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The demersal faunal assemblage of the north-western Ionian Sea (central Mediterranean): current knowledge and perspectives

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Data reported in this article were collected in the context of several trawl surveys carried out in the north-western Ionian Sea in the last 25 years. An overview of the available information on the demersal resources in the area and an historical analysis at population and community levels is reported with the aim of identifying eventual significant changes over time. During the study period 1985–2006, a total of 365 species (41 cephalopods, 76 crustaceans, 33 chondroichthyes and 215 osteichthyes) were collected in the investigated area from 10 to 4000 m, updating the faunal lists of this area with 18 new records and one alien species for the Mediterranean. An increase in the species richness was observed throughout the study period. The historical analysis showed a low abundance of chondroichthyes and significant increases over time for cephalopods, crustaceans and osteichthyes during the study period 1985-2006. An increasing trend in density over time was also detected for some target species (Illex coindetii and Nephrops norvegicus) and an inverse significant correlation with the fishing effort was also shown. Nevertheless, a significant decrease in the median lengths over time was depicted for N. norvegicus and Parapenaeus longirostris. A decreasing trend in the total mortality (Z) and exploitation rates (E) with time was only observed for Mullus barbatus. An overexploitation condition was shown by P. longirostris and Merluccius merluccius during time while a moderate overexploitation was detected for M. barbatus and Aristaeomorpha foliacea over time. A state of almost equilibrium and an optimal exploitation were observed for N. norvegicus and Aristeus antennatus, respectively. The authors give rise to discussion on the fishing effort-exploitation rate-recruitment process to explain the trends shown in the north-western Ionian Sea.

Keywords: demersal resources; biodiversity; distribution; abundance; population dynamics; Ionian Sea

1. Introduction

The start of a systematic investigation into knowledge on the demersal resources in the north-western Ionian Sea dates back to the late 1980s with the start of the National Program on the Assessment of Demersal Resources in the Italian Seas (GRUND; Italian National Law 41/82; UE Reg. 1543/2000, 1639/2001, 1581/2004) [1], and further information was later provided by the International Research project on the Mediterranean Bottom Trawl Surveys (MEDITS) funded by the European Union and also included in the UE Reg. 1543/2000, 1639/2001, 1581/2004 from 2001 [2].

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In the first years, the distribution and abundance of the most common resources in the north-western Ionian Sea were explored [3,4], and research on the spatio-temporal distribution and population dynamics for many commercial species was carried out focusing on the most valuable stocks [5–10].

Starting from the fully or over-exploited status for many demersal stocks, several studies on the life cycles and exploitation condition of marketable species were also carried out [11–14] according to the priority of a stock-oriented fishery management. Moreover, throughout selectivity experiments on the employed trawl net in the Ionian areas, further information on the commercial and discarded fractions of the exploited resources was also collected [15–19]. All the results provided useful suggestions to the Italian government for defining the best management policy and taking up adequate regulation measures [3,4]. In particular, starting from 1987, a fishery regulation measure was first planned as a 'closed season' in different Italian areas according to the local conditions (D.L. July 1987) and then a weekend closure was also added (D.L. 31 May 1999) to reduce the fishing effort. Moreover, the adoption of a legal mesh size in the trawl net and definition of the minimum legal size for the most important commercial species (CE N° 1626/94, 27/6/1994) were also introduced. Most recently, the institution of 'no-take zones' (Zone di Tutela Biologica, ZTB) was defined along the Italian coast but this is not still performed in the north-western Ionian area.

Taking into account the habitat heterogeneity and high biodiversity of marine communities in the Mediterranean Sea [20], this basin has been considered a priority area for nature conservation (Barcelona Convention, 1976). Thus, increasing interest in biodiversity led to the development of innovative and wider approaches to assess marine ecosystems both for conservation and fisheries management objectives, providing further studies focusing on biodiversity of the demersal communities for the Ionian area [21–23]. In this way, the multi-species nature of Mediterranean fisheries, together with the systematic collection of a large amount of data, gave an opportunity to improve knowledge on the composition of demersal assemblages and update the faunal lists previously reported for the north-western Ionian Sea within the bathymetric range (10–800 m) where biological resources are generally exploited in this area [24–27].

Moreover, new information on the life-history traits of many bathyal species was also provided, extending studies on low or non-marketable species [28–33].

In recent years, the increasing exploitation of deep-sea resources (down to 800 m) in the Mediterranean Sea has promoted some investigations into the bathyal environment of the Ionian Sea, improving knowledge on the deepest almost 'virgin' ecosystems where fishing activity does not occur [34–38].

To date, the large amount of data collected in the context of all the performed research, represents a good opportunity to better investigate on a wide temporal scale possible changes that have occurred in the demersal resources of the north-western Ionian Sea. In particular, the availability of historical data, collected in the Ionian basin using the same methodology and sampling plans throughout the investigated period of 1985–2008 as part of the national GRUND project, represents a powerful opportunity to detect potential significant changes over time in the availability of demersal resources, also related to environmental conditions and in particular to global warming. Moreover, observations on species diversity over two decades by means of spring (MEDITS) and autumn (GRUND) surveys could be an efficient method for monitoring the eventual change in biodiversity due to fishing or the incoming of new species in the Mediterranean.

Although the MEDITS time series is too short to identify eventual temporal trends in the abundance of demersal resources, it has given further insight into the spatio-temporal distribution of these species in the north-western Ionian Sea, as already reported on a large scale in the Mediterranean basin ([39] and references therein).

The new demand from both the scientific and political communities is focused on the development of an ecosystem approach to fisheries management through the implementation of indicators related to marine environmental pressures, both natural and anthropogenic. Thus, an overview of the available information on demersal resources of the north-western Ionian Sea for the last 25 years, as well as an historical analysis on the demersal faunal assemblage, are reported in this article with the aim of identifying eventual significant changes over time.

The analysis, over a long period, of abundance, size and mortality of the most abundant commercial species is examined with respect to changes in fishing effort in the study area as a first step towards a wider approach on the study of environmental phenomena and their influence on marine resources.

2. Materials and methods

2.1. Study area

The Ionian Sea is the deepest sea in the Mediterranean basin and is characterised by a complex geomorphology and oceanography. The north-western Ionian Sea corresponds to Geographical Sub Area (GSA) n. 19. The studied area is between Cape Otranto (40° 06'N 18° 31'E) and Cape Passero (36° 41'N 15° 10'E). This area has a coastline \sim 1000 km long and covers, between 10 and 800 m in depth, a surface of \sim 16,500 km² (Figure 1).

The north-western Ionian is divided by the Taranto Valley into an eastern sector represented by a broad continental shelf and a south-western sector where the shelf is generally very limited and many submarine canyons are located along the coasts [40].

The Ionian Sea receives Modified Atlantic Water (MAW) from the western Mediterranean through the Sicilian Channel, with salinity increasing from 37.5 psu in the Sicilian Channel to 38.6 psu near the Cretan Passage [41]. The Levantine Intermediate Water (LIW) is characterised by variable salinity and temperature values between the southern and northern Ionian. Hydrographic observations and current measurements conducted in the 1990s revealed strong modifications in the dynamics of the entire water column termed as 'transient' [42]. Highly saline (>39.0 psu), warmer (around 15 °C) and well-oxygenated intermediate waters were found to be flowing out of the Aegean through the western Cretan Arc Straits. They interrupted the traditional path of the LIW, spread northwards into the Ionian Sea and eastwards into the Levantine basin and also affected the water properties of the bottom layer. This interruption caused a greatest input of MAW into the Ionian Sea with a change in circulation of water masses from cyclonic to anticyclonic, now re-established [43].

2.1.1. Fisheries data

The mean annual catch from the three main fisheries of the north-west Ionian Sea (Crotone, Taranto and Gallipoli) is $\sim 3\%$ of the whole Italian production [3]. In the north-western Ionian Sea, fishing occurs from coastal waters to 700–750 m [3,4]. The most important demersal resources in the north-western Ionian Sea are represented by the red mullet (*Mullus barbatus*) on the continental shelf, hake (*Merluccius merluccius*), rose shrimp (*Parapenaeus longirostris*) and Norway lobster (*Nephrops norvegicus*) over a wide bathymetric range and the deep-water red shrimps (*Aristeus antennatus* and *Aristaeomorpha foliacea*) on the slope [4].

Gallipoli, Taranto, Crotone and Reggio Calabria represent the most important fisheries in the north-west Ionian Sea, although with a different distribution of the fishing effort. Official national statistics (IREPA, 2008) report the highest percentage of big gross tonnage vessels (\geq 10 GRT) in the Crotone (44%) and Reggio Calabria (21%) fisheries, whereas a lower percentage of trawlers operates in the Gallipoli (24%) and Taranto (11%) districts (Table 1) where fisheries are mainly made up of small vessels. Considering the low reliability of official statistics of fishing effort data



Figure 1. Map of the area investigated in the north-western Ionian Sea from 1985 to 2008.

engine power (TKW) and vessels (IV) (IKETT, 2000).								
	GRT	PKW	Ν					
Crotone	1676	13384	86					
Gallipoli	923	10863	80					
Reggio Calabria	789	7184	38					
Taranto	439	7225	44					
Total area	3827	38656	248					

Table 1. Recorded trawlers in the principal harbours of the north-western Ionian Sea with an indication of the total number for gross tonnage (GRT), engine power (PKW) and vessels (N) (IREPA, 2008).

for the whole investigated area, the potential fishing effort in the north-western Ionian Sea was computed taking account of all available working days per year, starting from 1985. In particular, all holidays and closed season days were subtracted from the total. Moreover, assuming that a wind speed ≥ 15 knots did not allow fishing, all these days were also deleted from the total. The residual days were considered as potential working days and thus as a measure of the potential



Figure 2. Potential fishing effort per year computed for the north-western Ionian Sea from 1985 to 2006.

fishing effort. Thus, a significant decrease in the fishing effort in the north-western Ionian Sea was detected from 1985 to 2006 (Figure 2).

It should be noted that since 1988 a 45-day 'closed season' for trawling has been carried out in late summer–early autumn, as a management measure adopted by the Italian Government.

2.2. Biological data collection

The information reported in this article comes mostly from the scientific literature and experimental bottom trawl surveys carried out by the authors in the north-western Ionian Sea from 1985 to 2008 within the framework of several national and international projects funded by the Italian Government and EU. In particular, the national project 'Assessment of Italian Demersal Resources' (GRUND) [1], from 1985 to 2008, and the international 'MEDiterranean International Trawl Survey' (MEDITS) [2] from 1994 until 2008, were performed seasonally during autumn and spring–summer, respectively. The area examined was from Cape Otranto (LE) to Cape Passero (SR), covering a depth range of 10 to 800 m. Moreover, other experimental trawl surveys were carried out in the Ionian area in different depth ranges and seasons throughout the investigated period, as reported in Table 2.

A professional motor-powered vessel was hired during all cruises, with the exception of the DESEAS project which was carried out using the research vessel *García del Cid* [35]. Commercial and experimental trawl nets were differently adopted in the cruises as reported in Table 2.

The sampling design adopted in each project was random-stratified. The horizontal and vertical openings of all the types of nets were measured using the SCANMAR acoustic system [44].

All specimens sampled by trawl during the study period 1985–2008 were identified at the species level according to the nomenclature reported in CEPHBASE (2006) for cephalopods, in d'Udekem d'Acoz [45] for crustaceans and in FISHBASE [46] for bony fish and Serena [47] for elasmobranchs.

For each individual, the following data were taken: length, according to species, to the nearest mm, body weight to the nearest 0.1 g, sex and maturity stage of gonads.

Moreover, for growth analysis both *sagittae* were collected during the trawl surveys carried out from 1985 to 2007. These otoliths, extracted from fishes, were placed in a black dish with glycerine (30%) and alcohol (70%); an opaque and translucent (hyaline) zone deposition pattern was considered as an annual event. The translucent zones were considered as *annuli* and counted under a stereoscope using reflected light [30].

2.3. Data processing

Data collected in all surveys were differently processed according to the various goals of this article. In particular, in order to produce a full description of the north-western Ionian community and

Project	Date	Study area	Depth (m)	Sampling gear	Mesh size (mm)
GRUND	1985–2008	North-western Ionian Sea, Cape Otranto–Cape Passero (GSA 19)	10-800	Commercial trawl net	40
MEDITS	1994–2008	North-western Ionian Sea, Cape Otranto-Cape Passero (GSA 19)	10-800	Experimental trawl net	20
RED SHRIMPS	1993–1996	North-western Ionian Sea, Cape Otranto–Cape Passero (GSA 19)	200-800	Commercial trawl net	40
DEEP FISHERIES	1995–1999	North-western Ionian Sea, Calabrian area	200-800	Commercial trawl net	40
INTERREG Italy-Greece	1999–2001	North-western Ionian Sea, Apulian area	300-1200	Commercial trawl net	40
DESEAS	2001-2002	North-western Ionian Sea, Calabrian area	600–4000	Experimental otter trawl Maireta net	20
APLABES	2002-2006	North-western Ionian Sea, Apulian area	300-800	Commercial trawl net	40
RIME	2003-2004	North-western Ionian Sea, Apulian area	300-1200	Commercial trawl net	40
GAVIS	2006–2007	North-western Ionian Sea, Apulian area	400–1200	Experimental otter trawl Maireta net	20

Table 2. List of the surveys repoted in the article, with an indication of the investigated period, the study area, the depth range and the sampling gear employed with relative stretched mesh size in the codend.

to update the list of species collected in the study area during the overall study period (1985–2008), data from all the surveys carried out by trawling were considered and the relative depth range of occurrence was also reported.

The frequency of occurrence (Foc) of each species was computed as the percentage of the positive hauls on the total hauls carried out in the depth range 10–800 m from 1985 to 2008. Taking into account the stratified sampling design adopted throughout the study period, only data collected systematically during the GRUND and MEDITS trawl surveys were considered. Thus, the Foc was only reported for the species collected in the context of these two projects.

Data collected from all the surveys carried out in the north-western Ionian Sea allowed the recording of new species for the area as well as the increasing occurrence of tropical and subtropical species such as *Sphoeroides pachygaster* [48]. In order to detect any temporal trend in the catch of this species, a cumulative sums technique was computed on its abundance $(N \cdot km^{-2})$. The cumulative sums method was useful to highlight potential changes in a time series and an assessment of the intensity and duration of these changes [49]. Each value of the series was subtracted from a reference value (the mean of the time series), resulting in a new time series of residuals, which were used to calculate the cumulative sum (each value was summed to the previous) [50]. Finally, changes in density sums with time from 1991 (first record) to 2008 (last finding) were evaluated using the regression analysis.

In order to evaluate the biodiversity of the demersal communities in the area, only the data collected systematically during spring (MEDITS) and autumn (GRUND) surveys from 1994 to 2007 and standardised to the swept area (N·km⁻²) were considered. Univariate ecological indices (Margaleff richness *d*, Shannon–Wiener diversity index *H'*, Pielou's evenness *J*) [51] were computed using data collected for only demersal species in the investigated depth range 10–800 m and their changes over time (from 1994 to 2007) were evaluated using the regression analysis.

Abundance data were standardised to the 'swept surface unit' [52]. Thus, biomass (kg·km⁻²) and density (N·km⁻²) indices were computed by survey for each faunal category (cephalopods, crustaceans, chondrichthyes and osteichthyes) and species for the depth range 10–800 m and by depth stratum (10–200 and 200–800 m) [53]. Taking into account both the abundance and

the commercial interest, six target species were selected for the analysis of abundance over time: *Illex coindetii* for cephalopods, *Nephrops norvegicus* and *Parapenaeus longirostris* for crustaceans and *Galeus melastomus, Merluccius merluccius* and *Mullus barbatus* for fish.

In order to detect any temporal trend during the investigated period (1985–2006), the longest time series of the autumn GRUND surveys was considered and the trend in abundance indices was tested using linear regression analysis. For these analyses, the log transformation of the abundance was adopted to normalise the variables.

Given that changes both in abundance and size may be indicators of fishing effects [54,55], the median values of the Length Frequency Distribution (LFD) for the six selected species were computed by season and thus both the MEDITS (spring) and GRUND (autumn) surveys were considered for the study period 1994–2007; the changes in median values over time were also evaluated by Spearman rank correlation and linear regression [56,57].

In order to highlight the fishing effect on these exploited populations, the temporal changes in abundance were correlated (by Pearson correlation and Spearman rank correlation) with the trend in the fishing effort detected in the studied area over the same period. All the regression analyses computed on time series data have been checked for autocorrelation by means of the Durbin–Watson test [58,59]. When autcorrelations were identified, autoregressive models were applied using the Cochrane–Orcutt procedure [60].

Concerning growth, a review of the growth parameters computed for several fish and crustacean species in the last 25 years is also reported here. Age and growth were studied by reading otoliths and length frequency analysis for fish and crustaceans, respectively. The length frequency analysis was carried out to estimate crustacean age and compare the direct readings of otoliths for some fishes. The length distributions were calculated by sex and for sexes combined and the main modal components were separated by means of the Bhattacharya's methods. The Age–Length Keys (ALKs) from the two different methods were employed to calculate the growth parameters. The Von Bertalanffy Growth Function (VBGF) was adopted using the 'Length at Age' routine in the FISAT II program [61].

Finally, in order to detect the exploitation condition of the most important commercial species, the total mortality rates (Z) and exploitation rates (E) were considered as reference points [62].

The total mortality rates (Z) computed by year from 1994 to 2004, for the whole sampled population during autumn season of N. norvegicus, P. longirostris, A. foliacea, A. antennatus, M. merluccius and M. barbatus, are considered here. Two different approaches were followed for the computation of the total mortality rate (Z): the 'Length-Converted Catch Curve' (LCCC) method was applied for all species, as reported in FISAT II [61] and the Hoenig method was only utilised for A. foliacea because recruitment of this species can be considered almost discrete in the north-western Ionian Sea [8]. In order to detect any temporal trend, changes in Z per year values with time and their correlation with fishing effort (as independent variable) were tested by Spearman rank correlation. For each species, the fishing mortality (F) was obtained as the difference between total mortality (Z) and natural mortality (M). Thus, the exploitation rate (E = F/Z) was also estimated by year and the changes of E and Z over time were also evaluated by Spearman rank correlation. An average E value with relative confidence interval (95%) was computed for the study period (1994–2004).

3. Results

3.1. Faunal assemblage

The large amount of trawl surveys carried out in the last 25 years in the north-western Ionian Sea has provided new information on the faunal composition in the area and allowed the updating of

Table 3.	List of the species recorded for the first time in the north-western Ionian Sea from 1985	5
to 2008, w	ith indication of depth range of finding.	

	Depth (m)			
Species	Min.	Max.		
Cephalopods (41 species collected)				
Ancistrocheirus lesueurii (D'Orbigny, 1842)	508	563		
Brachioteuthis riisei (Steenstrup, 1882)	314	606		
Chiroteuthis veranii (Férussac, 1835)	345	670		
Ctenopteryx sicula (Verany, 1851)	501	501		
Galiteuthis armata Joubin, 1898	1123	1123		
Neorossia caroli (Joubin, 1902)	131	779		
Octopoteuthis sicula Rüppell, 1844	501	618		
Octopus defilippi Verany, 1851	25	40		
Crustaceans (76 species collected)				
Chaceon mediterraneus Manning & Holthuis, 1989	3300	3300		
Ebalia nux A. Milne-Edwards, 1883	736	736		
Gennadas elegans (S.I. Smith, 1882)	800	1500		
Munida rutllanti (iris) Zariquiey Alvarez, 1952	101	800		
Nematocarcinus exilis Bate, 1888	190	4000		
Philocheras echinulatus (M. Sars, 1861) ^a	161	595		
Plesionika acanthonotus (S.I. Smith, 1882)	284	1239		
Scyllarus pygmaeus (Bate, 1888) ^a	96	564		
Chondrichthyes (33 species collected)				
Dipturus oxyrinchus (Linnaeus, 1758)	429	1218		
Heptranchias perlo (Bonnaterre, 1788)	322	345		
Myliobatis aquila (Linnaeus, 1758)	16	85		
Oxynotus centrina (Linnaeus, 1758)	495	800		
Raja clavata Linnaeus, 1758	149	560		
Raja montagui Fowler, 1910	31	314		
Rostroraja alba (Lacépède, 1803)	532	532		
Osteichthyes (215 species collected)				
Cataetyx laticeps Koefoed, 1927a	2000	3300		
Coelorinchus mediterraneus Iwamoto & Ungaro, 2002 ^a	917	1500		
Coryphaenoides guentheri (Vaillant, 1888) ^a	1500	1700		
Coryphaenoides mediterraneus (Giglioli, 1893) ^a	1054	4000		
Deltentosteus collonianus (Risso, 1820) ^a	153	153		
Diaphus metopoclampus (Cocco, 1829) ^a	312	662		
Dysomma brevirostre (Facciolà, 1887) ^a	264	504		
Elates ransonnetii (Steindachner, 1876) ^b	20	20		
Gobius geniporus Valenciennes, 1837 ^a	34	165		
Grammonus ater (Risso, 1810) ^a	654	654		
Hygophum hygomii (Lütken, 1892) ^a	316	1142		
Lepidion lepidion (Risso, 1810) ^a	504	1700		
Lobianchia gemellarii (Cocco, 1838) ^a	528	528		
Sphoeroides pachygaster (Müller & Troschel, 1848)	66	400		
Synapturichthys kleinii (Risso, 1827) ^a	16	171		
Syngnathus taenionotus Canestrini, 1871 ^a	101	101		
Syngnathus tenuirostris Rathke, 1837 ^a	60	60		
Tetragonurus cuvieri (Risso, 1810)	300	300		
Vinciguerria attenuata (Cocco, 1838) ^a	73	569		

Notes: The total number of the species collected by taxon is reported in bold and parentheses. ^aSpecies not included in the checklist of Italian Fauna. ^bAlien species.

the species list previously reported. Throughout the study period from 1985 to 2008 a total of 365 species (41 cephalopods, 76 crustaceans both stomatopoda and decapoda, 33 chondroichthyes and 215 osteichthyes) were collected in the whole investigated depth range, from 10 to 4000 m (Table S1 – online only) and some of them have represented new records for the study area (Table 3).

Concerning cephalopods, in the last 20 years, the species *Octopus defilippi* [63], *Neorossia caroli* [64], *Chiroteuthis veranyi* [65], *Octopoteuthis sicula* and *Brachioteuthis riisei* [66], *Ancistrocheirus lesueurii* [67] and *Chtenopteryx sicula* [68] have been recorded for the first time in the study area. The bathypelagic species *Galiteuthis armata* was recently collected in the north-western Ionian Sea during the GAVIS project. Previous findings of this species in the basin were only reported in the Strait of Messina [69] and on the eastern Greek side of the Ionian Sea [70]. At present, the total number of cephalopods collected in the north-western Ionian Sea represents 71% of the total species (58) reported in the checklist of the Italian seas [71]. No new records for the Mediterranean Sea have been reported.

With regard to crustaceans, study projects conducted on the bathyal grounds provided new information on deep-sea decapod crustaceans of the north-western Ionian Sea with the new findings for the study area of the species *Chaceon mediterraneus*, *Gennadas elegans*, *Plesionika acanthonotus*, *Nematocarcinus exilis* [72] and the presence of *Ebalia nux* in the Santa Maria di Leuca coral bank [73]. Moreover, the occurrence of *Munida rutllanti*, *Philocheras echinulatus* and *Scyllarus pygmaeus* recorded in recent years updated the list of decapod crustaceans in the north-western Ionian Sea. In fact, the first species did not appear on the previous checklist of Italian fauna [74] and it has been added to the last version [75], whereas the last two species have not yet been included (Table 3). The decapods reported in this article for the north-western Ionian Sea correspond to 34% of the species reported for all the Italian seas [75].

The research carried out to date has also deepened the knowledge on chondroichthyes distribution in the north-western Ionian Sea, with the first update of the previous available information provided by Matarrese et al. [25], reporting a total of 19 species recorded, and then by Sion et al. [27] reporting the occurrence of seven other species (*Dipturus oxyrinchus, Heptranchias perlo, Myliobatis aquila, Oxynotus centrina, Raja clavata, Raja montagui* and *Rostroraja alba*). At present, a total of 14 sharks, 18 batoids and 1 chimaera have been collected in the north-western Ionian Sea, representing 39% of chondroichthyes reported for the Mediterranean Sea [47].

Also for teleost fish, the research carried out in the area provided new findings in the Ionian basin (Table 3). In the first updating of the previous knowledge on ichthyofauna, a total of 140 species was reported in the north-western Ionian Sea [25], but a lot of other species were later collected in the area.

It is important to emphasise the occurrence of *Sphoeroides pachygaster* in the Ionian basin. During 1991, one specimens of this tropical species was collected for the first time in the northwestern Ionian Sea [48] and since then it has almost always been present in the area with more individuals. The analysis of density indices after the application of the cumulated sums method computed in the time range of the species occurrence showed a significant increase over time as well as potential changes in the time series between 2001 and 2002 (Figure 3). Among fish, the occurrence of the bathypelagic species *Tetragonurus cuvieri* [76] was reported as a new finding in the north-western Ionian Sea. In recent years, it is also important to note the occurrence in the area of the subtropical benthopelagic species *Dysomma brevirostre* as the easternmost record in the Mediterranean Sea [77] as well as the first finding of the alien species *Elates ransonnetii* in the Mediterranean Sea [78]. Moreover, the bathyal species *Cataetyx laticeps, Coelorinchus mediterraneus, Coryphaenoides guentheri, Coryphaenoides mediterraneus* and *Lepidion lepidion* [79] have also been recorded for the first time in the area.

Therefore, the teleost fish species recorded here represent 49% of the total number of the osteichthyes reported in the checklist for all Italian areas [80]. However, it should be highlighted that, apart from the above-mentioned new records, another 10 species reported here (*Deltentosteus collonianus, Diaphus metopoclampus, Gobius geniporus, Grammonus ater, Hygophum hygomii, Lobianchia gemellarii, Synapturichthys kleinii, Syngnathus taenionotus, Syngnathus tenuirostris and Vinciguerria attenuata*) still have not been included in the checklist of Italian fauna for the Ionian area [79].



Figure 3. Density indices $(N \cdot km^{-2})$ per year computed for *Sphoeroides pachygaster* caught in the north-western Ionian Sea from 1991 to 2008.

The depth range of occurrence was also reported for all species of the studied taxa (Table S1 – online only).

With regard to the frequency of occurrence (Foc) by trawl across the investigated depth range from 10–800 m, apart from selachians, the most common species were generally of commercial value. In particular, *Illex coindetii, Eledone cirrhosa, Sepietta oweniana* and *Todaropsis eblanae* were caught more frequently among cephalopods, whereas some species such as *Abraliopsis morisii, Argonauta argo, Ctenopteryx sicula* and *Galiteuthis armata* were collected only once in the area most probably in relation to their typical pelagic habit (Table S1 – online only).

Concerning crustaceans, *Parapenaeus longirostris*, *Plesionika martia*, *Polycheles typhlops*, *Nephrops norvegicus* and *Aristeus antennatus* were the most common species in the area with a Foc >30%, while some others (*Chaceon mediterraneus*, *Periclimenes granulatus* and *Sergestes arcticus*) were occasionally caught probably due to their very deep distribution (Table S1 – online only).

With regard to chondrichthyes, *Galeus melastomus* and *Etmopterus spinax* showed the highest Foc values. It is important to note the very low frequency of occurrence for this taxon (<6%) for all species, apart from the above-mentioned and *Chimaera monstrosa*, which was also frequently collected in the area. A low incidence of Rajiformes was also detected throughout the study period and only *Leucoraja circularis* (Foc = 1.58%) and *Raja miraletus* (Foc = 1.54%) were caught more frequently, although with a very low frequency (Table S1 – online only).

For teleost fish, Merluccius merluccius, Phycis blennoides, Lophius budegassa and Helicolenus dactylopterus dactylopterus were the most common species, but a high Foc (>34%) was also recorded for Hymenocephalus italicus, Hoplostethus mediterraneus mediterraneus, Micromesistius poutassou and Nezumia sclerorhynchus (Table S1 – online only). Also for this taxon, the single finding of some species could be related to the clear pelagic (Auxis rochei rochei, Caranx crysos, Mola mola and Schedophilus ovalis) or bathypelagic (Ciclothone braueri and Lobianchia gemellarii) habits that make these species less available to the trawl. The rare finding of other species such as Coryphaenoides mediterraneus is linked to their deeper distribution.

Concerning the univariate ecological indices computed in the depth range of 10-800 m for the spring and autumn seasons from 1994 to 2007, the richness index (*d*) increased significantly over time, whereas the Shannon–Wiener (H') and eveness indices (*J*) fluctuated over time without any significant trend (Figure 4).

3.2. Temporal trend in abundance and population structure

Concerning the abundance of demersal resources in the north-western Ionian Sea, high variations were observed during the study period from 1985 to 2006. With regard to the faunal categories,



Figure 4. Species richness (d), diversity (H'), evenness (J') by season of demersal species collected in the north-western Ionian Sea during MEDITS (spring) and GRUND (autumn) projects.

significant increases over time were observed in the log-transformed density indices (N·km⁻²) of cephalopods, crustaceans (linear regression corrected for autocorrelation) and osteichthyes, whereas no trend was detected for chondroichthyes in the depth range 10–800 m (Figure 5). Increasing values were also recorded in the biomass indices (kg·km⁻²) of all faunal categories, although they were not significant. The temporal trends obtained in the abundance indices were correlated with the decreasing fishing effort (linear regression corrected for autocorrelation) that occurred in the north-western Ionian Sea during the study period (Figure 2). Thus, highly significant negative correlations were observed for cephalopods (Pearson = -0.585; p < 0.05; linear regression corrected for autocorrelation) and osteichthyes (Pearson = -0.843; p < 0,001; linear regression corrected for autocorrelation).

With regards to the target species, significant increases in density and biomass with time were detected for the cephalopod *Illex coindetii* (0.516 for biomass, corrected for autocorrelation) and the crustaceans *Nephrops norvegicus* (0.599 for biomass, corrected for autocorrelation), whereas a negative trend was shown in *Galeus melastomus* (-0.585 for biomass, corrected for



Figure 5. Log-transformed abundance indices per year by faunal categories collected in the north-western Ionian Sea from 1985 to 2006.



Figure 6. Log-transformed abundance indices per year by target species computed in the north-western Ionian Sea from 1985 to 2006.

	Season	Spearm	nan correlation	Linea	Linear regression			
Species	(1994–2007)	ρ	p value	R	p value			
Illex coindetii	Spring Autumn		n.s. n.s.		n.s. n.s.			
Nephrops norvegicus	Spring Autumn	-0.659	n.s. **	-0.462	n.s. *			
Parapenaeus longirostris	Spring Autumn	$-0.484 \\ -0.665$	* **	$-0.554 \\ -0.604$	*			
Galeus melastomus	Spring Autumn	0.018 0.590	**	0.011 0.495	***			
Merluccius merluccius	Spring Autumn		n.s. n.s.		n.s. n.s.			
Mullus barbatus	Spring Autumn		n.s. n.s.		n.s. n.s.			

Table 4. Changes of the median lengths by target species (*Illex coindetii*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Galeus melastomus*, *Merluccius merluccius* and *Mullus barbatus*) and season computed by Spearman rank correlation and linear regression, with indication of the statistic parameters and significance values.

Notes: n.s., Not significant; *p < 0.05; **p < 0.01; ***p < 0.001.

autocorrelation) (Figure 6). No significant trend was reported for *Parapenaeus longirostris*, *Merluccis merluccius* and *Mullus barbatus* and variable abundance indices over time were observed for these species (Figure 6). Moreover, significant negative correlations between the increasing density indices and decreasing fishing effort were detected for *I. coindetii* (Pearson = -0.520; p < 0.05), *P. longirostris* (Pearson = -0.471; p < 0.05) and *N. norvegicus* (Pearson = -0.673; p < 0.01 corrected for autocorrelation). No significant correlation was detected for the other considered species.

The analysis of LFDs for the six selected species showed different results depending on the species and the season. In particular, a significant decrease in the median length over time was detected for *N. norvegicus* in autumn and for *P. longirostris* in all investigated seasons (Table 4). By contrast, a significant increase in the median length over time was observed for *G. melastomus* and no significant trend was shown for *I. coindetii*, *M. merluccius* and *M. barbatus* (Table 4). All linear regression analyses were corrected for autocorrelation.

3.3. Review on age and growth parameters

As part of several projects carried out in the north-western Ionian Sea from 1985 to 2008, the age and growth of 6 crustaceans and 19 fish species were also studied. All the estimated parameters are reported in Table 5. Different life strategies were observed among the studied species. Concerning crustaceans, fast growth rates were generally exhibited and mostly in *P. longirostris*, whereas slower growth rates were observed for *A. antennatus* and *N. norvegicus* in both sexes. Apart from *P. martia*, faster growth rates were shown in females than in males (Table 5). With regard to fish, a moderate growth rate was almost always observed, apart from some species such as *L. caudatus* and *M. barbatus* that exhibited a fast growth with a *K* value around 0.3. In some species for which growth parameters were estimated for both sexes, different growth rates were detected with a general faster growth in males than females as observed in *M. merluccius* and *P. blennoides* (Table 5).

Table 5. Growth parameters estimated (using the von Bertalanffy equation) in the north-western Ionian Sea by sex and/or sex combined, with indication of the different methodologies employed in age determination.

Species	Sex	Methodology	L^{∞} (mm)	K (year ⁻¹)	t ₀ (year)
Crustaceans					
A. foliacea	F	LFA	69.78	0.45	-0.18
0	М	LFA	49.71	0.42	-0.34
A. antennatus	F	LFA	79.39	0.22	-0.23
	F	LFA	79.90	0.22	-0.23
N. norvegicus	F	LFA	58.00	0.25	-0.56
õ	М	LFA	79.70	0.20	-0.64
P. longirostris	F	LFA	47.70	0.74	-0.19
0	М	LFA	35.50	0.54	-0.29
P. martia	F	LFA	30.50	0.44	-0.43
	М	LFA	28.00	0.50	-0.48
Osteichthyes					
B. mediterraneus	M+F	0	194.30	0.15	-0.92
C. agassizi	M+F	0	189.04	0.24	-1.20
0	M+F	LFA	218.33	0.16	-1.69
C. coelorhincus	F	0	127.60	0.13	-1.06
	М	0	114.90	0.15	-1.05
H. dactvlopterus	M+F	0	307.20	0.16	-0.93
H. italicus	F	0	55.30	0.18	-1.56
	М	0	54.90	0.18	-1.57
H. mediterraneus	F	Õ	296.14	0.11	-2.64
	М	0	270.48	0.13	-2.47
	M+F	Õ	287.08	0.13	-2.13
	M+F	LFA	270.03	0.23	
L. boscii	F	0	490.50	0.11	-1.24
	M	Õ	480.00	0.11	-1.34
	M+F	Õ	484.60	0.11	-0.99
L. budegassa	F	Õ	684.50	0.11	-1.18
	M	Õ	603.00	0.11	-1.56
	M+F	Õ	683.90	0.10	-1.43
L caudatus	F	Õ	1824.60	0.30	-0.50
	M	Õ	1742.70	0.31	-0.53
M barbatus	F	Õ	245.00	0.27	-1.85
	M	Õ	224.00	0.28	-1.98
	M+F	Ő	252.00	0.26	-1.71
M merluccius	F	Ő	695.57	0.14	-0.73
m. meriacetas	M	Ő	518 43	0.14	-0.55
M poutassou	F	0	442 70	0.10	_1.32
m. poulussou	M	0	425.00	0.22	-1.32
	M⊥F	0	432.00	0.24	-1.20
N sclarorhynchus	E E	0	432.00	0.23	1.00
iv. scierornynchus	M	0	77.00	0.10	-1.90
P blannoidas	F	0	703.00	0.11	-1.73 -0.77
1. orennoides	г М	0	410.00	0.15	-0.77
T seabrus		0	234.00	0.21	-1.24
T trachurus	M + E	0	473.00	0.10	-1.08
1. <i>macmunus</i>	IVI+I	0	4/3.00	0.17	-0.91

Note: O, Otoliths; LFA, length-frequency analysis.

3.4. Mortality and exploitation rates

The total mortality rates by year computed for the target species fluctuated throughout the whole study period (Table 6). The highest Z values were shown for *P. longirostris* between 4.22 per year (during 2001) and 5.84 per year (during 1994), whereas the lowest mortality rates (0.60 < Z < 1.03) were detected for *A. antennatus*.

Table 6. Total mortality rate (Z) and exploitation ratio (E) calculated by year and species in the north-western Ionian Sea during 1994–2004.

	19	94	19	95	19	96	19	97	19	98	20	000	20	01	20	02	20	03	20	04
	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε	Ζ	Ε
M. merluccius	1.04	0.71	1.12	0.73	1.05	0.71	1.05	0.71	1.28	0.77	1.20	0.75	1.11	0.73	1.13	0.73	0.95	0.68	1.14	0.74
M. barbatus	1.77	0.66	2.28	0.74	1.63	0.63	1.55	0.61	1.40	0.57	1.22	0.51	1.04	0.42	1.15	0.48	1.19	0.50	1.12	0.46
N. norvegicus	0.94	0.47	0.90	0.44	0.93	0.46	0.97	0.48	1.05	0.52	1.05	0.52	0.82	0.39	1.12	0.55	1.16	0.57	1.17	0.57
P. longirostris	5.84	0.79	5.32	0.77	4.43	0.73	4.27	0.72	5.16	0.77	4.61	0.74	4.22	0.72	4.75	0.75	4.24	0.72	4.77	0.75
A. foliacea*	0.87	0.43	1.56	0.68	1.23	0.59	1.56	0.68	0.83	0.40	1.44	0.65	1.30	0.62	1.53	0.67	1.45	0.66	1.38	0.64
A. antennatus	0.76	0.47	0.6	0.33	0.85	0.53	0.76	0.47	0.72	0.44	1.03	0.61	0.87	0.54	0.64	0.38	0.65	0.38	0.96	0.58

Note: *Z values have been calculated with Hoenig method.



Figure 7. Average values of the exploitation rate (E), with relative confidence interval (95%), computed for the target species in the north-western Ionian Sea from 1994–2004.

Significant decreasing trends in the Z (Spearman = -0.707; p < 0.01) and E (Spearman = -0.711; p < 0.01) values with time were only observed for *M. barbatus*, although no significant trends were detected in other species.

The exploitation rate E was generally higher than the critical threshold of 0.5 for the different species examined (Table 6). Because E is the ratio between fishing mortality (F) and total mortality (Z), this means that >50% of mortality is due to the fishing pressure.

In particular, an overexploitation condition was shown in *P. longirostris* and *M. merluccius* with no variation over time, as enhanced by the narrow confidence limits (Figure 7). Moderate overexploitation was detected for *M. barbatus* and *A. foliacea*, more variable over time. Finally, *N. norvegicus* presented a near equilibrium state and a slightly underexploited condition was observed for *A. antennatus* stock.

4. Discussion

The particular geomorphology and oceanography of the north-western Ionian Sea determine the presence of different habitats that provide a complex system of environmental patches, reflected in the distribution and abundance of the demersal resources and in the biodiversity detected in this basin. The marine ecosystems are exposed to a strong increase in anthropogenic impact both directly through extension of the coastal fisheries to the slope, and indirectly due to the impact of global climatic change [81,82]. As a consequence, apart from areas where habitats and resources are naturally protected (irregular or unsuitable trawl bottoms), marine resources both living on the shelf and on the upper slope have also been subject to high trawl fishing pressure in recent decades in the north-western Ionian Sea.

The several surveys carried out systematically in the last 25 years on the demersal resources of this area have provided a large amount of standardised data useful for detecting the current status of these marine resources and investigating, over a wide time scale, any changes in their availability, as well as in the biodiversity of demersal faunal assemblages. Although two experimental and commercial trawl nets, with different catchability patterns, were adopted during the seasonal MEDITS and GRUND surveys, in this article, standardised data coming from both surveys were considered jointly for only biodiversity studies; moreover, in order to enhance any seasonal pattern related to the recruitment process in the population structure of the most commercially important species, data from both surveys were separately computed and consistent results were obtained. By contrast, only the longest time series of the autumn GRUND surveys (1985–2006) were

considered for detecting abundance changes over time of both faunal categories and species. Finally, considering the importance to enlarge the knowledge on the species occurrence also to the deepest bottoms, data coming from all trawl surveys carried out in the study area from 10 to 4000 m were used.

The results reported in this study have updated the faunal lists reported for this area. In fact, through the finding of various species during the period 1985–2008, a high number of cephalopod, crustacean, cartilaginous and teleost fish species was recorded for the noth-western Ionian Sea, representing a high percentage of the species reported for the Italian seas. In addition, 18 records not included in the Italian checklist have been reported in this article, together with 1 alien species (*Elates ransonnetii*) for the Mediterranean Sea. These results reflect the increase in species richness observed throughout the study period. This knowledge may be used as a reference base to monitor the complexity of the biodiversity of the demersal faunal assemblage not only on the local Ionian scale, but also in the context of the whole Mediterranean basin. Moreover, it may also be useful to properly assess the response of these demersal assemblages to natural and anthropogenic pressures also acting in the recent years.

The tropical species *Sphoeroides pachygaster*, after its first occurrence in the Ionian basin in 1991 [48], showed a significant increase with time and there is now a steady population with the presence of spawning females. These data should document the effect of global warming in the Mediterranean [20] and the tropicalisation of this basin as already observed in other areas [83,84]. Moreover, the first finding of *Sphoeroides pachygaster* in the Ionian Sea was recorded shortly after the Eastern Mediterranean Transient (EMT) [42,43], whereas the increase in abundance after 2001–2002 could be most probably related to a more recent increase in the temperature and salinity recorded in this basin [85].

With regard to more direct anthropogenic forcing, the low contribution of the chondroichthyes in the species assemblage of the north-western Ionian Sea and particularly the low incidence of Rajiformes throughout the investigated period could be strictly linked to the fishing pressure as already documented in other Mediterranean areas [86,87]. According to Stevens et al. [88] chondroichthyes are particularly vulnerable to overexploitation because of their general k-selected life-history strategy. In fact, higher catches of Rajiformes and in particular of *D. oxyrinchus* and *R. clavata* have also been observed on the eastern side of the Ionian Sea (Greek waters) [89], where a lower fishing pressure is acting on the bathyal grounds [90]. In any case, a relevant presence of Rajiformes, such as *R. clavata* and *R. asterias* was also detected in neighbouring areas to the Ionian basin (South Adriatic and Sicily Channel), where the fishing activity is strong [87], also enhancing the role of environmental characteristics (edaphic conditions and physical–chemical parameters) in structuring the species assemblages.

The available time series showed high variations in the abundance of faunal categories and species during the study period. Apart from the general low abundance of chondroichthyes with no trend during the investigated period, significant increases over time were observed for the other faunal groups and they proved to be negatively correlated with the trend of fishing effort detected in the last decades in the area, enhancing the influence of a decreasing fishing effort on the increase in the experimental catch. Moreover, significant increases in abundance over time were also detected for the target species *Illex coindetii* and *Nephrops norvegicus* and an inverse significant correlation with fishing effort was also shown for these species. Nevertheless, a significant decrease in median length over time was depicted for *N. norvegicus* and *P. longirostris*, showing apparent conflicting results between abundance and this population parameter. Fluctuations in the marine populations have been generally supposed to be related to the biology of the species as well as fishing effort in the study areas. In the Mediterranean Sea, large changes in experimental catches and landings have been detected over time [91–93] and the effects of fishing on the dynamics of the marine biological resources and ecosystem have recently been documented [93]. High fluctuations in the catches also reflect large changes in the recruitment process that provides a

remarkable contribution of juveniles to the catches by trawling in the area. Thus, the significant increase detected in abundance of the above-mentioned species could also be related to intense recruitment processes verified in the last years. In fact, some studies carried out in the northwestern Ionian Sea described the remarkable contribution of recruitment to the abundance of many commercial species in this geographic area [4,15] that was recently confirmed as containing nursery areas for P. longirostris, N. norvegicus, M. barbatus and M. merluccius [94,95]. Thus, the intense recruitment documented for these species could explain both the increasing abundance and the decreasing median size throughout the study period. Moreover, the coastal distribution of nurseries of hake and deep-water rose shrimp and their consequent exposure to a high fishing activity could also explain their stable overexploitation conditions observed over such a long period of investigation in the north-western Ionian Sea. The significant decreasing trend in the Z values with time, together with a moderate overexploitation observed in the red mullet, although variable over time, could be related to the regulation measures of the 'closed season' adopted in recent years, which has proved particularly efficient in protecting the summer-autumn recruitment of this species. The nearly equilibrium state and the optimal or slightly underexploited condition detected for N. norvegicus and A. antennatus respectively, could be related to the specific habit and life cycles of these two species. For A. antennatus, recruits and juveniles are distributed in deep waters and inside canyons [38,96,97] that represent 'ecological refuges' for this species, habitats unsuitable for trawling and providing some renewal of the stock. For N. norvegicus, the typical burial habit, particularly during the spawning phase, prevents the full exploitation of its stock [98].

Finally, some significant correlations shown in this study could be simply correlative. Indeed, because fluctuations in the abundance of biological resources over time are related to manifold variables, further studies will be required to distinguish between relationships that are predictive and those that are simply correlative. The abundance increase of each demersal faunal group, apart from cartilaginous fish, seems to be a typical effect due to fishing effort decrease. This is less evident in each single species due to both the above-mentioned reason related to the recruitment phenomenon and to the fact that the fishing effort reported in this study probably does not explain efficaciously the real effort.

All the results reported here enhanced the role of environmental factors in the structure of demersal assemblages as well as the complexity of the management of marine biological resources. In the context of Mediterranean countries, several conservation and/or management plans have recently been proposed at an international level (e.g. the Marine Strategy Framework Directive of the European Union, MSFD 2008) and scientists are requested to provide comprehensive studies in order to support and orientate these plans. The influence of environmental factors and oceanographic conditions on the abundance and recruitment of commercial species has only recently been reported in the western Mediterranean [99,100].

Thus, taking into account the complexity of ecosystem processes coupled with human activities and climatic change affecting aquatic populations, the next objective is to deepen and explore potential relationships between marine resources and environmental conditions. Further projects on a wide geographic scale are also needed in order to apply an ecosystem based approach to the management of marine resources and human activities.

The results presented here point out the importance of systematic studies, which can allow monitoring biological resources subject to the exploitation. In particular, these studies should be integrated with knowledge of the environmental factors (climatic, oceanographic, etc.), which may influence their fluctuations as well as the knowledge of other ecosystem biological components, such as strictly benthic and pelagic fauna, with which demersal species interact within the complex marine food web.

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SPECIES	Dept	Foc (%)		
Cephalopods	Min.	Max.		
Abralia verany (Rüppell, 1844)	62	746	8.43	
Abraliopsis morisii (Vérany, 1839)	558	558	0.04	
Alloteuthis media (Linnaeus, 1758)	12	478	15.19	
Alloteuthis subulata (Lamarck, 1798)	12	539	1.93	
Ancistrocheirus lesueurii (D'Orbigny, 1842)	508	563	0.17	
Ancisiroleulnis lichtensteinil (Ferussac, 1835)	105	1123	1.93	
Reachiotauthis riisai (Steenstrup, 1882)	502 314	502 606	0.04	
Chiroteuthis veranii (Férussac 1835)	345	670	0.21	
Ctenoptervx sicula (Verany, 1851)	501	501	0.04	
Eledone cirrhosa (Lamarck, 1798)	15	650	28.07	
Eledone moschata (Lamarck, 1798)	12	363	16.73	
Galiteuthis armata Joubin, 1898	1123	1123	-	
Heteroteuthis dispar (Rüppell, 1844)	143	1142	2.57	
Histioteuthis bonnellii (Férussac, 1835)	254	763	4.15	
Histioteuthis reversa (Verrill, 1880)	153	769	7.92	
Illex coindetii (Verany, 1839)	14	767	38.90	
Loligo forbesii Steenstrup, 1856	20	425	1.41	
Lougo vulgaris Lamarck, 1/98	12	560	8.94	
Neorossia caroli (Joudin, 1902)	131	/ /9	8.43	
Octopoleullus sicula Kuppell, 1844 Octopus defilippi Verany, 1851	501	40	0.20	
Octopus aejuippi veraity, 1051 Octopus macropus Risso 1826	23 17	350	0.20	
Octopus salutii Verany 1839	31	778	15.92	
Octopus suturi Verany, 1839	11	290	18.23	
Onychoteuthis banksii (Leach, 1817)	327	772	0.43	
Pteroctopus tetracirrhus (Delle Chiaje, 1830)	55	714	10.65	
Pyroteuthis margaritifera (Rüppell, 1844)	287	605	0.09	
Rondeletiola minor (Naef, 1912)	12	585	9.88	
Rossia macrosoma (Delle Chiaje, 1830)	68	772	12.49	
Scaeurgus unicirrhus (Delle Chiaje, 1841)	23	625	21.05	
Sepia elegans Blainville, 1827	14	562	20.54	
Sepia officinalis Linnaeus, 1758	12	219	10.61	
Sepia orbignyana Férussac, 1826	12	562	7.62	
Septena oweniana (D'Ordigny, 1841)	12	002	24.35	
Sepiola Intermedia Nael, 1912 Sepiola ligulata Naef 1912	12	313 360	1.0/	
Seniola robusta Naef 1912	20	300	0.81	
Sepiola rodeletii Leach 1817	18	87	0.47	
Todarodes sagittatus (Lamarck, 1798)	97	779	9,46	
Todaropsis eblanae (Ball, 1841)	13	742	21.69	
Crustaceans	-			
Decapoda				
Acanthephyra eximia S.I. Smith, 1884	659	4000	0.56	
Acanthephyra pelagica (Risso, 1816)	531	4000	0.43	
Aegeon cataphractus (Olivi, 1792)	18	125	2.57	
Aegeon lacazei (Gourret, 1887)	31	1054	16.77	
Alpheus glaber (Olivi, 1792)	31	786	1.03	
Aristaeomorpha foliacea (Risso, 1827)	127	1145	29.87	
Ansieus amennanus (KISSO, 1810) Ateleovelus rotundatus (Olivi 1702)	108	5500 50	0.21	
Alelecyclus rolundallus (Olivi, 1792) Bathynectes maraviana (Prestandrea, 1830)	24 125	30 1500	0.21	
Calanna granulata (Linnaeus, 1758)	125	665	616	
Calappa rissoana Pastore. 1995	25	165	0.26	
Calappa tuerkayana Pastore, 1995	23	140	0.26	
Chaceon mediterraneus Manning & Holthuis, 1989	3300	3300	-	
Chlorotocus crassicornis (A. Costa, 1871)	52	736	19.73	
Dromia personata (Linnaeus, 1758)	49	101	0.09	
Ebalia nux A. Milne-Edwards, 1883	736	736	0.04	
Ethusa mascarone (Herbst, 1785)	18	18	0.04	
Gennadas elegans (S.I. Smith, 1882)	800	1500	-	
Geryon longipes A. Milne-Edwards, 1882	140	1147	5.52	
Goneplax rhomboides (Linnaeus, 1758)	12	917	7.79	
Homola barbata (J.C. Fabricius, 1/93)	29	665 120	1.20	
Inachus communissimus Kizza, 1839 Inachus dorsattansis (Pennent, 1777)	12	130	0.94	
Latreillia elevans elevans Roux 1830	13	267	0.51	
Ligur ensiferus (Risso, 1816)	320	1000	0.56	
<i>Liocarcinus depurator</i> (Linnaeus. 1758)	12	698	21.69	
Macropipus tuberculatus (Roux, 1830)	18	778	18.27	
Macropodia tenuirostris (Leach, 1814)	27	651	1.28	

Table S1. List of the species caught in the Northern Ionian Sea (Eastern-Central Mediterranean) from 1985 to 2008 with indication of depth range of finding and frequency of occurrence (Foc). *Species not included in the checklist of Italian Fauna; **Alien species.

Crusteaus Min. Max. Macropoil arstin (Linnes), [76]) 16 290 1.71 Maja spinoka (Herks, 178) 64 130 0.21 Mala reputa lawata (Linnes, 187) 18 773 3.64 Mala reputa lawata (Linnes, 187) 18 773 3.64 Marida varianous A. Mine-Edwards&Bouvier, 1894 208 0.04 Marida varianous A. Mine-Edwards&Bouvier, 1899 255 725 9.20 Marida varianous A. Mine-Edwards&Bouvier, 1899 255 725 9.20 Marida varianous (perarnato) (Co. Sars, 1872 142 1500 6.42 Marida varianous (perarnato) (Co. Sars, 1872 12 10 0.09 Parlmanse elaphas (USas), 1810 13 11.1 45.79 Parameta causing (Kasas, 1810) 13 11.1 45.79 Parlmanse elaphas (Kasas, 1810) 13 13.50 14 Parleneous causing (Kasas, 1810) 13 13.50 14 Parleneous causing (Kasas, 1810) 13 13.50 14 Parleneous causing (Kasas, 1810)	SPECIES	Dept	h (m)	Foc (%)
$\begin{split} \begin{tabular}{lllllllllllllllllllllllllllllllllll$	Crustaceans	Min.	Max.	
Angie Grapati Riso, 1827 24 60 0.09 Medorigo squinol (Hersk, 178) 64 139 0.21 Medockess coexidi (Coch, 1851) 22 1123 8.64 Minida terrimotia (Coch, 1851) 22 1123 8.64 Minida terrimotia (Coch, 1851) 22 1123 8.64 Minida terrimotia (Coch, 1851) 22 113 800 0.04 Minida terrimotia (Coch, 1857) 73 151 0.16 0.17 Paramota cavier (Risso, 1810) 18 711 45.79 73 151 0.17 Paramota cavier (Risso, 1810) 18 711 45.79 123 152 152.33 Parthenope macroschois (Hersh, 1780) 18 885 2.57 12 150 0.09 Parthenope macroschois (Hersh, 1787) 12 136 0.39 - 135.6 132 115.2 152.33 Parthenope macroschois (Hothiai, 1805) 131 132 152.33 136 0.39 - 136 0.26 133 152 152.33 152.33 136 135 153 153 </td <td>Macropodia rostrata (Linnaeus, 1761)</td> <td>16</td> <td>290</td> <td>1.71</td>	Macropodia rostrata (Linnaeus, 1761)	16	290	1.71
Single signified (Herris, 178) 64 1.99 0.21 Medorigne land, Chanacas, 1767) 1.8 7.78 3.68 Mondous cundit (Conch, 1851) 2.2 11.23 8.64 Manida curinama, A. Milos-Edwards/Bouvier, 1899 2.5 7.25 9.20 Manida tenzimana, A. Milos-Edwards/Bouvier, 1899 2.5 7.25 9.20 Manida tenzimana, C. C. Farcicus, Navez, 1952 101 800 10.837 Manida tenzimana (peramuta) (C. Sars, 1872 12 150 6.42 Nentocorrins escill Bate, 1888 190 4000 0.17 Parpenear environ escill (Cass, 1846) 18 7.11 4.57 Partemene environ escill (Cass, 1846) 18 7.11 4.57 Partemene environ escill (Cass, 1810) 10 0.09 9.99 10 13.56 Partemene environ escill (Sass, 1816) 100 100 1.50 1.52 1.52 1.52 1.52 1.52 1.52 1.52 1.52 1.52 1.52 1.53 1.56 1.50 1.56 1.50 1	Maja crispata Risso 1827	24	60	0.09
Index or projection of the start o	Maja saujnado (Herbst 1788)	64	130	0.21
and one of the second	Madarinna lanata (Linnous, 1767)	19	778	2.69
Alphonome 24 1125 8.84 Alphonome A. Mine-Edwards&Bouvier, 1894 25 35 36 36 Manufa intermedia (i) Zariguiday Alsanze, 1953 255 255 37 36 Manufa intermedia (i) Zariguiday Alsanze, 1952 142 1500 6.42 Nemdo tennimus (peramual (o. S. Sass, 1872) 143 908 36.67 Pathenome lephone (peramual (o. S. Sass, 1877) 73 151 0.17 Parameno lephone (J. C. Fabricus, 1755) 73 151 0.17 Parameno lephone (J. C. Fabricus, 1757) 73 151 0.17 Parameno lephone (Risso, 1816) 91 1118 5.82 Parthenope macrochelos (Herbs, 1700) 18 885 2.57 Parthenope macrochelos (Risso, 1810) 99 910 13.56 Parabaes and (Risso, 1810) 99 910 13.56 Parabaes and (Risso, 1810) 160 595 0.33 Parabaes and (Risso, 1810) 161 95 0.43 Parabaes ando (Risso, 1815) 113 774	Meaorippe landia (Linnaeus, 1767)	10	//0	5.00
Manda (arryman A. Mine-Edwards Edbourg, 1894 208 208 0.04 Manda (arryman A. Mine-Edwards Edbourg, 1899 255 725 9.20 Manda (arryman (arryma) (Co. San, 1872) 101 800 0.177 Manda (arryman (arryma) (Co. San, 1872) 112 150 6.42 Nemoscurrims cilic Bae, 1888 193 400 0.177 Parlmens (elphan (C. Exbords), 1757) 73 151 1.17 Parnonla curier (Bisso, 1816) 91 1118 5.82 Parthenope macrophiltron (Co. Sank, 1873) 18 885 2.57 Parthenope macrophiltron (Larcall, 1825) 12 20 0.09 Parthenope macrophiltron (Larcall, 1830) 47 50 0.09 Parthenope macrophiltron (Edsakal, 1775) 12 316 0.39 Pariphean multilutatus (Bass, 1801) 151 0.26 Pisa arrauia (Larcall, 1815) 151 0.13 Para arrauia (Larcalle, 1803) 47 108 0.26 Pisa arrauia (Larcalle, 1815) 113 0.66 Para arrauia (Larcalle, 1815) 113 0.63 </td <td>Monodaeus couchii (Couch, 1851)</td> <td>22</td> <td>1123</td> <td>8.64</td>	Monodaeus couchii (Couch, 1851)	22	1123	8.64
Maida intermedia A. Mine-Edwards&Bouvier, 1899 255 725 9.20 Maida ratifum (irris) Zarique Alvare, 1952 101 800 10.87 Maida terminua (peramuta) GO. San, 1872 142 1500 6.42 Nentoracrinus cuils Bate, 1888 190 4000 0.17 Appiros norregicas (Limaus, 175) 73 151 0.17 Parameta cuirie (Risso, 1816) 19 111 45.79 Parameta cuirie (Risso, 1816) 19 113 8.85 0.59 Partheory maximum (Risso, 1816) 19 113 8.85 0.59 Partheory maximum (Risso, 1816) 99 1910 15.56 15.36 Partheory maximum (Risso, 1816) 99 101 5.56 16.39 Pericimenes granularu Iohluhis, 1950 800 800 - 1010 5.56 Parahyses vidue (Risso, 1816) 161 595 0.43 1110 15.56 Presonalize (Lisso, 1803) 47 108 0.26 153 163 164 154 154 154 <t< td=""><td>Munida curvimana A. Milne-Edwards&Bouvier, 1894</td><td>208</td><td>208</td><td>0.04</td></t<>	Munida curvimana A. Milne-Edwards&Bouvier, 1894	208	208	0.04
Manida tenzilami (tris) Zariquicy Alvance, 1952 101 800 10.87 Manida tenzima (perarma), Co. Sans, 1872 142 1500 6.42 Nematocarcinus sviifs Bate, 1888 190 4000 0.17 Nephorys norvegicus (Linacus, 1753) 73 151 0.17 Parapenees forgitoris (Luczs, 1846) 18 711 45.79 Parathenope angritoris (Luczs, 1846) 12 20 0.09 Parthenope angritoris (Luczs, 1846) 132 115.2 15.23 Parthenope angritoris (Luczs, 1840) 47 50 0.09 Parthenope macroelies (Ilerbs, 1750) 12 316 0.33 Parthenope macroelies (Ilerbs, 1850) 47 150 0.09 Parisheas studie (Ikso, 1816) 99 910 13.56 Pencinenes granulatus Holhukus, 1830 47 161 595 0.43 Philocheras chinalaus (Ikso, 1816) 47 118 0.62 Para mato (Laucile, 180) 47 118 0.65 Presonality and presonality (Instruct, 1855) 53 669 <td< td=""><td>Munida intermedia A. Milne-Edwards&Bouvier, 1899</td><td>255</td><td>725</td><td>9.20</td></td<>	Munida intermedia A. Milne-Edwards&Bouvier, 1899	255	725	9.20
Manida temininana (pcaramata) (G.O.Sars, 1872 142 1500 6.42 Nematocarcinas criis Bate, 1885 990 4000 0.17 Neptorga norregicar (Linacus, 175) 43 908 36.67 Paitumus elephasi (C. Exbricius, 1787) 73 151 0.17 Paramola cubrer (Risso, 1816) 91 1118 5.82 Partheorge anguiffrons Latcille, 1825 12 20 0.09 Partheorge anguiffrons Latcille, 1825 12 20 0.09 Partheorge anguiffrons Latcille, 1825 12 20 0.09 Partheorge anguiffrons Latcille, 1825 12 315 15.23 Partheorge maximus (Forskal, 1775) 12 316 0.09 Paisphare multidicatur Ensur, 1860 43 49 115 0.26 Prisonoper (F. Milline-Edward, 1851) 50 151 0.13 116 Prisonoper (F. Milline-Edward, 1852) 284 1239 9.20 Prisonoper (F. Milline-Edward, 1853) 107 058 8.04 Prisonoper (F. Milline-Edward, 1853) 113 <td< td=""><td>Munida rutllanti (iris) Zariquiey Alvarez, 1952</td><td>101</td><td>800</td><td>10.87</td></td<>	Munida rutllanti (iris) Zariquiey Alvarez, 1952	101	800	10.87
Nematocarcinus exilis Bate, 1888 190 4000 0.17 Nephrops norregizists (Linaues, 1787) 73 151 0.17 Paramenatos longitostis (Lucas, 1787) 73 151 0.17 Paramenatos longitostis (Lucas, 1840) 91 1118 5.82 Partnehoge macrochelos (Herbst, 1790) 18 885 2.57 Partnehoge macrochelos (Herbst, 1780) 47 50 0.09 Partnehoge macrochelos (Herbst, 1780) 12 316 0.39 Percilieness granulants Holthistis, 1950 800 0.7 - Philochertas chauldants (M. Sars, 1861) 30 131 0.13 136 Prisonandiges (Lach, 1815) 50 151 69 9.11 150 Prisonandiges (Lach, 1815) 113 2000 Prisonandiges (Lach, 1815) 151 151 <td< td=""><td>Munida tenuimana (perarmata) G.O. Sars, 1872</td><td>142</td><td>1500</td><td>6.42</td></td<>	Munida tenuimana (perarmata) G.O. Sars, 1872	142	1500	6.42
Nephrops norvegicus (Linnaeus, 1758) 43 908 36.67 Pairums elepticas (Linnaeus, 1775) 73 151 0.17 Paromola curvier (Risso, 1816) 91 11118 5.82 Parthenope macri (Risso, 1816) 91 1118 8.85 5.27 Parthenope macrocheda (Herbits, 1790) 18 8.85 5.27 Parthenope macrocheda (Herbits, 1790) 18 8.85 5.23 Parthenope macrocheda (Herbits, 1800) 47 50 0.09 Pericihueda multidhentia Esmant, 1866 132 1152 52.3 Pericihueda multidhentia Esmant, 1861 151 0.13 115 0.26 Prisumas pinifer H. Milne-Edvards, 1834 49 115 0.26 1153 0.13 Prisumata Curvelli, 1803) 50 151 0.13 115 12 Prestomika antigai Zariquicy Avarez, 1955 107 658 8.04 115 0.56 Prestomika duraterili, 1803) 103 1167 39.15 115 113 100 150 Prestom	Nematocarcinus exilis Bate, 1888	190	4000	0.17
refluxes clephas (J.C. Habricus, 1787) 73 151 0.17 Parapencas longinerris (Lisss, 1840) 91 1118 5.82 Parabencas compilerons Larginelle, 1825 12 120 0.09 Parabencas enguifrons Larginelle, 1825 12 152 15.23 Parabencas enguifrons Larginelle, 1825 122 15.23 15.25 Parabencas enguifrons Larginelle, 1800) 18 885 2.57 Parabencas enguifrons Larginelle, 1800 175 12 316 0.39 Perichnese granulatus Holdmins, 1950 80 0.0 - Philocherus echinadeus (M. Sars, 1861) * 161 595 0.43 Pisa andipes (Cach, 1815) 50 151 0.35 169 9.11 Plesionika anging Zariguige Valvere, 1955 101 153 669 9.11 Plesionika anging Zariguige Valvere, 1955 103 167 39.15 Plesionika anging Zariguige Valvere, 1955 103 167 39.15 Plesionika anging Zariguige Valvere, 1955 103 174 873	Nephrons norvegicus (Linnaeus, 1758)	43	908	36.67
Parametanis verginal Service 11 11 14 19 Parametanis verginal Service 18 11 522 Parametanis verginal Service 18 11 522 Parametanis verginal Service 12 10 0.09 Parametanye macrocheos (flexis, 1750) 18 885 257 Parametanye macrocheos (flexis, 1750) 12 16 0.39 Periclinences granulants (floxissakial, 1775) 12 316 0.39 Periclinences granulants (floxissakial, 175) 13 10 0.26 Pisa andipse (Lach, 1815) 161 955 0.43 11 Pisa andipse (Lach, 1815) 13 669 9.11 11 Perisonika anathonoma (S1. Smith, 182) 284 1239 9.20 Presonika anathonoma (S1. Smith, 182) 284	Palinurus alanhas (I.C. Espricius, 1787)	73	151	0.17
Paraphatasis (orginsaria (Latisa, 1946) 18 111 45.79 Paramola caries (Risso, 1816) 91 1118 5.82 Parthemope angulfrons Laturille, 1825 12 20 0.09 Parthemope massena (P. Roux, 1830) 47 50 0.09 Parthemope massena (P. Roux, 1830) 47 50 0.09 Parthemope massena (P. Roux, 1830) 47 10 0.25 Parthemope massena (P. Roux, 1830) 40 800 - Philocherus echnidans (M. Saux, 1861) 81 47 108 0.26 Philocherus echnidans (M. Saux, 1861) 47 108 0.26 9 Philocherus echnidans (M. Saux, 1861) 47 108 0.26 9 Philocherus echnidans (M. Saux, 1861) 53 669 9.11 10 57 19 Philocherus e	Provence and the size of the s	10	711	0.17
Partmenge Partmenge <t< td=""><td>Purupendeus iongirosiris (Lucas, 1840)</td><td>10</td><td>/11</td><td>43.79</td></t<>	Purupendeus iongirosiris (Lucas, 1840)	10	/11	43.79
Parthenope angulfrons Latrelle, 1825 12 20 0.09 Parthenope ancsena (P. Roux, 1830) 47 50 0.09 Posiphaea mildlentata Ismark, 1866 132 1152 15.23 Posiphaea sivada (Risso, 1816) 99 910 13.56 Perceimenex granulants Holhniis, 1950 800 800 - Perceimenex granulants Holhniis, 1950 800 800 - Pitalichers esticulaturas (Forsakal, 1775) 12 316 0.39 Perceimenex granulants Holhniis, 1950 800 800 - Pitalichers esticulaturas (Forsakal, 1775) 12 316 0.39 Perceimenex granulants Holhniis, 1950 800 800 - Pitalichers esticulaturas (Horsakal, 1824 49 115 0.26 Pisa annata (Larcelle, 1835) 50 151 0.13 Pitalichers esticulaturas (Horsakal, 1821) 50 151 0.13 Pitalichers esticulaturas (Horsakal, 1821) 50 151 0.13 Pitalichers esticulaturas (Horsakal, 1831) 13 673 15.06 Pitalionka antigai Zariquiej Alvarez, 1955 107 658 8.04 Pitasionika antigai Zariquiej Alvarez, 1955 107 658 8.04 Pitasionika antigai Zariquiej Alvarez, 1955 107 658 8.04 Pitasionika antigai Zariquiej Alvarez, 1955 103 113 673 15.06 Pitasionika martia (A. Milne Edwards, 1833) 103 1167 39.15 Pitasionika martia (A. Milne Edwards, 1833) 103 1167 39.15 Pitasionika norregicus (M. Sars, 1861) 365 1500 0.09 Processa canditudat Leach, 1815) 111 3774 8.73 Pontophilis moregicus (M. Sars, 1861) 365 1500 0.09 Processa canditudat Leach, 1815) 133 570 Scyllarare status (Lacelle, 1862) 20 130 0.04 Scyllarare promous (Lacelle, 1882) 20 150 0.04 Scyllarare promous (Lacelle, 1883) 80 Pontophilis moregicus (M. Sars, 1861) 70 365 1500 0.04 Scyllarare status (Lacelle, 1883) 80 Pontophilis moregicus (M. Sars, 1861) 70 30 Processa canditadura (Lacelle, 1883) 80 Processa canditadura (Lacelle, 1883) 81 Scyllarare pathilatus (Lanceus, 1785) 12 4000 2.91 Scyllarare status (Lanceus, 1785) 12 4000 2.91 Scyllarare status (Lanceus, 1785) 12 4000 2.91 Scyllarare status (Lanceus, 1785) 12 4000 3.01 Processa canditadura (Lacelle, 1862) 816 171 Pixenohika marteri (Hisso, 1816) 89 675 3.00 Pitanessa marteri (Hisso, 1816) 89 675 3.00 Pitanestatus (Lanceus, 1788) 42 9 10.10	Paromola cuvieri (Risso, 1816)	91	1118	5.82
Parthenope macrochelos (Herbs, 1790) 18 885 2.57 Parthenope massen (P. Roux, 1830) 47 50 0.09 Pasiphaea sixuado (Risso, 1816) 99 90 13.56 Pendeus (Melicertus) kerathurus (Forsskal, 1775) 12 316 0.39 Perichmense granultatus Holthurus, (Forsskal, 1775) 12 316 0.39 Princhense granultatus Holthurus, (Forsskal, 1775) 12 316 0.39 Princhense granultatus Holthurus, 1950 800 800 - Philocheras echinulatus (Massa, 1831) 161 0.26 Pisa andipes (Lach, 1815) 50 151 0.13 Pisa andipes (Lach, 1815) 50 151 0.13 Pisa andipes (Lach, 1815) 13 669 9.11 Plesionika anartia (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika anarta (A. Costu, 1871) 64 694 17.89 Plesionika marci (A. Costu, 1871) 101 557 1.97 Portophilus sprower (A. Costu, 183) 13 774 8.73 Perisonika marci (A. Mine Edwards, 1883) 13	Parthenope angulifrons Latreille, 1825	12	20	0.09
Parthenope massena (P. Roux, 1830) 47 50 0.09 Pasiphace multidicatus Esmank, 1866 132 1152 15.23 Pasiphace multidicatus Esmank, 1866 132 115 0.39 Periclineres granulatus Holthuis, 1950 800 800 - Philocheras certinulatus (M. Sans, 1861)* 161 595 0.43 Pliannus spinifer H. Milne-Edwards, 1834 49 115 0.26 Pisa anota (Larcille, 1803) 47 108 0.26 Pisa anota (Larcille, 1803) 47 108 0.26 Pisa anota (Larcille, 1803) 47 108 0.26 Pisa anota (Larcille, 1803) 107 658 8.04 Plesionika avarda (M. Stath, 1851) 53 669 9.11 Plesionika avarda (J. Carbicicus, 1787) 101 557 1.97 Plesionika avarda (J. Carbicicus, 1787) 101 557 1.97 Pelsonika avarda (J. Carbicicus, 1787) 101 557 1.97 Pelsonika avarda (J. Carbicicus, 1787) 101 57 1.97 <t< td=""><td>Parthenope macrochelos (Herbst, 1790)</td><td>18</td><td>885</td><td>2.57</td></t<>	Parthenope macrochelos (Herbst, 1790)	18	885	2.57
Pasiphaea induced Russo, B160 132 1152 15.23 Pasiphaea isvado (Risso, B16) 99 90 13.56 Penciences (Melicerrus) keradhuras (Forsskal, 1775) 12 316 0.39 Periclimenes genualmas Holhousi, 1950 800 800 - Philocheras echimaleus (M. Sars, 1861) * 161 595 0.43 Pisa andpres (Lach, 1815) 50 151 0.13 Plesionika acathomota (S. L. Smith, 1820) 284 1239 9.20 Plesionika acathomota (S. L. Smith, 1820) 53 669 9.11 Plesionika acathomota (S. L. Smith, 1820) 133 673 1506 Plesionika deviardsii (Brandt, 1851) 13 674 673 1937 Plesionika marta (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika marta (A. Kinite, 1777) 101 557 1.97 Potophilus provegicus (M. Sars, 1861) 365 1500 0.09 Processicus (M. Sars, 1861) 365 1500 0.09 Protephilus provegicus (M. Sars, 1861) 365 1500 0.04 <t< td=""><td>Parthenope massena (P. Roux, 1830)</td><td>47</td><td>50</td><td>0.09</td></t<>	Parthenope massena (P. Roux, 1830)	47	50	0.09
Paragination of the second s	Pasiphaea multidentata Esmark, 1866	132	1152	15.23
Pendeaus (Melicerus) keardharus (Forsskal, 175) 12 316 0.39 Periclinenes granulatus Holthuis, 1950 800 800 - Plicoherus contuntatus (M. Sars, 1861) * 161 595 0.43 Pluamus spinifer H. Mine-Edwards, 1834 49 115 0.26 Pisa armata (Latrille, 1803) 47 108 0.26 Pisa armata (Latrille, 1815) 53 669 9.11 Plesionika duratisi (Brank, 1851) 53 669 9.11 Plesionika arbita (Latrille, 1851) 13 673 15.06 Plesionika arbita (Latrille, 1851) 13 2000 38.00 Petsoinika arbita (Latrille, 1852) 13 2000 38.00 Parcesias canalichita ta Lech, 1815 11 713 9.76 Parcesias canalichita ta Lech, 1815 113 204 800 133	Pasinhaea siyada (Risso 1816)	99	910	13 56
Protection (Protection) 12 10 0.93 Printiceners extimulature (Molthuiis, 1950) 800 Philocheras echimalature (M. Sars, 1861) * 161 595 0.43 Philocheras echimalature (M. Sars, 1861) * 161 0.26 Pisa anaptite, Clasch, 1815) 0.15 0.13 Pisa anaptite, Clasch, 1815) 50 151 0.13 Pisa anaptite, Clasch, 1815) 53 669 9.11 Plesionika anigria Zraiquige Mavate, 1955 107 658 8.04 Plesionika anigria Zraiquige Mavate, 1955 107 658 8.04 Plesionika entrica (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika martia (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika martia (A. Mine Edwards, 1883) 103 117 13 9.76 Protechika hearcheracarput (A. Costa, 1871) 10 557 1.97 Portechika hearcheracarput (A. Costa, 1871) 101 577 1.97 Postophikas protecticus, 1787) 101 577 1.97 Portecosta anaptinostas (Lasch, 1815) 111	Panagus (Malicertus) karathurus (Forssakal 1775)	12	316	0.30
Pericularity Constrained Statistics 800 800 900 - Philocherss continuatus (M. Sar, 1861) * 161 595 0.43 Philocherss continuatus (M. Sar, 1861) * 161 595 0.43 Phiannus spinifer H. Milne-Edwards, 1834 49 115 0.26 Pisa armati (Larcille, 1805) 50 151 0.13 Plesionika continontos (S.I. Smith, 1882) 284 123 9.20 Plesionika continontos (S.I. Smith, 1882) 284 123 9.20 Plesionika continearity (S.I. Smith, 1882) 284 123 9.20 Plesionika controcoratis (S. Smith, 1851) 13 673 15.06 Plesionika martia (A. Milne Edwards, 1883) 103 1167 39.15 Plesionika martia (J. Cabrichicus, 1787) 101 557 1.97 Pohtophilus pinoaus (Leach, 1815) 13 2704 8.73 Pontophilus pinoaus (Leach, 1815) 111 713 9.76 Scyllarus pigmeaus (Bate, 1828)* 96 564 0.09 Scyllarus pigmeaus (Bate, 188)* 96	Periodice of the file of the second start of t	12	200	0.39
Philocteris echunidats (M. Sars, 1861) * 161 595 0.43 Pliamus spinfer H. Mine-Edwards, 1834 49 115 0.26 Pisa anotpres (Lach, 1815) 50 151 0.13 Plesionika accambonous (S.I. Smith, 1822) 284 1239 9.20 Plesionika angiai Zariquizy Alvarez, 1955 107 658 8.04 Plesionika netrocarpus (A. Costa, 1871) 53 669 9.11 Plesionika netrocarpus (A. Costa, 1871) 64 694 17.89 Plesionika netrocarpus (A. Costa, 1871) 101 557 1.97 Policheles tiphiops Heller, 1862 113 2000 38.00 Pontophitis provegicus (M. Sars, 1861) 365 1500 0.09 Portoesist cardiculata Lach (1815) 111 17.13 9.76 Rochinia rissoana (P. Roux, 1828) 204 800 1.33 Scyllarides latist Catterille, 1803) 40 77 0.13 Scyllarides latist Catterille, 1815 111 17.13 9.76 Rochinia rissoana (P. Roux, 1828) 204 800 1.3	Pericumenes granulatus Holthulis, 1950	800	800	-
Pitamus spinter H. Milne-Edwards, 1834 49 115 0.26 Pisa armato Laterille, 1803) 47 108 0.26 Pisa armato Laterille, 1803) 50 151 0.13 Plesionika continonous (S.I. Smith, 1882) 284 1239 9.20 Plesionika continonous (S.I. Smith, 1882) 284 1239 9.20 Plesionika continonous (S.I. Smith, 1882) 103 167 3.1506 Plesionika digitolii (Senna, 1903) 113 673 15.066 Plesionika marria (A. Mine Edwards, 1883) 103 1167 3.9.15 Plesionika marria (A. Mine Edwards, 1883) 103 1167 3.9.15 Postphilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus norvegicus (M. Sax, 1861) 365 1500 0.09 Processa condiculato Leach, 1815 111 713 9.76 Scyllarais pysmaeus (Bate, 1883) 40 77 0.13 Scyllarais pysmaeus (Bate, 1883) 222 4000 2.91 Sergesse archica krayson (P. Roux, 1823) 223 400 2.	Philocheras echinulatus (M. Sars, 1861) *	161	595	0.43
Pisa andipee, Uaech, 1815) 47 108 0.26 Plesionika acauthonous (S.I. Smith, 1882) 284 1239 9.20 Plesionika acauthonous (S.I. Smith, 1882) 284 1239 9.20 Plesionika acauthonous (S.I. Smith, 1882) 284 1239 9.20 Plesionika bardwarki (Brandt, 1851) 53 669 9.11 Plesionika hardwarki (Brandt, 1851) 13 673 15.06 Plesionika hardwarki (Brandt, 1851) 13 674 8.73 Plesionika hardwarki (Brandt, 1852) 103 1167 39.15 Polycheles tophlops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Lacak, 1815) 13 774 8.73 Pontophilus spinosus (Lacak, 1815) 111 713 9.76 Rochinia rissoan (P. Roux, 1828) 204 800 1.33 Scyllarus pysameaus (Bata, 1888)* 96 564 0.09 Scregetes arachnidopus (Cocco, 1832) 213 4000 2.31 Scyllarus pysameaus (Bata, 1888)* 96 561 1.71 Rissoades admited Brunnich, 1768 13 49 0.09	Pilumnus spinifer H. Milne-Edwards, 1834	49	115	0.26
Piso onde accountmonuos (S. L. Smith, 1882) 50 151 0.13 Plesionika cantigai Zariquipe Alvarez, 1955 107 658 8.04 Plesionika cantigai Zariquipe Alvarez, 1955 107 658 8.04 Plesionika cantigai Zariquipe Alvarez, 1955 107 658 8.04 Plesionika andria (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika narrai (A. Mine Edwards, 1883) 103 1167 39.15 Plesionika narrai (A. Mine Edwards, 1883) 103 1167 39.15 Poscheles typhips Heller, 1862 113 2000 38.00 Pontophilus phiposus (Leach, 1815) 13 774 8.73 Pontophilus phinosus (Leach, 1815) 111 713 9.76 Pontophilus phinosus (Leach, 1815) 111 713 9.76 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Latreille, 1803) 213 4000 2.91 Sergetse arcticus Kröyer, 1855 570 1500 0.04 Sergit robust (GLS, 1816) 18 741 27.56 Stergit robust (GLS, 1816) 18 74	Pisa armata (Latreille, 1803)	47	108	0.26
Plesionika acanthonorus (S.I. Smith, 1882) 284 123 9.20 Plesionika acimica Zariquicy Alvarez, 1955 107 658 8.04 Plesionika acimica Zariquicy Alvarez, 1955 107 658 8.04 Plesionika acimica (A. Costa, 1871) 64 694 17.89 Plesionika marria (A. Milne Edwards, 1883) 103 1167 39.15 Plesionika marria (A. Milne Edwards, 1883) 103 1774 8.73 Pontophilus privous (Leach, 1815) 113 774 8.73 Pontophilus privous (Leach, 1815) 111 713 9.76 Rochinia rissoma (P. Roux, 1828) 204 800 1.33 Scyllarus programeurs (Bate, 1881* 96 564 0.09 Sergestes archnidopus (Cocco, 1832) 213 4000 2.91 Sergestes archnidopus (Cocco, 1832) 213 400 2.13 Streametard Runnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Streamicous formulosus (Bloch and Schneider, 1801) 300 115	Pisa nodipes (Leach, 1815)	50	151	0.13
Plesionika antigai Zariquiey Alvarez, 1955 107 658 8.04 Plesionika gebardiska edwardsii (Brandt, 1851) 53 669 9.11 Plesionika gebardiska detwardsii (Brandt, 1851) 53 669 9.11 Plesionika marria (A. Milne Edwards, 1853) 103 1167 39.15 Plesionika marria (A. Milne Edwards, 1853) 103 1167 39.15 Poscheles typholps Heller, 1862 113 2000 38.00 Pontophilus norregicus (M. Sars, 1861) 365 1500 0.09 Processa condiculata Leach, 1815 111 713 9.76 Rochnia rissoara (P. Roux, 1828) 204 800 1.33 Scyllarides Instruk (Latrelle, 1803) 40 77 0.13 Scyllarides Instruk (Latrelle, 1803) 40 77 0.13 Scyllarides Instruk (Sartelle, 1888) * 96 564 0.09 Scregetes arciticus Krayer, 1855 570 1500 0.04 Scrylarides Instruk (Sartelle, 1883) 13 49 0.09 Solenostopda 70 13 49	Plesionika acanthonotus (S.I. Smith, 1882)	284	1239	9.20
International angle Languery, Plantary Place Dot Dot Plesionika devardsii (Brand, 1851) 53 669 9.11 Plesionika hereoccarpus (A. Costa, 1871) 64 694 17.89 Plesionika hereoccarpus (A. Costa, 1871) 101 557 1.97 Polycheles typhlops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus spinosus (Leach, 1815) 111 713 9.76 Rochinia rissoana (P. Roux, 1828) 204 800 1.33 Scyllarides lanus (Latreille, 1803) 40 77 0.13 Scyllarides lanus (Latreille, 1803) 40 77 0.13 Scyllarides lanus (Latreille, 1803) 222 4000 2.91 Sergiar obtaix (S.L. Smith, 1822) 222 4000 5.31 Scylaride arachidopus (Scoco, 1832) 213 4000 2.91 Sergiar obtaix (G.L. Smith, 182) 13 49 0.09 Sole	Plesionika antigai Zarioniev Alvarez 1955	107	658	8 04
Instant Communic Control Data Data Data Plesionika pietrocarpus (A. Costa, 1871) 64 673 15.06 Plesionika matria (A. Milne Edwards, 183) 103 1167 39.15 Plesionika marria (A. Cista, 1871) 101 557 1.97 Polycheles typhicps Heller, 1862 113 2000 38.00 Pontophilus norregicus (M. Sars, 1861) 365 1500 0.09 Processa condicultat Leach, 1815 111 713 9.76 Rochnita rissoara (P. Roux, 1828) 204 800 1.33 Scyllarides Latus (Latrelle, 1803) 40 77 0.13 Scyllarides Latus (Latrelle, 1803) 40 77 0.13 Scyllarides Latus (Latrelle, 1803) 40 77 0.13 Scyllarides Latus (Latrelle, 1803) 222 4000 2.91 Scyllarides Latus (Latrelle, 1803) 13 49 0.09 Sciencia carmetrize Trains Brannich, 1768 13 49 0.09 Sciencia carmetrize Brannich, 1768 13 49 0.09	Plasionika adwardsii (Brondt 1951)	52	660	0.11
Plesionika deterocarpus (A. Costa, 1871) 64 694 17.89 Plesionika metria (A. Milne Edwards, 1883) 103 1167 39.15 Plesionika norval (J.C. Fabricius, 1787) 101 557 1.97 Polycheles typhlops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus norvegicus (M. Sars, 1861) 365 1500 0.09 Processa canaliculata Leach, 1815 111 713 9.76 Rochinia rissona (P. Roux, 1828) 204 800 1.33 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Latreille, 188)* 96 564 0.09 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergia robus (Sl.S. mith, 1882) 222 4000 5.31 Solenocera membranacea (Risso, 1816) 18 741 27.56 Somatopoda 12 253 8.86 1.71 Rissoides gandichasus (Bloch and Schneider, 1801) 300 115 0.13 Centrophorus granulosus (Bloch and Schneider, 1801) 300	Plesionika eawarasii (Dialiat, 1651)	112	(72	9.11
Plesionika netrocarpus (A. Costa, 1871) 64 694 17.89 Plesionika narval (A. Cista, 1883) 103 1167 39.15 Plesionika narval (J.C., Fabricius, 1787) 101 557 1.97 Polycheles typhlops Heller, 1862 113 2000 38.00 Portophilus spinosus (Leach, 1815) 13 774 8.73 Portophilus spinosus (Leach, 1815) 111 713 9.76 Rochnia rissoana (P. Roux, 1828) 204 800 1.33 Scyllarids Intu (Latreille, 1803) 40 77 0.13 Scyllarids Intu (Latreille, 1803) 204 800 1.33 Scyllarids Intu (Latreille, 1803) 40 77 0.13 Scyllarids Intu (Latreille, 1803) 213 4000 2.91 Sergestes archnidopus (Cocco, 1832) 213 4000 2.91 Scyconic acrinata Brunnich, 1768 13 49 0.09 Solecocera membranacea (Risso, 1816) 18 741 27.56 Stomatopda	Plesionika gigliolii (Senna, 1903)	113	6/3	15.06
Plesionika marria (A. Milne Edwards, 1883) 103 1167 39.15 Plesionika marria (A. Milne Edwards, 1883) 101 557 1.97 Poliycheles typhlops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus spinosus (Leach, 1815) 111 713 9.76 Rochinia rissona (P. Roux, 1828) 204 800 1.33 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Gaster, 1855) 570 1500 0.04 Sergestes archicus Knyer, 1855 570 1500 0.04 Sergia robus (S.L. Smith, 182) 222 4000 5.31 Steyonia carinata Brunnich, 1768 13 49 0.09 Solenosopai 77 1.33 27.56 Stomatopaid 78 71 73 3.00 Rissoides dasmarsti (Risso, 1816) 18 71 27.36 Stamatopaid 75 3.00 3.00 135 Rissoides dasma	Plesionika heterocarpus (A. Costa, 1871)	64	694	17.89
Plesionika narval (J.C. Fabricius, 1787) 101 557 1.97 Polycheles typholops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus norvegicus (M. Sars, 1861) 365 1500 0.09 Processa canadiculata Leach, 1815 111 713 9.76 Rochinia rissoana (P. Roux, 1828) 204 800 1.33 Scyllarids Intu (Latreille, 1803) 40 77 0.13 Scyllarus pygmeaus (Bate, 1888)* 96 564 0.09 Sergestes archinads Brunnich, 1768 13 49 0.09 Scyconic acrinata Brunnich, 1768 13 49 0.09 Solemotopola 75 3.00 Rissoides admaresti (Risso, 1816) 86 615 1.71 Rissoides admaresti (Risso, 1816) 89 675 3.00 Rissoides admaresti (Risso, 1816) 89 675 3.00 Stromatophorus granulosus (Bloch and Schneider, 1801) 300 115 0.13 Centrophorus uyato (Rafinesque, 180) 748 96	Plesionika martia (A. Milne Edwards, 1883)	103	1167	39.15
Polycheles ryphlops Heller, 1862 113 2000 38.00 Pontophilus spinosus (Leach, 1815) 13 774 8.73 Portophilus spinosus (Leach, 1815) 111 713 9.76 Rochina irsisonan (P. Roux, 1828) 204 800 1.33 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Latreille, 1803) 40 0.09 291 Sergestes arcicius Krysyer, 1855 570 1500 0.04 Sergia robusta (S.L. Smith, 182) 222 4000 5.31 Stoige operatic (S.L. Smith, 182) 13 49 0.09 Solenocera membranacea (Risso, 1816) 86 615 1.71 Rissoided semaresti (Rissoi, 816) 89 675 3.00 Rissoided semaresti (Rissoi, 816) 89 62 0.04 <td< td=""><td>Plesionika narval (J.C. Fabricius, 1787)</td><td>101</td><td>557</td><td>1.97</td></td<>	Plesionika narval (J.C. Fabricius, 1787)	101	557	1.97
Pontophilus spinosus (Leach, 1815) 13 774 8.73 Pontophilus norvegicus (M. Sars, 1861) 365 1500 0.09 Processa canadiculata Leach, 1815 111 713 9.76 Rochnia rissoana (P. Roux, 1828) 204 800 1.33 Scyllarides Lattes (Latreille, 1803) 40 77 0.13 Scyllarides Lattes (Latreille, 1803) 213 4000 2.91 Sergestes arachnidopus (Cocco, 182) 222 4000 5.31 Siconic carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stronatopota	Polycheles typhlops Heller, 1862	113	2000	38.00
Pontophilus norvegicus (M. Sars, 1861) 365 1500 0.09 Processa canaliculata Leach, 1815 111 713 9,76 Rochina rissonan (P. Roux, 1828) 204 800 1.33 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scrylarides latus (Latreille, 1803) 40 77 0.13 Scrylarides garachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes archidopus (Cocco, 1832) 222 4000 5.31 Steyonia carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda 75 3.00 Rissoides garillous (Giesbercht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthye C C Chinaera mostrosa Linnaeus, 1758 173 1239 10.10 Dalatius licha (Bonnaterre, 1788) 315 <t< td=""><td>Pontophilus spinosus (Leach, 1815)</td><td>13</td><td>774</td><td>8.73</td></t<>	Pontophilus spinosus (Leach, 1815)	13	774	8.73
Foressa conadiculata Leach, 1815 111 713 9.76 Rochinia rissoana (P, Roux, 1828) 204 800 1.33 Scyllarides Luts (Latreille, 1803) 40 77 0.13 Scyllarides Luts (Latreille, 1803) 40 0.09 Solgenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda	Pontophilus porvegicus (M Sars 1861)	365	1500	0.09
Processa Cardina Leada, 1917 111 111 111 113 2.00 Rochina rissonan (P. Roux, 1828) 204 800 1.33 Scyllarides latus (Latreille, 1803) 40 77 0.13 Scyllarides latus (Bate, 1888)* 96 564 0.09 Sergestes arachinidopus (Cocco, 1832) 213 4000 2.91 Sergestes arachinidopus (Cocco, 1832) 222 4000 5.31 Steyonia carinata Brunnich, 1768 13 49 0.09 Solenocera membrancace (Risso, 1816) 18 741 27.56 Stomatopoda - - - - Pseudosquillopsis ceristi (Roux, 1828) 86 615 1.71 Rissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 233 8.86 Chondrichutyes - - - <t< td=""><td>Processa canaliculata Leoch 1815</td><td>111</td><td>713</td><td>0.05</td></t<>	Processa canaliculata Leoch 1815	111	713	0.05
Rochmar hissoana (P. Kolix, 1828) 204 800 1.33 Scyllarides Latus (Latville, 1803) 40 77 0.13 Scyllarides Latus (Latville, 1803) 40 77 0.13 Scyllarides Latus (Latville, 1803) 40 77 0.13 Scyllarides Latus (Latville, 1803) 213 4000 2.91 Sergestes arachidopus (Occco, 1832) 213 4000 5.31 Stery arabusta (S.L. Smith, 1882) 222 4000 5.31 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda	P 1::::::::::::::::::::::::::::::::::::	204	/15	9.70
Scyllara by gymaeus (Bate, 1888)* 96 564 0.09 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergia robust (S.I. Smith, 1852) 222 4000 5.31 Sicyonia carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda	Rochinia rissoana (P. Roux, 1828)	204	800	1.55
Scyllarus pygmaeus (Bate, 1888) * 96 564 0.09 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes arachnidopus (Cocco, 1832) 222 4000 5.31 Sityonia carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda	Scyllarides latus (Latreille, 1803)	40	11	0.13
Sergestes arachnidopus (Cocco, 1832) 213 4000 2.91 Sergestes arcticus Krøyer, 1855 570 1500 0.04 Sergia robusta (S.I. Smith, 1882) 222 4000 5.31 Sicyonia carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda Pseudosquillopsis cerisii (Roux, 1828) 86 615 1.71 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Kissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla manits (Linnaeus, 1758) 12 253 8.86 Chondrichtyes Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Datatias licha (Bonnatere, 1788) 315 1239 10.10 Datatias licha (Bonnatere, 1788) 617 617 0.04 Dipturus oxyrinchus (Linnaeus, 1758) 64 1500 32.09 <td>Scyllarus pygmaeus (Bate, 1888) *</td> <td>96</td> <td>564</td> <td>0.09</td>	Scyllarus pygmaeus (Bate, 1888) *	96	564	0.09
Sergestes arcticus Krøyer, 18555701500 0.04 Sergia robusta (S.I. Smith, 1882)22240005.31Sicyonia carinata Brunnich, 17681349 0.09 Solenocera membranacea (Risso, 1816)1874127.56Stomatopoda </td <td>Sergestes arachnidopus (Cocco, 1832)</td> <td>213</td> <td>4000</td> <td>2.91</td>	Sergestes arachnidopus (Cocco, 1832)	213	4000	2.91
Sergia robusta (S.I. Smith, 1882)2224000 5.31 Sicyonia carinata Brunnich, 176813490.09Solenocera membranacea (Risso, 1816)1874127.56Stomatopoda74127.56Pseudosquillopsis cerisii (Roux, 1828)866151.71Rissoides desmaresti (Risso, 1816)896753.00Rissoides desmaresti (Risso, 1816)926053.94Squilla mantis (Linnaeus, 1758)122538.86Chondrichthyes </td <td>Sergestes arcticus Krøyer, 1855</td> <td>570</td> <td>1500</td> <td>0.04</td>	Sergestes arcticus Krøyer, 1855	570	1500	0.04
Siconia carinata Brunnich, 1768 13 49 0.09 Solenocera membranacea (Risso, 1816) 18 741 27.56 Stomatopoda 741 27.56 Pseudosquillopsis cerisii (Roux, 1828) 86 615 1.71 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Rissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla mattis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes 748 962 0.04 Chimaera monstrosa Linnaeus, 1758 173 1239 10.10 Dalatias licha (Bonnaterre, 1788) 315 1239 5.99 Dasyatis centroura (Michill, 1815) 49 49 0.04 Dasyatis centroura (Linnaeus, 1758) 12 130 1.03 Dipturus batis (Linnaeus, 1758) 617 617 0.04 Disputarus spirax (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 1810 140 1500 39.15 Gymnura altavela (Linnaeus, 1758) 219	Sergia robusta (S.I. Smith, 1882)	222	4000	5.31
Solenocera membrancea (Risso, 1816) 18 741 27.56 Stomatopoda	Sicvonia carinata Brunnich 1768	13	49	0.09
Stomatopoda 10 141 21.50 Pseudosquillopsis cerisii (Roux, 1828) 86 615 1.71 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Siguilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes	Solenocera membranacea (Risso 1816)	18	741	27.56
Stonatopual Pseudosynillepsis cerisii (Roux, 1828) 86 615 1.71 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Rissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Centrophorus uyato (Rafinesque, 1810) 748 962 0.04 Chimaera monstrosa Linnaeus, 1758 173 1239 5.99 Dayatis certroura (Mitchill, 1815) 49 49 0.04 Dipturus batis (Linnaeus, 1758) 12 130 1.03 Dipturus batis (Linnaeus, 1758) 617 617 0.04 Dipturus oxyrinchus (Linnaeus, 1758) 429 1218 0.60 Emoopterus spinax (Linnaeus, 1758) 140 1500 32.99 Galeus melastomus Rafinesque, 1810 140 1500 39.15 Gymmura altavela (Linnaeus, 1758) 12 59 1.75	Stemotopada	10	/ 41	27.50
Pseudosquittopsis certsii (Roux, 1828) 86 615 1.71 Rissoides desmaresti (Risso, 1816) 89 675 3.00 Rissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Centrophorus uyato (Rafinesque, 1810) 748 962 0.04 Chimaera monstrosa Linnaeus, 1758 173 1239 5.99 Dasyatis centroura (Mitchill, 1815) 49 49 0.04 Dasyatis pastinaca (Linnaeus, 1758) 12 130 1.03 Dipturus batis (Linnaeus, 1758) 617 617 0.04 Dipturus oxyrinchus (Linnaeus, 1758) 429 1218 0.60 Etmopterus spinax (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 1810 140 1500 32.09 Galeus melastomus Rafinesque, 178) 322 345 0.04 Heptranchias perlo (Bonnaterre, 1788) 322 345 0.09		0.6	<i>c</i> 1 <i>c</i>	1.71
Rissoides desmaresti (Risso, 1816) 89 675 3.00 Rissoides pallidus (Giesbrecht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes	Pseudosquillopsis cerisii (Roux, 1828)	86	615	1./1
Rissoides pallidas (Giesbrecht, 1910) 92 605 3.94 Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Centrophorus uyato (Rafinesque, 1810) 748 962 0.04 Chindaria monstrosa Linnaeus, 1758 173 1239 5.99 Dasyatis centroura (Mitchill, 1815) 49 49 0.04 Dasyatis centroura (Mitchill, 1815) 49 49 0.04 Dasyatis centroura (Mitchill, 1815) 49 49 0.04 Dasyatis pastinaca (Linnaeus, 1758) 12 130 1.03 Dipturus oxyrinchus (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 1810 140 1500 39.15 Gymura altavela (Linnaeus, 1758) 345 0.04 Heptranchias perlo (Bonnaterre, 1788) 322 345 0.09 Leucoraja circularis (Couch, 1838) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758 16 85 0.26 Oxynotus ce	Rissoides desmaresti (Risso, 1816)	89	675	3.00
Squilla mantis (Linnaeus, 1758) 12 253 8.86 Chondrichthyes	Rissoides pallidus (Giesbrecht, 1910)	92	605	3.94
Chondrichthyes 2 Centrophorus granulosus (Bloch and Schneider, 1801)30011550.13Centrophorus granulosus (Bloch and Schneider, 1801)7489620.04Chimaera monstrosa Linnaeus, 1758173123910.10Dalatias licha (Bonnaterre, 1788)31512395.99Dasyatis centroura (Mitchill, 1815)49490.04Dasyatis centroura (Mitchill, 1815)49490.04Dasyatis pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)42912180.60Etmopterus spinax (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)21911550.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja circularis (Couch, 1838)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)12720.90Raja caterias Delaroche, 1809185411.45Raja clavata Linnaeus, 17581495600.09Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758124301.54Raja clavata Linna	Squilla mantis (Linnaeus, 1758)	12	253	8.86
Centrophorus granulosus (Bloch and Schneider, 1801) 300 1155 0.13 Centrophorus uyato (Rafinesque, 1810) 748 962 0.04 Chimaera monstrosa Linnaeus, 1758 173 1239 10.10 Dalatias licha (Bonnaterre, 1788) 315 1239 5.99 Dasyatis centroura (Mitchill, 1815) 49 49 0.04 Dasyatis pastinaca (Linnaeus, 1758) 12 130 1.03 Dipturus batis (Linnaeus, 1758) 617 617 0.04 Dipturus oxyrinchus (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 1810 140 1500 39.15 Gymnura altavela (Linnaeus, 1758) 345 345 0.04 Heptranchias perlo (Bonnaterre, 1788) 322 345 0.09 Leucoraja circularis (Couch, 1838) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 12 72 0	Chondrichthyes			
Centrophorus uyato (Rafinesque, 1810)7489620.04Chimaera monstrosa Linnaeus, 1758173123910.10Dalatias licha (Bonnaterre, 1788)31512395.99Dasyatis centroura (Mitchill, 1815)49490.04Dasyatis pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 175812720.90Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 19105325320.04	Centrophorus granulosus (Bloch and Schneider, 1801)	300	1155	0.13
Interpretation of the second	Centrophorus uvato (Rafinesque, 1810)	748	962	0.04
Dalatias licha (Bonnaterre, 178)17512571010Dalatias licha (Bonnaterre, 178)31512395.99Dasyatis centroura (Mitchill, 1815)49490.04Dasyatis pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus varinchus (Linnaeus, 1758)42912180.60Etmopterus spinax (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758124301.54Raja antraletus Linnaeus, 1758124301.54Raja acterias Delaroche, 18091191190.04Raja acterias Delaroche, 18091191190.04Raja randula Delaroche, 18091191190.04Raja randula Delaroche, 180	Chimaera monstrosa Linnaeus 1758	173	1230	10.10
Data Intra (Bonnaterie, 1766)51512593.99Dasyatis centroura (Mitchill, 1815)49490.04Dasyatis pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 175812430 <td< td=""><td>Dalatias licha (Bonnoterra, 1790)</td><td>215</td><td>1237</td><td>5 00</td></td<>	Dalatias licha (Bonnoterra, 1790)	215	1237	5 00
Dasyatis centrolra (Mitchili, 1815)4949490.04Dasyatis pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)42912180.60Etmopterus spinax (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 175816850.26Oxynotus centrina (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)4958000.09Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 17581495600.09Raja miraletus Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758190.13Raja montagui Fowler, 1910Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 19105325320.04	Damatia controlla (Dominatine, 1700)	515	1239	5.99
Dasyatts pastinaca (Linnaeus, 1758)121301.03Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)42912180.60Etmopterus spinax (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)2223450.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758124301.54Raja anterias Delaroche, 1809313140.13Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04	Dasyans centroura (Mitchill, 1815)	49	49	0.04
Dipturus batis (Linnaeus, 1758)6176170.04Dipturus oxyrinchus (Linnaeus, 1758)42912180.60Etmopterus spinax (Linnaeus, 1758)64150032.09Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Leucoraja circularis (Couch, 1838)21911550.09Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja clavata Linnaeus, 1758124301.54Raja miraletus Linnaeus, 1758124301.54Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04	Dasyatis pastinaca (Linnaeus, 1758)	12	130	1.03
Dipturus oxyrinchus (Linnaeus, 1758) 429 1218 0.60 Etmopterus spinax (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 1810 140 1500 39.15 Gymnura altavela (Linnaeus, 1758) 345 345 0.04 Heptranchias perlo (Bonnaterre, 1788) 322 345 0.09 Hexanchus griseus (Bonnaterre, 1788) 219 1155 0.09 Leucoraja circularis (Couch, 1838) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758 160 587 0.21 Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 12 430 1.54 Raja antraletus Linnaeus, 1758 12 430 1.54	Dipturus batis (Linnaeus, 1758)	617	617	0.04
Etmopterus spinax (Linnaeus, 1758) 64 1500 32.09 Galeus melastomus Rafinesque, 18101401500 39.15 Gymnura altavela (Linnaeus, 1758) 345 345 0.04 Heptranchias perlo (Bonnaterre, 1788) 322 345 0.09 Hexanchus griseus (Bonnaterre, 1788) 219 1155 0.09 Leucoraja circularis (Couch, 1838) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758 160 587 0.21 Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja montagui Fowler, 1910 31 314 0.13 Raja antaletus Linnaeus, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Dipturus oxyrinchus (Linnaeus, 1758)	429	1218	0.60
Galeus melastomus Rafinesque, 1810140150039.15Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)4958000.09Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja radula Delaroche, 1809313140.13Raja radula Delaroche, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04	Etmopterus spinax (Linnaeus, 1758)	64	1500	32.09
Gymnura altavela (Linnaeus, 1758)3453450.04Heptranchias perlo (Bonnaterre, 1788)3223450.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)4958000.09Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja radula Delaroche, 1809313140.13Raja radula Delaroche, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04	Galeus melastomus Rafinesque, 1810	140	1500	39.15
Heptranchias perlo 0.04 $Heptranchias perlo0.04Heptranchias perlo0.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)18Leucoraja fullonica Linnaeus, 1758160S870.21Mustelus mustelus (Linnaeus, 1758)12S591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)4958000.09Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja miraletus Linnaeus, 1758124301.54Raja montagui Fowler, 1910313113140.13Raja radula Delaroche, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04$	Gymnura altavela (Linnaeus 1758)	345	345	0.04
Ineproduction of the perior (boundarie), 17803223430.09Hexanchus griseus (Bonnaterre, 1788)21911550.09Leucoraja circularis (Couch, 1838)1810091.58Leucoraja fullonica Linnaeus, 17581605870.21Mustelus mustelus (Linnaeus, 1758)125591.75Myliobatis aquila (Linnaeus, 1758)16850.26Oxynotus centrina (Linnaeus, 1758)4958000.09Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817)12720.90Raja asterias Delaroche, 1809185411.45Raja clavata Linnaeus, 1758124301.54Raja miraletus Linnaeus, 1758124301.54Raja montagui Fowler, 1910313140.13Raja montagui Fowler, 19105325320.04	Hantranchias north (Bonnaterre 1788)	272	345	0.04
Itexanchus griseus (Bolinaterie, 1768) 219 1155 0.09 Leucoraja circularis (Couch, 1838) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758 160 587 0.21 Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 12 430 1.54 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Haranahus arisaus (Dornataria 1700)	344	1155	0.09
Leucoraja circularis (Couch, 1858) 18 1009 1.58 Leucoraja fullonica Linnaeus, 1758 160 587 0.21 Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 12 430 1.54 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	I = xanchus griseus (Donnaterre, 1/88)	219	1155	0.09
Leucoraja fullonica Linnaeus, 1758 160 587 0.21 Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 16 85 0.26 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 12 430 1.54 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja radula Delaroche, 1809 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Leucoraja circularis (Couch, 1838)	18	1009	1.58
Mustelus mustelus (Linnaeus, 1758) 12 559 1.75 Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Leucoraja fullonica Linnaeus, 1758	160	587	0.21
Myliobatis aquila (Linnaeus, 1758) 16 85 0.26 Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Mustelus mustelus (Linnaeus, 1758)	12	559	1.75
Oxynotus centrina (Linnaeus, 1758) 495 800 0.09 Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Myliobatis aquila (Linnaeus, 1758)	16	85	0.26
Pteromylaeus bovinus (Geoffroy Saint-Hilaire, 1817) 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Oxynotus centrina (Linnaeus, 1758)	495	800	0.09
Raja asterias Delaroche, 1809 12 72 0.90 Raja asterias Delaroche, 1809 18 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Pteromylaeus hovinus (Geoffroy Saint-Hilaire 1817)	12	72	0.90
Raja asterius Delabelie, 1605 16 541 1.45 Raja clavata Linnaeus, 1758 149 560 0.09 Raja miraletus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Raja astorias Delaroche 1809	10	5/1	1.45
Raja miraletus, 17581495000.09Raja miraletus Linnaeus, 1758124301.54Raja montagui Fowler, 1910313140.13Raja radula Delaroche, 18091191190.04Rostroraja alba (Lacépède, 1803)5325320.04	Raja alavata Linnoous 1759	140	560	0.00
Raja miratetus Linnaeus, 1758 12 430 1.54 Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	Ruju ciuvuiu Linnacus, 1750	149	300	0.09
Raja montagui Fowler, 1910 31 314 0.13 Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	<i>Kaja miraletus</i> Linnaeus, 1758	12	430	1.54
Raja radula Delaroche, 1809 119 119 0.04 Rostroraja alba (Lacépède, 1803) 532 532 0.04	kaja montagui Fowler, 1910	31	314	0.13
<i>Rostroraja alba</i> (Lacépède, 1803) 532 532 0.04	Raja radula Delaroche, 1809	119	119	0.04
	Rostroraja alba (Lacépède, 1803)	532	532	0.04

SPECIES	Dept	h (m)	Foc (%)
Chondrichthyes	Min.	Max.	
Scyliorhinus canicula (Linnaeus, 1758)	20	634	4 54
Scyliarhinus stellaris (Linnaeus, 1758)	50	50	0.04
Somniogus (Phinogeometris) asstuatus (Di 1010)	500	500	0.04
Somniosus (Rhinoscymnus) rostratus (Risso,1810)	590	590	-
Squalus acanthias Linnaeus, 1758	20	20	0.04
Squalus blainvillei (Risso, 1826)	688	688	0.04
Torpedo (Torpedo) marmorata Risso, 1758	12	525	3.47
Torpedo (Tetronarce) nobiliana Bonaparte, 1835	18	675	1.58
Tornedo (Tornedo) tornedo (Linnseus, 1758)	12	550	1.58
Orterialthere	12	550	1.50
Osteicninyes	1.42	207	0.04
Acantholabrus palloni (Risso, 1810)	142	297	0.26
Alosa alosa (Linnaeus, 1758)	33	56	0.13
Alosa fallax (Lacepède, 1803)	42	125	0.09
Anthias anthias (Linnaeus, 1758)	101	153	0.17
Argenting sphyraena Linnaeus 1758	18	675	12 45
Arguranglacus hamigumnus Cocco, 1829	147	1210	4.15
Arises and hele mission (Delege de la 1900)	147	240	4.15
Ariosoma balearicum (Delaroche, 1809)	24	340	0.73
Arnoglossus kessleri Shmidt, 1915	124	124	0.04
Arnoglossus laterna (Walbaum, 1792)	12	637	23.92
Arnoglossus rueppelli (Cocco, 1844)	13	675	12.02
Arnoglossus thori Kyle, 1913	15	363	5.73
Aspitriala cuculus (Linnaeus, 1758)	17	478	12.28
Aulonus filamentosus (Plach 1702)	120	526	0.24
Autopus fitumentosus (Diocii, 1792)	150	550	0.54
Auxis rochei rochei (Kisso, 1810)	5/3	5/3	-
Balistes capriscus Gmelin, 1789	13	48	0.34
Bathophilus nigerrimus Giglioli, 1884	350	586	0.13
Bathypterois mediterraneus Bauchot, 1962	659	3300	0.13
Benthocometes robustus (Goode & Bean, 1886)	85	767	1.93
Benthosema alaciale (Reinhardt 1837)	161	760	6.80
Demnosenia glaciale (Reinlardi, 1657)	101	107	0.80
Blennius oceilaris Linnaeus, 1758	17	18/	1.14
Boops boops (Linnaeus, 1758)	12	379	25.07
Bothus podas (Delaroche, 1809)	11	680	4.71
Buglossidium luteum (Risso, 1810)	16	520	0.34
Callanthias ruber (Rafinesque, 1810)	56	418	0.17
Callionymus lyra Linnaeus 1758	133	133	0.04
Calliemmus manulatus Defineerus 1810	10	504	11.51
Cattonymus macutatus Rannesque, 1810	12	394	11.51
Callionymus pusillus Delaroche, 1809	20	20	0.04
Callionymus risso Lesueur, 1814	12	370	0.17
Callyonimus fasciatus Valenciennes, 1837	50	92	0.04
Campogramma glaycos (Lacepède, 1801)	25	25	0.04
Capros aper (Linnaeus, 1758)	14	673	18.01
Carany anysos (Mitchill 1815)	16	16	0.04
Carana abarahya Cooffron Spint Hilping 1917	10	220	0.04
Caranx monchus Geolifoy Saint-Hilaire, 1817	30	320	0.17
Carapus acus (Brünnich, 1768)	13	557	1.11
Cataetyx laticeps Koefoed, 1927 *	2000	3300	-
Centracanthus cirrus Rafinesque, 1810	12	350	0.90
Centrolophus niger (Gmelin, 1789)	204	878	2.35
Cepola macrophthalma Linnaeus 1758	18	684	16 99
Caratosconalus madaransis (Lowe 1830)	161	1038	4.62
Chaulia dua ala ani Sabaaidan 1801	264	1152	9.20
Chamber Storm Schneider, 1801	204	1152	0.50
Cheliaonichthys lastoviza (Brünnich, 1/68)	12	534	8.30
Chelidonichthys lucernus Linnaeus, 1758	12	462	20.54
Chelidonichthys obscurus (Linnaeus, 1764)	23	299	0.68
Chlopsis bicolor Rafinesque, 1810	97	629	0.47
Chlorophthalmus agassizi Bonaparte, 1840	50	698	26.83
Cichlasoma himaculatum (Linnaeus, 1758)	22	268	0.13
Ciolathana humuani Iooponoon & T ^e ring 1000	1200	200	0.15
Cicionone braueri Jespersen & Taning, 1926	1200	1200	-
Citharus linguatula (Linnaeus, 1758)	13	300	0.90
Coelorinchus caelorhincus (Risso, 1810)	127	1034	25.33
Coelorinchus mediterraneus Iwamoto & Ungaro, 2002 *	917	1500	-
Conger conger (Linnaeus, 1758)	12	1098	22.68
Coris julis (Linnaeus, 1758)	11	60	0.47
Corvinhagina hinnurus Linnaeus 1758	520	520	-
Complete and the another (11-11-11-1000) *	1500	1700	-
Corypnaenoiaes guentneri (Vallant, 1888) *	1500	1700	-
Coryphaenoides mediterraneus (Giglioli, 1893) *	1054	4000	-
Cubiceps gracilis (Lowe, 1843)	508	667	0.09
Dactylopterus volitans (Linnaeus, 1758)	12	55	0.86
Dalophis imberbis (Delaroche, 1809)	25	429	0.98
Deltentosteus collonianus (Risso 1820) *	153	152	0.04
Deltentestore and minageletic (Valenciere 1927)	10	1JJ 542	10.04
Dettemosteus quaarimacutatus (Valenciennes, 1857)	12	545	12.84
Dentex dentex (Linnaeus, 1758)	15	258	0.30
Dentex gibbosus (Rafinesque, 1810)	15	15	0.04
Diaphus holti Tåning, 1918	316	1054	0.17
Diaphus metopoclampus (Cocco, 1829) *	312	662	0.17
Diaphus rafinesaueii (Cocco, 1838)	330	676	0.17
Diagntagebus Jahray (Linnoous, 1750)	15	10	0.12
Dicentiarchus iubras (Lilliacus, 1730)	15	10	0.13

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Lepidotrigla cavillone (Lacepède, 1801) 12 501 14.38
Lesueurigopius suerii (Risso, 1810) 15 530 3.08
Leusieuriaobius friesii (Malm 1874) 12 549 12 20
$\begin{array}{ccc} Listic arrived (min, 1017) & 12 & 547 & 1220 \\ Listic arrived (min, 1759) & 20 & 20 & 0.04 \\ \end{array}$
Licha anta (Linnaeus, 1758) 59 59 0.04
Lithognathus mormyrus (Linnaeus, 1/58) 11 120 2.05
<i>Liza aurata</i> (Risso, 1810) 15 15 0.04
<i>Liza ramada</i> (Risso, 1826) 12 77 0.21
Lobianchia dofleini (Zugmayer, 1911) 16 1130 1.58
Lobianchia gemellarii (Cocco, 1838) * 528 528 0.04
Lonhius budgagsa Spinola 1807 13 745 43 87
Lophine stateguese spinon, 1007 13 140 43.02 Lophine sized spinon, 1207 12 07
Lopinus piscuorius Linnacus, 1750 10 072 13.80 Manual and manual linnacus, 1750 12 12 12 12
<i>Macrorampnosus scolopax</i> (Linnaeus, 1758) 12 674 21.31
<i>Mauroticus muelleri</i> (Gmelin, 1789) 170 339 0.30
Merlangius merlangus (Linnaeus, 1758)604120.09
<i>Merluccius merluccius</i> (Linnaeus, 1758) 14 828 60.63
Microchirus ocellatus (Linnaeus, 1758) 16 50 0.86
Microchirus variegatus (Donovan 1808) 12 181 0.04
Micromanistring participants (Donormin, 1000) 12 101 0.74
Mile metal Question 49 815 35.43 Mile metal Generation 150 151 151
Mola mola (Linnaeus, 1758) 151 151 -
Molva dipterygia (Pennant, 1784) 20 800 20.45
Monochirus hispidus Rafinesque, 1814 12 520 0.34
Mora moro (Risso, 1810) 148 1239 16.65
Mugil cephalus Linnaeus, 1758 12 18 0.13
Mullus barbatus barbatus Linnaeus, 1758 11 379 30 51
Mullus surmulatus Linnacus 1789 11 672 17 67
Initiation Summatrix Limitation Limitation <thlimitation< th=""> Limitation <t< td=""></t<></thlimitation<>
Maraena netena Linnaeus, 1758 58 155 0.13
Myctophum punctatum Rafinesque, 1810 253 1014 4.45
Nansenia oblita (Facciolà, 1887) 461 535 0.04
Nemichthys scolopaceus Richardson, 1848 123 859 0.94
Nettastoma melanurum Rafinesque, 1810 63 1500 21.01
Nezumia sclerorhynchus (Valenciennes 1838) 128 1500 35.30
Natocanthus hongarte Risso 1840 83 1500 1974
Notocomplus donactus (Costo 1944) 100 100 10.14
information 153 878 5.48 0 1:1:1:1:1:1:1:1:1:1:1:1:1:1:1:1:1:1:1:
<i>Opnicntnus ruțus</i> (Katinesque, 1810) 12 508 2.82

SPECIES	Dept	th (m)	Foc (%)
Osteichthyes	Min.	Max.	
Onhidion barbatum Linnaeus 1758	18	687	5.18
	10	087	5.16
Ophidion rochei Muller, 1845	655	655	-
Ophisurus serpens (Linnaeus, 1758)	50	346	0.47
Pagellus acarne (Risso, 1827)	12	575	14.25
Pagellus hogarayeo (Brijnnich 1768)	12	1000	14 46
Pagellus erythrinus (Linnaeus, 1758)	11	535	17.29
D (1: 1750)	11	102	17.29
Pagrus pagrus (Linnaeus, 1758)	12	183	4.49
Parablennius tentacularis (Brünnich, 1768)	27	27	-
Paralepis speciosa Bellotti, 1878	18	926	1.67
Peristedion cataphractum (Linnaeus, 1758)	14	570	4.79
Phycis blannoidas (Brünnich, 1768)	3/	1155	58 92
Pl : 1 : (1: 1766)	22	(70)	0.56
Phycis phycis (Linnaeus, 1766)	23	672	0.56
Polyprion americanus (Bloch & Schneider, 1801)	18	712	0.21
Pomatomus saltatrix (Linnaeus, 1766)	22	26	0.09
Psetta maxima (Linnaeus, 1758)	13	13	0.04
Sarding nilchardus (Walbaum, 1792)	12	470	13.61
Sandinal prenaraus (Waldadin, 1772)	12	470	2.50
Saraineila aurita valenciennes, 1847	12	1/1	3.59
Sarpa salpa (Linnaeus, 1758)	17	17	0.04
Schedophilus ovalis (Cuvier, 1833)	510	510	0.04
Sciaena umbra Linnaeus, 1758	32	32	0.04
Scomber ignoricus Houtturn 1782	25	401	0.68
Scomber juponicus Houldyn, 1782	2.5	401	0.08
Scomber scombrus Linnaeus, 1758	15	260	4.28
Scophthalmus rhombus (Linnaeus, 1758)	61	61	0.04
Scorpaena elongata Cadenat, 1943	16	383	0.98
Scornaena lonnei Cadenat 1943	30	30	_
Scorpacha topper Cadena, 1945	10	50	2.10
Scorpaena notata Raimesque, 1810	18	555	2.10
Scorpaena porcus Linnaeus, 1758	11	525	1.88
Scorpaena scrofa Linnaeus, 1758	11	400	1.71
Seriola dumerili (Risso, 1810)	12	292	0.34
Sarranus cabrilla (Linnaeus, 1758)	11	330	12.24
Services Long (Lingers, 1750)	12	500	21.44
Serranus hepatus (Linnaeus, 1758)	12	502	21.44
Serranus scriba (Linnaeus, 1758)	15	125	0.26
Solea solea (Linnaeus, 1758)	12	401	1.16
Sparisoma cretense (Linnaeus, 1758)	14	14	0.04
Sparisonia creata Linnacus, 1750	15	57	0.20
Sparas auraia Linnacus, 1758	15	57	0.39
Sphoeroides pachygaster (Müller & Troschel, 1848)	66	400	1.20
Sphyraena sphyraena (Linnaeus, 1758)	12	209	1.24
Spicara maena (Linnaeus, 1758)	12	585	20.84
Spicara smaris (Linnaeus, 1758)	11	380	17 54
Sponduliosoma canthamus (Linnoous, 1758)	29	62	0.00
Sponayuosoma caninarus (Linnaeus, 1758)	30	05	0.09
Sprattus sprattus sprattus (Linnaeus, 1758)	20	255	0.56
Stomias boa boa (Risso, 1810)	34	1039	10.91
Stromateus fiatola Linnaeus, 1758	20	20	0.04
Sudis hvalina Rafinesque 1810	31	1132	0.47
Sumbolonhomus veranni (Morean, 1888)	190	1007	2.12
Symbolophorus veranyi (Moleau, 1888)	109	1007	3.12
Symphodus cinereus (Bonnaterre, 1788)	12	40	0.39
Symphodus mediterraneus (Linnaeus, 1758)	27	40	0.04
Symphodus melops (Linnaeus, 1758)	27	27	-
Symphodus raissali (Risso 1810)	27	27	_
Symphotus rossuu (1350, 1010)	12	120	0.04
Sympnoaus rostratus (Bloch, 1791)	13	120	0.04
Symphodus tinca (Linnaeus, 1758)	18	18	-
Symphurus ligulatus (Cocco, 1844)	18	1118	10.10
Symphurus nigrescens Rafinesque, 1810	12	1130	34.10
Synanturichthys kleinii (Risso 1827) *	16	171	0.21
Syndplationary's Retail (Risso, 1027)	10	672	2.04
Synchiropus phaeton (Gunther, 1861)	12	0/3	5.94
Syngnathus acus Linnaeus, 1758	12	125	1.50
Syngnathus taenionotus Canestrini, 1871 *	101	101	0.04
Syngnathus tenuirostris Rathke, 1837 *	60	60	0.04
Syngnathus tumbla Linnoous, 1759	15	508	0.17
Syngiaunus typine Linnacus, 1750	1.0	J70 225	0.17
Synodus saurus (Linnaeus, 1758)	11	335	2.70
Tetragonurus cuvieri (Risso, 1810)	300	300	-
Trachinus draco Linnaeus, 1758	12	375	9.41
Trachinus radiatus Cuvier 1829	16	300	0.21
Trachurus maditarrangus (Steindachnar 1960)	12	661	1/ 55
The land in the second stellar (Den 11 1, 1005)	12	001	14.33
<i>I rachurus picturatus</i> (Bowdich, 1825)	12	/63	10.44
Trachurus trachurus (Linnaeus, 1758)	12	763	33.46
Trachyrincus scabrus (Risso, 1810)	289	1239	7.83
Triola lyra Linnaeus 1758	12	673	11.60
Trisontarie minutes (Linnons 1759)	25	570	0.07
Lininaeus, 1750)	23	320	9.97
Uranoscopus scaber Linnaeus, 1758	11	425	13.44
Vinciguerria attenuata (Cocco, 1838) *	73	569	1.20
Xyrichthys novacula (Linnaeus, 1758)	11	105	2.91
Zeus faber Linnaeus, 1758	16	429	10.65
Zestarisasson ankiacankalus (Dellas 1914)	01	01	0.04
Losiensessor opnioceptatus (Pallas, 1814)	91	91	0.04