago suezensis Golani, Fricke and Tikochinski, 2014 | 1 | E | RS | Su |
| Species List | Saros Bay | Ayvalık | Foça | Karaburun | Gökova Bay | Datça | Köyceğiz | Fethiye | Pàtara | Kaş-Kekova | Göksu | ES | O | PW |
|--------------|-----------|---------|------|-----------|------------|-------|----------|---------|-------|-----------|-------|-----|---|-----|
| *Sphyraena chrysotaenia* Klunzinger, 1884 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| *Sphyraena flavicauda* Rüppell, 1838 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| *Stephanolepis diaspros* Fraser-Brunner, 1940 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
| *Synchiropus sechellensis* Regan, 1908 | 1 | E | RS | Su |
| *Torquigener flavimaculosus* Hardy & Randall, 1983 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| *Tylerius spinosissimus* (Regan, 1908) | 1 | C | RS | Su |
| *Upeneus moluccensis* (Bleeker, 1855) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| *Upeneus pori* Ben-Tuvia & Golani, 1989 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inv | RS | Su |
| *Vanderhorstia mertensi* Klausewitz, 1974 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | E | RS | Su |
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