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Commented checklist of marine fishes from the Galicia Bank seamount (NW Spain)

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Abstract

A commented checklist containing 139 species of marine fishes recorded at the Galician Bank seamount is presented. The list is based on nine prospecting and research surveys carried out from 1980 to 2011 with different fishing gears. The ichthyofauna list is diversified in 2 superclasses, 3 classes, 20 orders, 62 families and 113 genera. The largest family is Macrouridae, with 9 species, followed by Moridae, Stomiidae and Sternoptychidae with 7 species each. The trachichthid *Hoplostethus mediterraneus* and the morid *Lepidion lepidion* were the most abundant species. Biogeographically, the Atlantic group, with 113 species (81.3%) is the best represented, followed by the Lusitanian one with 17 species (12.2%). Data on species abundance, as number of individuals caught, size and depth are reported. Habitat, distribution and vulnerability status are commented. Moreover, biometric data and meristic counts are also reported for several species. The results obtained showing a high fish biodiversity and a sensible number of threatened species, strongly support the future declaration of the Galicia Bank as a Marine Protected Area.

Key words: checklist, ichthyofauna, Galicia Bank, NE Atlantic, seamount, deep-water fishes

Resumen

Se presenta un listado comentado de 139 especies de peces marinos de la montaña submarina Banco de Galicia. El listado se basa en nueve campañas de prospección e investigación llevadas a cabo desde 1980 hasta 2011 con diferentes artes de pesca. Las especies se agrupan en 2 superclases, 3 clases, 20 órdenes, 62 familias y 113 géneros. Las familias más diversas son Macrouridae con 9 especies, seguido por Moridae, Stomiidae y Sternoptychidae con 7 especies. Por especies, el trachichtido *Hoplostethus mediterraneus* y el mórido *Lepidion lepidion* fueron las más abundantes. Con respecto a la biogeografía, el grupo Atlántico incluye 113 especies (81.3%), seguido por 17 especies del Lusitánico (12.2%). Se comentan datos sobre la abundancia de cada especie tamaño y profundidad, así como su hábitat y distribución y el estado de vulnerabilidad. Se aportan además los datos biométricos y recuentos merísticos de varias especies. Los resultados obtenidos, una alta biodiversidad de peces y un alto nivel de vulnerabilidad, apoyan la futura declaración del Banco Galicia como Área Marina Protegida.

Palabras clave: listado, ictiofauna, Banco de Galicia, Atlántico NE, montaña submarina, peces de aguas profundas

Introduction

Seamounts are typically defined as submarine mountains that rise at least 1000 meters from the abyssal floor of the ocean but do not reach the surface. However, there is not a general accepted definition, having being extensively

modified in the literature according to the authors' disciplines (Staudigel *et al.* 2010). In fact, the Galicia Bank, aside from a seamount, has been defined in many different ways, such as a structural high (Ercilla *et al.* 2006; Alonso *et al.* 2008), a submarine bank (Ruiz-Villareal *et al.* 2006), or a microplate (Sibuet *et al.* 2007). In the northeastern Atlantic, seamounts are defined according to the Oslo-Paris Convention (OSPAR) as undersea mountains of volcanic origin, with a crest that rises more than 1000 meters above the surrounding seafloor (Howell *et al.* 2010).

The number of seamounts is difficult to estimate, but according to the Census of Marine Life, there are potentially up to 100,000 seamounts over 1 kilometer high and many more of smaller elevation. Seamount biodiversity is still poorly understood on a global scale due to the lack of prospecting and exploratory surveys. Thus very few seamounts have been studied so far; only about 350 seamounts have been sampled, and less than 200 have been surveyed in any detail because many of them are located in waters within national jurisdiction (Secretariat of the Convention on Biological Diversity 2008).

Available research results suggest that seamounts are often highly productive ecosystems known for their ability to support high biodiversity and special biological communities, including cold-water coral reefs, abundant fishery resources, marine mammals and seabirds (Johnston & Santillo 2004).

The Galicia Bank seamount was described for the first time by Black *et al.* (1964). The first biological study was on fossil benthonic foraminifera (Fisher 1969). The geophysical and geological studies were carried out focusing on its geodynamic origins, evolution, and magnetic field (Black *et al.* 1964; Sibuet *et al.* 1978; Vanney *et al.* 1979).

Unfortunately, on 19 November 2002, the Galicia Bank gained international notoriety with the sinking of the "Prestige" oil tanker in the southwestern part of the bank. As a result of this environmental catastrophe, the area was the object of intensive and multidisciplinary studies, resulting in many scientific papers related to marine pollution and geology (Albaigés *et al.* 2006; Ercilla & Vilas 2008).

The available biological information on the Galicia Bank showed a low benthic biomass dominated by filter feeders (Duineveld *et al.* 2004). The Bank is characterized by the presence of living and dead cold-water corals *Lophelia pertusa* and *Madrepora oculata*, both of high ecological importance (Bouchet & Metivier 1988; Somoza *et al.* 2014). The rest of the macrofauna is diverse and includes mainly corals (Scleractinia, Octocorallaires), mollusks (bivalves, gastropods, aplacophora), echinoderms (including some stalked crinoids and ophiuroids), polychaetes (Nereidae and Polynoidae) sponges (Demospongiae and Hexactinellida) and decapod crustaceans (decapods, euphausiids, peracarids, ostracods) (Rolán & Pérez-Gándaras 1981; Flach *et al.* 2002; Duineveld *et al.* 2004; Cristobo *et al.* 2010; Cartes *et al.* 2014)

Compared with the surrounding ocean waters, seamounts support a high diversity of fish species, which may form dense aggregations for spawning or feeding and are generally targeted by large-scale fisheries (Clark *et al.* 2006). The ichthyofauna of the Galicia Bank is not well known. The first records have been reported in the decade of 1980 in grey literature and since the late 1990's in scientific journals. The first compilation reported the presence of 86 fish species in this area: 70 teleosts, 11 sharks, 3 rays, and 2 chimaeras (Piñeiro *et al.* 2001). However, these authors only provided the scientific name of 19 species. Bañón *et al.* (2010) included a checklist of marine fishes from Galician waters captured up until 2009 in the Galicia Bank, but without distinguishing between fishes captured in the continental shelf and in the bank.

There is a need for large-scale management and conservation of deep-sea biodiversity and ecosystem function, including the establishment of networks of marine protected areas (MPAs) on the high seas, including the seamounts (Clark *et al.* 2011). The Galicia Bank is one of the eleven areas proposed by the Spanish Ministry for Agriculture, Food and Environment (Ministerio de Agricultura, Alimentación y Medio Ambiente) to be designated, first as a special area of conservation (SAC) for species and habitats, under the Habitat Directive (Council Directive 92/43/EEC), and finally as part of the Natura 2000 network of MPAs in the North East Atlantic Ocean. In order to obtain the information required to fulfil the SAC proposal and begin conservation and management actions, the project LIFE+ "Inventory and designation of marine Natura 2000 areas in the Spanish sea (INDEMARES)" (EC contract INDEMARES-LIFE, 07/NAT/E/0007) was conducted (www.indemares.es). In addition, the Galicia Bank is one of the areas under evaluation for habitat monitoring in the European Union's Marine Strategy Framework Directive (2008/56/CE). In both Habitats and Marine Strategy directives, the presence of vulnerable and threatened species listed on international conventions, such as the Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR) or the International Union for Conservation of Nature (IUCN), is one of the key factors in conservation actions.

The aim of this investigation is to present an updated and commented check list of the marine fishes currently known in the Galicia Bank and to briefly discuss the results obtained.

Material and methods

Study area. The Galicia Bank is an isolated, non-volcanic, large seamount located in the Northwestern of the Iberian Peninsula (Northeast Atlantic), between 42° 15'N and 43°N and from 11° 30'W to 12° 15'W, at water depths from 625 to 1,800 meters and approximately 125 nautical miles offshore the coast (Fig. 1). The bank has an extension of about 2117 km² and shows a trapezoidal shape of 75 km wide in the NNE-SSO direction and 58 km length in the ONO-ESE direction mostly bounded by a steep scarp (Cristobo *et al.* 2015; Somoza *et al.* 2014). A peak in the eastern zone of the bank comes within 625 m of the surface. Towards the north-northwest the bank slopes very steeply from approximately 1,000 m down to the abyssal plain at 5,000 m, and is separated from the Iberian continental margin by a 3000 m depth channel.

The bank is part of the Galicia Bank region, an area of complex morphology, which is divided, from east to west, in five physiographic provinces: the Galicia Interior Basin, the Transitional Zone, the Galicia Bank, the Half-Graben Province and the Deep Galicia Margin (Vázquez *et al.* 2008). The Galicia Bank is formed by series of narrow (10–20 km) and elongated (60–100 km) blocks tilted to the continent along normal faults oriented roughly N–S, interrupted and/or slightly displaced by NW–SE and ESE–WNW transverse faults (Díaz *et al.* 2007).

The Galicia Bank is under the influence of several thermohaline-driven water masses flowing northwards. These mostly comprise the North Atlantic Central Water, at depths around 540 m, the Mediterranean Outflow Water, at around 1,490 m, the Labrador Sea-influenced Deep Intermediate Water at around 2,155 m, the Lower North Atlantic Deep Water at around 3,450 m, and the Lower Deep Water below this depth (Rey *et al.* 2008).

Sampling, species identification and morphological analysis. Ichthyological samplings were carried out during three distinct periods between 1980 and 2011 (Table 1). The samplings included both exploratory surveys, conducted by commercial vessels, and multidisciplinary scientific research surveys, conducted by oceanographic vessels. Both type of surveys aimed different objectives. The main purposes of the exploratory surveys were to evaluate the possibility of a long-term sustainable exploitation of the fisheries resources and also to obtain scientific information (Durán & Román 2000), whereas the main objective of the INDEMARES scientific surveys was to obtain information about habitats, species, and the environmental conditions required for the Natura 2000/SAC proposals.

TABLE 1. Summary of datasets used in this study.

Year	No. Surveys	Total days	Survey type	Gear	Acronym
1980	2	37	exploratory	multi-gear	—
1981	2	23	exploratory	multi-gear	—
1997	2	13	exploratory	longline	—
1998	1	5	exploratory	longline	—
1998	3	13	exploratory	bottom trawl	—
1999	9	35	exploratory	bottom trawl	—
2009	1	3	scientific	multi-gear	Ecomarg0709
2010	1	16	scientific	multi-gear	BanGal0810
2011	1	13	scientific	multi-gear	BanGal0811

The present checklist includes the compilation of all fish species recorded in each survey. However, the taxonomical list obtained during the exploratory surveys carried out during the 1980s was partial and restricted to the main commercial species. Therefore, this information was only used to point out the presence of some epipelagic species reported in these surveys or as complementary information of some species poorly recorded in the other surveys.

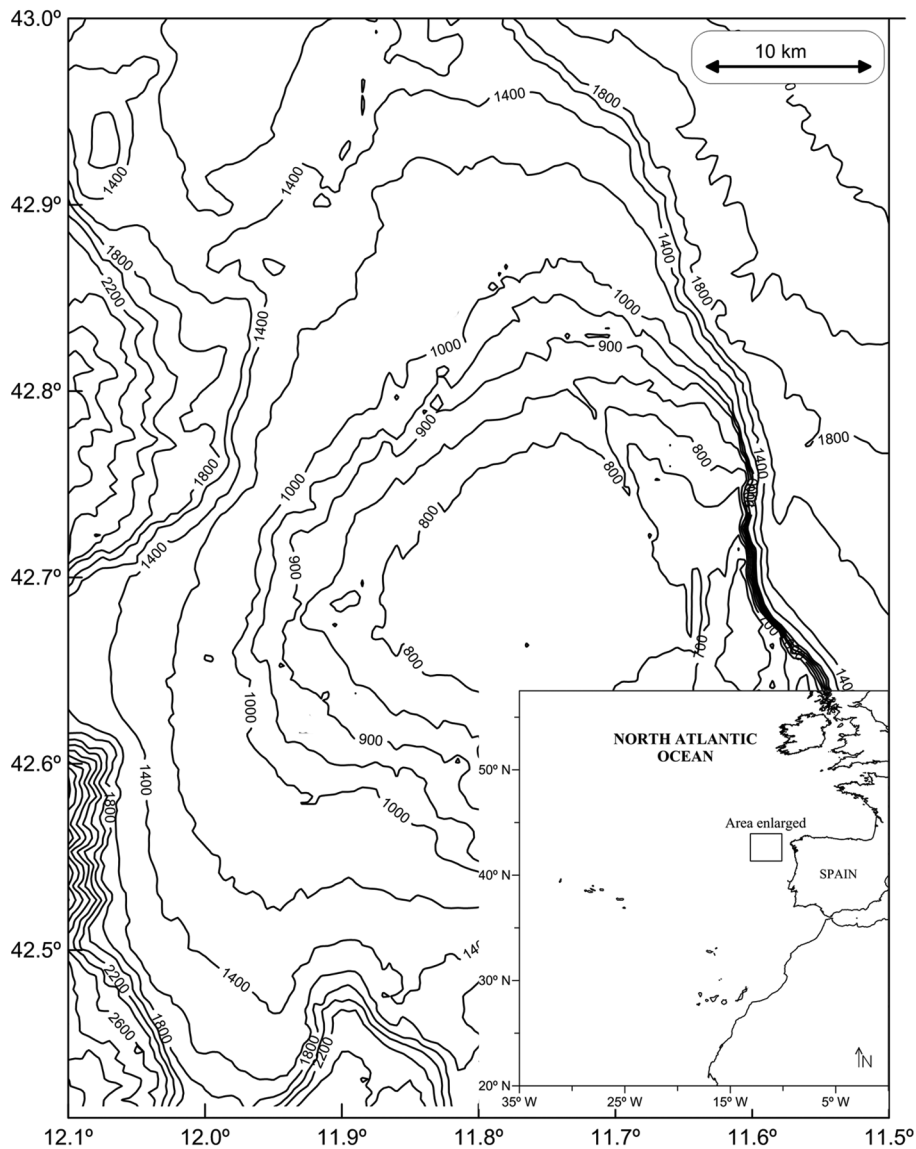


FIGURE 1. Map of the study area.

Fish species were collected using many types of fishing gears, including commercial ones, such as bottom trawl, pelagic and bottom longlines, “piedra-bola” longline and scientific sampling gears, mainly beam trawl (10 mm codend mesh size) and GOC73 otter trawl (20 mm codend mesh size).

Only specimens identified to species level have been included in the list. Fish species were identified according to published keys and guides, mainly Whitehead *et al.* (1986) and Quéro *et al.* (2003), but also following other specific guides and numerous scientific papers. The checklist is presented in the taxonomic sequence: superclass, class, order, family, genus and species. Quéro *et al.* (2003), Eschmeyer (2014) and Froese & Pauly (2014) were followed for the classification system order, the scientific nomenclature and the common names respectively.

For the majority of species listed, the total number of captured specimens, their size or size range, the mean length \pm SD (only in samples with $N \geq 30$), depth or depth range, and the habitat and distribution data are reported. Size was generally reported as total length (TL) to the nearest cm or mm, with the exception of macrurids (family Macrouridae), where the preanal length (PAL) was measured. Habitat and distribution information has been compiled from Ebert & Stehman (2013) for elasmobranches and from Froese & Pauly (2014) and Whitehead *et al.* (1986) for teleosts. In addition, specific literature on several species was used when necessary.

Biometric data and meristic counts were also reported for several species. The total length, standard length and fork length data are expressed in millimeters and the rest of the measures as percentage of the standard length. The

following abbreviations were used for morphometric and meristic characters: total length (TL), standard length (SL), Fork length (FL), Head length (HL), pre-orbital length (PO), Eye diameter (ED), Post orbital Length (POL), Inter-orbital width (IOW), barbel length (BL), pre-dorsal length, first, second (PD, PD1, PD2), pre-anal length (PA), dorsal fin base length, first, second (LD, LD1, LD2), anal fin base length (LA), pre-pectoral distance (PP), pre-ventral distance (PV), pectoral fin length (LP), ventral fin length (LV), maximum body height (H), number of rays in dorsal, first, second (D, 1D, 2D), pectoral (P), ventral (V), anal (A) and caudal (C) fins., total number of gillrakers on the first gill arch (Gr); number of scales on the lateral line (LL). For the nomenclature of photophores; ventral-anal (VAV); pectoral-pelvic (PV); lateral series (OA); ventral series posterior to anal fin origin (AC); isthmus-pectoral (IP); (IC); subpectoral (PVO); suprapectoral (PLO); thoracic (PO); supraventral (VLO); superanal (SAO); ventral (VO); anal (AO).

Biogeography and Vulnerability. The attribution of biogeographic affinity categories was adopted following Ellis *et al.* (2007): Boreal, Lusitanian (including Mediterranean species), Atlantic (including deep-water or mesopelagic species widely distributed), and African.

The vulnerability and conservation status of each fish species were compiled from two global Red List inventories, IUCN (IUCN 2014; Nieto *et al.* 2015) and FishBase (Froese & Pauly 2014) and one regional, OSPAR (OSPAR, 2014). According to IUCN criteria, species are considered threatened if they are categorized as critically endangered (CR), endangered (EN), or vulnerable (VU), and non-threatened if categorized as near threatened (NT), least concern (LC), or data deficient (DD). According to FishBase criteria (Cheung *et al.* 2005), species are considered to be threatened if they are categorized as very high vulnerability (VHV), high to very high vulnerability (HHV), and high vulnerability (HV) and non-threatened if categorized as moderate to high vulnerability (MHV), moderate vulnerability (MV), low to moderate vulnerability (LMV), and low vulnerability (LV). Species listed in the OSPAR list of threatened and/or declining species were considered as vulnerable (VU).

Results

SUPERCLASS GNATHOSTOMATA

CLASS CHONDRICHTHYES

ORDER HEXANCHIFORMES

Family Hexanchidae

Hexanchus griseus (Bonnaterre, 1788)—Bluntnose sixgill shark

14 specimens were caught at depths between 682 and 1,035 m. Length data were available for eight females from 130 to 355 cm and one male of 73 cm TL. Habitat and Distribution: deep-water demersal species inhabiting the outer continental shelves, upper continental slopes, insular shelves and slopes, and submarine canyons down to at least 2,500 m depth. Circumglobal in tropical and temperate seas, including the Mediterranean, Baltic and North Seas, and the Hawaiian Islands. Vulnerability: NT (IUCN), VHV (FishBase).

ORDER SQUALIFORMES

Family Centrophoridae

Centrophorus granulosus (Bloch & Schneider, 1801)—Gulper shark

218 specimens were caught at depths between 823 and 1,119 m. Length data were recorded for all specimens: two males of 115 cm TL and 216 females between 107 and 166 cm TL (145.4±12.4). The main biological data of the specimens of *C. granulosus* captured in Galician waters, including the Galicia Bank, were previously reported by Bañón *et al.* (2008). Habitat and Distribution: deep-water shark of the outer continental shelves and upper slopes at depths from 50 to 1,440 m. Widely distributed in all ocean basins except the eastern Pacific. Vulnerability: CR (IUCN), VU (OSPAR), VHV (FishBase).

Centrophorus squamosus (Bonnaterre, 1788)—Leafscale gulper shark

1,329 specimens were caught at depths between 749 and 1,119 m. Length data were available for 1,226 specimens, with males between 88 and 129 cm (110.9 ± 4.1 , $N=1,015$) and females between 96 and 144 cm (122.2 ± 10.6 , $N=211$). The main biological data relating to *C. squamosus* caught in Galician waters, including the Galicia Bank, were previously reported (Bañón *et al.* 2006a). Habitat and Distribution: deepwater gulper shark of the continental slopes from 229 to over 4,000 m depth, but rare above 1,000 m depth. Eastern Atlantic, western North Atlantic (one record from Venezuela), western Indian, and western Pacific oceans. Vulnerability: EN (IUCN), VU (OSPAR), VHV (FishBase).

Deania calcea (Lowe, 1839)—Birdbeak dogfish

Prior to 2009 this species was classified erroneously together with *D. profundorum*, and since then only 4 males, from 90 to 108 cm TL, were caught at depths between 851 and 916 m. Habitat and Distribution: outer continental and insular shelves and upper, middle, and lower slopes from 60 to 1,490 m depth, but usually at depths between 400 and 900 m. Wide and patchy distribution in the eastern Atlantic (Iceland to southern Africa) and Pacific oceans (Chile, Peru, Japan, southern Australia and New Zealand). Vulnerability: EN (IUCN), HHV (FishBase).

Deania profundorum (Smith & Radcliffe, 1912)—Arrowhead dogfish

Until 2009 this species was misidentified as *D. calcea*. It was correctly identified in 2009 based on morphological and molecular approaches (Sanjuán *et al.* 2012). 83 specimens were caught at depths between 749 and 1,079 m. Length data were available for 70 specimens ranging from 25 to 88 cm TL (61.8 ± 17.6), with males between 27 and 76 cm TL (61.9 ± 13.7 , $N=32$) and females between 25 and 88 cm TL (61.8 ± 20.4 , $N=38$). Habitat and Distribution: bathydemersal with patchy distribution in eastern Atlantic, western Indian, and western Pacific oceans from 275 to 1,785 m depth. Vulnerability: LC (IUCN), HHV (FishBase).

Deania hystricosa (Garman, 1906)—Rough longnose dogfish

4 specimens were caught between 766 and 909 m depth. Only one specimen was measured, a female of 100 cm TL. Habitat and Distribution: benthic and probably epibenthic of the upper and middle continental and insular slopes, at depths between 471 and 1,300 m. Patchily distributed in eastern Atlantic and western North Pacific. Vulnerability: DD (IUCN), HHV (FishBase).

Family Etmopteridae

Etmopterus spinax (Linnaeus, 1758)—Velvet belly lantern shark

2,951 specimens were caught at depths between 643 and 1,115 m. Length data were available for 1,156 specimens ranging from 13 to 49 cm TL (33.9 ± 7.5), with males between 13 and 44 cm TL (31.6 ± 6.3 , $N=446$) and females between 13 and 49 cm TL (35.8 ± 7.6 , $N=680$). Habitat and Distribution: bathydemersal, found on the outer continental shelves and upper slopes at depths of 70–2,000 m, mostly between 200 and 500 m. Eastern Atlantic, from Iceland and Norway to Gabon, including the Azores and Cape Verde islands and western Mediterranean Sea. Vulnerability: LC (IUCN), MHV (FishBase).

Etmopterus pusillus (Lowe, 1839)—Smooth lanternshark

33 specimens were caught at depths between 643 and 936 m. Length data were available for 21 specimens ranging from 33 to 47 cm TL, with males between 33 and 45 cm ($N=15$) and females between 33 and 47 cm ($N=6$). Habitat and Distribution: benthopelagic, on the continental slopes, on or near bottom at a depth of 274 to 1000 m or deeper (possibly up to 1998 m). Eastern Atlantic, western Atlantic, Indian, Central and western Pacific oceans. Vulnerability: LC (IUCN), MV (FishBase).

Etmopterus princeps Collet, 1904—Great lanternshark

25 specimens were caught at depths between 1,460 and 1,809 m. Length data were recorded for all specimens ranging from 18 to 64 cm TL, with males between 19 and 64 cm ($N=11$) and females between 18 and 60 cm

(N=14). Habitat and Distribution: bathydemersal on the continental slopes and also lower rise from 350 to 4,500 m depth. Eastern North Atlantic, from Greenland and Iceland to Mauritania and possibly Sierra Leone and western North Atlantic (Canada and USA). Vulnerability: DD (IUCN), MHV (FishBase).

Family Somniosidae

Centroscymnus coelolepis Barbosa du Bocage & de Brito Capello, 1864—Portuguese dogfish.

318 specimens were caught at depths between 749 and 1,685 m. Length data were available for 306 specimens ranging from 78 to 120 cm TL (107.3 ± 7.5), with males between 83 and 100 cm (91.8 ± 3.3 , N=34) and females between 78 and 120 cm (109.2 ± 5.3 , N=272). The main biological data of the specimens of *C. coelolepis* caught in Galician waters, including the Galicia Bank, was previously reported by Bañón *et al.* (2006a). Habitat and Distribution: bathydemersal, inhabits continental and insular slopes and abyssal plains, on or near the bottom at depths of 128–3,675 m, but mostly below 400 m depth. Widely distributed in the Atlantic, including western Mediterranean Sea and Indian and Pacific oceans. Vulnerability: EN (IUCN), HV (FishBase), VU (OSPAR).

Centroselachus crepidater (Barbosa du Bocage & de Brito Capello, 1864)—Longnose velvet dogfish.

14 specimens were caught at depths between 823 and 1,024 m. Length data were available for one male of 58 cm TL and 11 females between 74 and 88 cm TL. Habitat and Distribution: bathydemersal, occurs along upper continental and insular slopes on or near the bottom at depths of 200 to 1,500 m. Eastern Atlantic, from Iceland to South Africa and scattered distribution throughout the Indo-Pacific and eastern South Pacific from coast off of Chile. Vulnerability: LC (IUCN), VHV (FishBase).

Scymnodon ringens Barbosa du Bocage & de Brito Capello, 1864—Knifetooth dogfish

366 specimens were caught at depths between 712 and 1,470 m. Length data were available for 185 specimens ranging from 25 to 110 cm TL (69.5 ± 23.2), with males between 26 and 84 cm (53.3 ± 14.3 , N=46) and females between 25 and 110 cm (78 ± 22.1 , N=125). Habitat and Distribution: usually mesopelagic, although captured most often near the bottom at depths from 200 to 1,600 m. Eastern Atlantic: from Scotland to Mauritania, and Senegal. One specimen recorded in the South Pacific Ocean. Vulnerability: DD (IUCN), HV (FishBase).

Somniosus rostratus (Risso, 1827)—Little sleeper shark

17 specimens were caught at depths between 822 and 1,119 m. Length data were recorded for all specimens ranging from 76 to 126 cm TL, with males between 76 and 106 cm (N=7) and females between 89 and 126 cm (N=10). Habitat and Distribution: outer continental shelves and upper slopes, occurring on or near the bottom at depths between 180 and 2,200 m. Eastern Atlantic: France, Portugal, and Madeira Islands, and the western Mediterranean Sea. Western Central Atlantic: possibly off Cuba. Vulnerability: DD (IUCN), VHV (FishBase).

Family Oxynotidae

Oxynotus paradoxus Frade, 1929—Sailfin roughshark (Fig. 2)

2 specimens were caught at depths between 866 and 877 m. Only one specimen of 32 cm TL was measured. Habitat and Distribution: continental slope at depths from 265 to 720 m. Endemic to the eastern Atlantic, from Scotland and northern North Sea to Senegal and possibly southwards to the Gulf of Guinea region. Apparently absent from the Mediterranean Sea. Vulnerability: DD (IUCN), HV (FishBase).

Family Dalatiidae

Dalatias licha (Bonnaterre, 1788)—Kitefin shark

101 specimens were caught at depths between 731 and 1,115 m. Length data were available for 37 specimens ranging from 38 to 151 cm TL (117.1 ± 31.8), with males between 38 and 122 cm (N=10) and females between 42

and 151 cm (N=26). Habitat and Distribution: deepwater, warm–temperate and tropical shark of the outer continental and insular shelves and slopes from 37 to at least 1800 m depth, but most common below 200 m. Northeast Atlantic from north of the British Isles to the northwestern coast of Africa, including Azores and Madeira Islands, Mediterranean Sea, western North Atlantic, Central and western Pacific, and Indian oceans. Vulnerability: EN (IUCN), VHV (FishBase).



FIGURE 2. *Oxynotus paradoxus*.

ORDER LAMNIFORMES

Family Pentanchidae

Galeus melastomus Rafinesque, 1810 —Blackmouth catshark

One female of 70 cm TL was caught at depths between 669 and 676 m. Habitat and Distribution: deepwater bottom shark found on the outer continental shelves and upper slopes, mainly between 200 and 500 m but occasionally up to 55 m and down to 2000 m. Eastern North Atlantic, from Norway to Senegal and throughout the Mediterranean Sea. Vulnerability: LC (IUCN), HV (FishBase).

Galeus murinus (Collett, 1904)—Mouse catshark (Fig. 3)

18 specimens between 29 and 44 cm TL were caught at a depth range from 1,450 to 1,683 m, with males between 29–41 cm TL (N=5) and females between 31–44 cm (N=13). Habitat and Distribution: Iceland to the Faroe Islands, Scotland, the Hebrides Islands, Ireland, France, Spain, Morocco, and western Sahara. Vulnerability: LC (IUCN), MHV (FishBase).



FIGURE 3. *Galeus murinus*.

Apristurus aphyodes Nakaya & Stehmann, 1998—No common name

18 specimens, 6 males ranging from 24 to 39 cm and 12 females from 22 to 37 cm TL, were caught at a depth range of 1,460–1,809 m. Habitat and Distribution: bathydemersal deepwater species known from continental

slopes, on or near bottom at depths of 380 to 1,250 m. North Atlantic, from Iceland to the northern Bay of Biscay. The Galicia Bank records constitute the southern limit in the distribution of this species (Rodríguez-Cabello *et al.* 2014). Vulnerability: DD (IUCN), HHV (FishBase).

Apristurus profundorum (Smith & Radcliffe, 1912)—Arrowhead dogfish

One female of 14 cm TL was caught at 1,459 m depth. Habitat and Distribution: deepwater shark found on the continental slopes at 1,100 to 1,830 m. Reported in the western North Atlantic, the mid-Atlantic Ridge and eastern North Atlantic (Mauritania). This record extends northwards the known distribution of this species in the Northeast Atlantic (Rodríguez-Cabello *et al.* 2014). Vulnerability: DD (IUCN), MHV (FishBase).

Apristurus melanoasper Iglesias, Nakaya and Stehmann, 2004—Black roughscale catshark

One female of 25 cm TL was caught at 1,683 m depth. Habitat and Distribution: widely distributed but very patchy in the North Atlantic, southeastern Atlantic (Namibia), Central Indian Ocean and south of Madagascar, and in the western South Pacific (Australia, New Zealand and New Caledonia). This record extends the known distribution of this species in the Northeast Atlantic (Rodríguez-Cabello *et al.* 2014). Vulnerability: DD (IUCN), MHV (FishBase).

Family Pseudotriakidae

Pseudotriakis microdon de Brito Capello, 1868—False catshark

32 specimens were caught at depths between 823 and 1,119 m. Length data were recorded for all specimens ranging from 186 to 256 cm TL (224.1 ± 21.2), with males between 186 and 220 cm (N=16) and females between 207 and 256 cm (N=16). Habitat and Distribution: continental and insular slopes at depths from 100 to 1,890 m; occasionally wandering onto continental shelves, even in shallow water. Sporadically recorded in all oceans, with the exception of the South Atlantic and eastern Pacific. Vulnerability: LC (IUCN), HHV (FishBase).

Family Carcharhinidae

Prionace glauca (Linnaeus, 1758)—Blue shark

5 females ranging between 75–113 cm TL were caught at an unknown depth during the hauling of bottom longline. In addition, 13 specimens were reported during the exploratory surveys carried out on the 1980s. Habitat and Distribution: oceanic epipelagic and fringe-littoral shark, occurring from the surface to at least 350 m depth; deeper in warm temperate and subtropical waters. Circumglobal in temperate and tropical waters. Vulnerability: NT (IUCN), HHV (FishBase).

Isurus oxyrinchus Rafinesque, 1810—Shortfin mako

Reported only during the exploratory surveys on the 1980s with length range from 125 to 245 cm TL. Habitat and Distribution: epipelagic, oceanic shark generally occurring in tropical and warm temperate seas off the continental shelf at depths of 120 to 240 m or even deeper. North Atlantic Ocean and scattered records in the Pacific and western Indian oceans. Vulnerability: VU (IUCN), VHV (FishBase).

ORDER RAJIFORMES

Family Rajidae

Dipturus batis (Linnaeus, 1758)—Blue skate

9 specimens were caught at depths between 729 and 896 m. Length data were available for five specimens ranging from 22 to 146 cm TL. Currently, this species is under taxonomic revision. According to Iglésias *et al.* (2010) *D. batis* is a composite species and was provisionally split into the smaller *D. sp. cf. flossada* and the much larger *D. sp. cf. intermedia*. Vulnerability: CR (IUCN), VHV (FishBase), VU (OSPAR).

Rajella bigelowi (Stehmann, 1978)—Bigelow's ray (Fig. 4)

Two specimens, one male of 53 cm and one female of 42 cm TL, were caught at depths between 1,450 and 1,683 m. Habitat and Distribution: demersal on several types of bottom substrate from 650 to up to 4,165 m depth. Eastern North Atlantic, from Greenland and Iceland to Mauritania. Vulnerability: LC (IUCN), MV (FishBase).

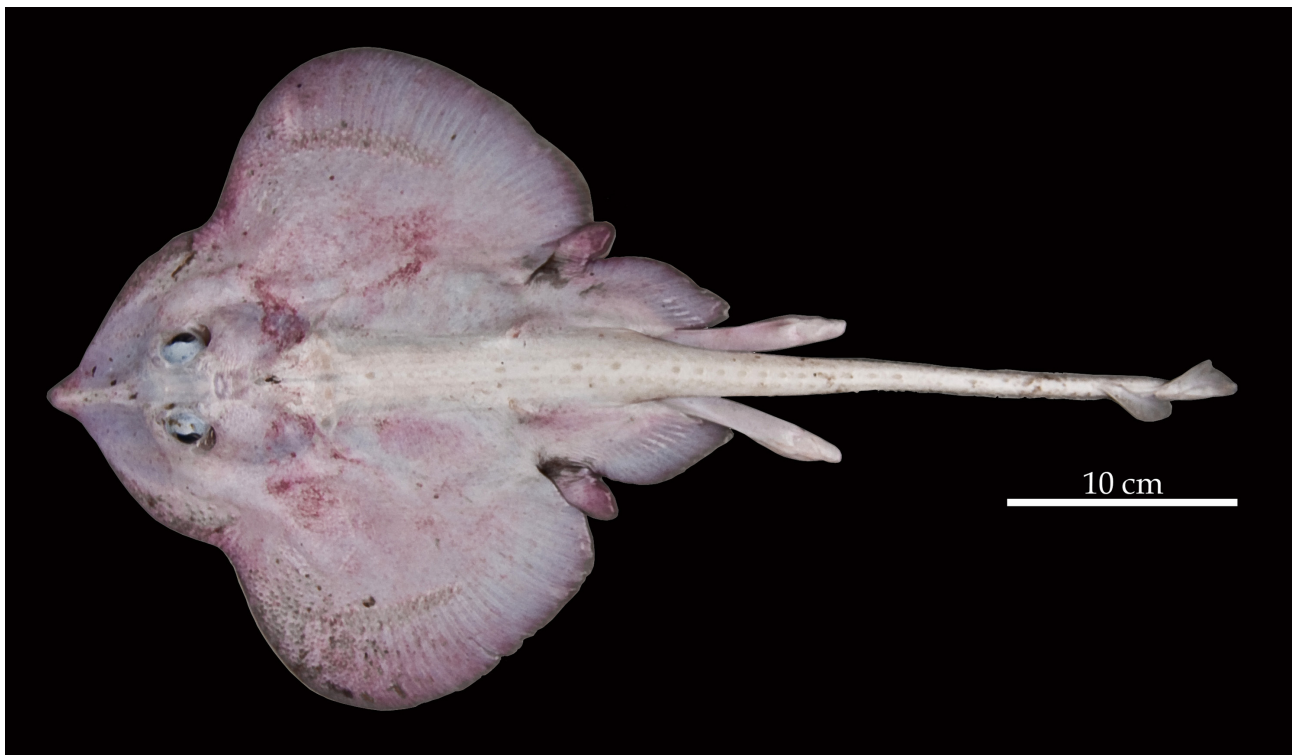


FIGURE 4. *Rajella bigelowi*.

Family Dasyatidae

Pteroplatytrygon violacea (Bonaparte, 1832)—Pelagic stingray

Two specimens, one male of 45 cm and one female of 109 cm TL, were caught at depth unknown, during the hauling of the bottom longline (Bañón *et al.* 1997). Habitat and Distribution: pelagic and oceanic, occurring from over the edge of continental and insular shelves into the open ocean at depths of 1–381 m usually in the upper 100 meters. Tropical and subtropical seas, including eastern Atlantic, western Atlantic, eastern Pacific and northwestern Pacific (Japan and Taiwan). Vulnerability: LC (IUCN), HHV (FishBase).

CLASS HOLOCEPHALI

ORDER CHIMAERIFORMES

Family Chimaeridae

Chimaera monstrosa Linnaeus, 1758—Rabbit fish

3 specimens were caught at depths between 877 and 1,323 m. Dubious identification specially after the capture of the cryptic species *C. opalescens* also in the bank. Habitat and Distribution: bathydemersal to benthopelagic at depth range 40–1,000 m, generally between 300 and 500 m depth. Eastern Atlantic: northern Norway and Iceland, Skagerrak and Kattegat south to Morocco including western Mediterranean Sea (some isolated records from eastern part), Azores and Madeira Islands. Records from South Africa are questionable. Vulnerability: NT (IUCN), HHV (FishBase).

Chimaera opalescens Luchetti, Iglésias & Sellos, 2011—Opal chimaera

4 specimens, 3 males of 10, 57 and 63 cm and one female of 64 cm TL, were caught at depths from 903 to 1,450 m. This species was recently described (Luchetti *et al.* 2011) and could probably be confused with *C. monstrosa* in previous surveys. Habitat and Distribution: Northeast Atlantic, along the slope to the west of the British Isles and France, from 900–1,400 m depth. Vulnerability: DD (IUCN), HV (FishBase).

Hydrolagus affinis (de Brito Capello, 1868)—Smalleyed rabbitfish

Three specimens, 2 females of 12 and 22 cm TL and one male of 24 cm, were caught at depths between 1,683 and 1,808 m. Habitat and Distribution: Found on continental slopes and down to deep-sea plains, reported up to 3,000 m. Occurs in northeastern Atlantic from the Rockall Trough along Ireland, northern Bay of Biscay and off Portugal down to 22° off NW Africa, Cape Verde, and Azores. Vulnerability: LC (IUCN), HHV (FishBase).

CLASS ACTINOPTERYGII

ORDER NOTACANTHIFORMES

Family Halosauridae

Halosaurus ovenii Johnson, 1864—No common name

12 specimens were caught at depths between 746 and 1,536 m. Length data were available for eight specimens ranging from 20 to 57 cm TL. Habitat and Distribution: both sides of the Atlantic Ocean, from Madeira, the Azores, and Canaries to Walvis Bay and the Gulf of Mexico, the Caribbean, the Antilles, and the Mediterranean Sea. Vulnerability: DD (IUCN), MHV (FishBase).

Halosauropsis macrochir (Günther, 1878)—Abyssal halosaur (Fig. 5)

7 specimens from 52 to 62 cm TL were caught at depths between 1,536 and 1,809 m. Habitat and Distribution: benthopelagic, 1,100–3,300 m. Antitropical distribution in Atlantic, Indian, and Pacific oceans. Vulnerability: DD (IUCN), MHV (FishBase).



FIGURE 5. *Halosauropsis macrochir*.

Aldrovandia affinis (Günther, 1877)—Gilbert's halosaurid fish

3 specimens from 42 to 48 cm TL were caught at depths between 1,477 and 1,545 m. Habitat and Distribution: benthopelagic, 730–2,200 m. Worldwide, known from all major oceans. Vulnerability: DD (IUCN), MHV (FishBase).

Aldrovandia phalacra (Vaillant 1888)—Hawaiian halosaurid fish

2 specimens of 19 and 33 cm TL were caught at a depth of 1,536 and 1,477 m respectively. Habitat and Distribution: Benthopelagic between 500–2,300 m depth. Circumglobal, mainly at tropical and temperate latitudes. Vulnerability: DD (IUCN), MV (FishBase).

Aldrovandia oleosa Sulak, 1977—No common name

16 specimens from 20 to 39 cm TL were caught at depths between 1,477 and 1,751 m. Benthopelagic to benthic on the lower slope, continental rise and upper abyss, between 1,100 and 3,300 m depth and primarily between 2 and 4°C isotherm. Circumglobal at tropical and temperate latitudes in Atlantic, Indian, and Pacific oceans. Vulnerability: DD (IUCN), MV (FishBase).

Family Notacanthidae

Notacanthus bonaparte Risso, 1840—Shortfin spiny eel

656 specimens were caught at depths between 731 and 1685 m. Length data were available for 375 specimens ranging from 15 to 46 cm TL (31.3 ± 6.5). Habitat and Distribution: bathypelagic between 487–2,000 m depth. Eastern Atlantic Ocean, Iceland, Faeroes, and from Ireland to Cape Blanc, Mauritania, and in the western Mediterranean Sea. Vulnerability: DD (IUCN), LV (FishBase).

Polyacanthonotus rissoanus (De Filippi & Verany, 1857)—Smallmouth spiny eel

7 specimens between 21 and 43 cm TL were caught at depths between 1,536 and 1,809 m. Habitat and Distribution: epibenthic antitropical on the continental slope, between 540–2,875 m with most records between 1,500–2,000 m depth. Eastern Atlantic, from Iceland to South Africa, including the Mediterranean Sea and western Atlantic, from Davis Strait to Cape Hatteras and North Carolina in the USA. Vulnerability: DD (IUCN), MV (FishBase).

ORDER ANGUILLIFORMES

Family Synphobranchidae

Synphobranchus kaupii Johnson, 1862—Kaup's arrowtooth eel

1,264 specimens were caught at depths between 711 and 1,809 m. Length data were available for 1,252 specimens ranging from 8 to 72 cm TL (21.8 ± 11.4). Habitat and Distribution: demersal deep-sea fish between 120–4,800 m depth, usually 400–2,200 m. Distribution in all major ocean basins: Atlantic, Indian, and Pacific oceans. In the eastern North Atlantic, it is recorded from west of the Faroe Islands slope to the coast of northwest Africa. Vulnerability: LC (IUCN), MHV (FishBase).

Family Congridae

Conger conger (Linnaeus, 1758)—European conger

208 specimens were caught at depths between 643 and 914 m. Length data were available for 37 specimens ranging from 36 to 141 cm TL (73.8 ± 33.3). Habitat and Distribution: benthic species living in rocky and sandy bottoms between 10 and 1,171 m. Northeast Atlantic, from Norway and Iceland to Senegal, the Mediterranean, and the western Black Seas. Vulnerability: DD (IUCN), VHV (FishBase).

Pseudophichthys splendens (Lea, 1913)—Purplemouthed conger

3 specimens, 1 adult of 31 cm TL and 2 juveniles of 12 and 15 cm TL, were recorded at depths between 887 and 1,041 m. Habitat and Distribution: bathydemersal species of ampho-Atlantic distribution, between 37 and 1,647 m depth. Off the western Atlantic Ocean, from Canada (larval specimens) to Brazil, while off the eastern Atlantic Ocean from Morocco, the Canary and Azores islands, and the Gulf of Guinea. These records constitute a northward range extension of their known distribution in the eastern Atlantic (Bañón *et al.* 2011). Vulnerability: DD (IUCN), LMV (FishBase).

Family Derichthyidae

Nessorhamphus ingolfianus (Schmidt, 1912)—Duckbill oceanic eel (Fig. 6)

One specimen of 47 cm TL was caught at a depth of 1,470 m. Habitat and Distribution: bathypelagic, 0–1,800 m depth. Temperate, tropical and subtropical regions of Atlantic, Indian and Pacific oceans. In the eastern Atlantic it occurs from France to Morocco and off the Cape, South Africa. Vulnerability: DD (IUCN), MHV (FishBase).



FIGURE 6. *Nessorhamphus ingolfianus*.

Family Nemichthyidae

Nemichthys scolopaceus Richardson, 1848—Slender snipe eel

14 specimens were caught at depths between 751 and 896 m. Length data were available for 11 specimens ranging from 60 to 111 cm TL. Habitat and Distribution: mesopelagic and oceanic, from the surface down to depths of 2,500 m, usually between 200–500 m depth. Worldwide in tropical and temperate seas. Vulnerability: DD (IUCN), MHV (FishBase).

Family Serrivomeridae

Serrivomer beanii Gill & Ryder, 1883—Bean's sawtoothed eel

15 specimens were caught at depths between 726 and 1,750 m. Length data were available for 13 specimens ranging from 25 to 82 cm TL. Habitat and Distribution: epibenthic–pelagic species distributed in the Atlantic and western Pacific oceans. In the eastern Atlantic it occurs from north to Iceland to South Africa. Vulnerability: DD (IUCN), MV (FishBase).

ORDER SACCOPHARYNGIFORMES

Family Eurypharyngidae

Eurypharynx pelecanoioides Vaillant, 1882—Pelican eel (Fig. 7)

3 specimens between 34 and 47 cm TL were caught at depths between 780–1,674 m. Habitat and Distribution: meso- to abyssopelagic and bathypelagic. Circumglobal in tropical and temperate waters. In the Atlantic Ocean it is recorded from off Iceland (65°N) to 48°S. Vulnerability: DD (IUCN), MHV (FishBase).



FIGURE 7. *Eurypharynx pelecanoioides*.

ORDER OSMERIFORMES

Family Bathylagidae

Bathylagus euryops Goode & Bean, 1896—Goiter blacksmelt (Fig. 8)

2 specimens of 19 and 20 cm TL were caught at depths between 1,685 and 1,750 m. Habitat and Distribution: meso- and bathypelagic zones of the North Atlantic, sometimes in large aggregations, between 300 and 2,300 m depth. Western Atlantic, as far north as Greenland, extending south to Bermuda and eastern Atlantic, from Iceland to Portugal. Vulnerability: DD (IUCN), LMV (FishBase).



FIGURE 8. *Bathylagus euryops*.

Family Alepocephalidae

Alepocephalus rostratus Risso, 1820—Risso's smooth-head

72 specimens were caught at depths between 781 and 1,683 m. Length data were available for 51 specimens ranging from 18 to 65 cm TL (43.7 ± 13.2). Habitat and Distribution: bathydemersal, over soft bottoms at about 300–3,600 m depth, usually at 300–1,600 m. Eastern Atlantic Ocean, from Iceland to Namibia and western Mediterranean Sea. Vulnerability: DD (IUCN), HHV (FishBase).

Alepocephalus bairdii Goode & Bean, 1879—Baird's smooth-head

1,895 specimens were caught at depths between 711 and 1,809 m. Length data were available for 1,228 specimens ranging from 13 to 89 cm TL (64.4 ± 12.1). Biometry and meristic: 6 specimens 521–817 mm TL, 443–708 mm SL; HL: 23.8–28.3; PO: 4.5–5.1; POL: 14.4–17.4; ED: 4.6–7.0; IOW: 3.4–4.4; PD: 55.6–66.4; LD: 12.4–15.4; PA: 56.1–68.9; LA: 13.8–17.2, PP: 24.6–29.9; PV: 40.6–49.2; LP: 7.7–11.5; LV: 4.9–5.6; H: 17.8–20.5; D: 20–22; A: 21–24; P: 10–13; V: 8–9; Gr: 8–11+1+18–19; SLL: 61–64. Habitat and Distribution: bathydemersal over ooze and sand bottoms at a depth range of 365–2,500 m. Eastern Atlantic Ocean, from Greenland and Iceland southward to 17°N and western Atlantic Ocean, from Greenland to Grand Banks and 29°52'N, 77°09'W. Vulnerability: DD (IUCN), HHV (FishBase).

Xenodermichthys copei (Gill, 1884)—Bluntnout smooth-head

69 specimens were caught at depths between 735 and 1,640 m. Length data were available for 49 specimens ranging from 6 to 19 cm TL (14 ± 2.8). Habitat and Distribution: mesopelagic to benthopelagic as adults, between 100–2,650 m, usually at 100–1,230 m depth. Widely distributed in the Atlantic, eastern Pacific and Indian oceans. Vulnerability: DD (IUCN), MV (FishBase).

Rouleina attrita (Vaillant, 1888)—Softskin smooth-head

248 specimens were caught at depths between 1,470 and 1,809 m. Length data were available for all specimens, ranging from 6 to 49 cm TL (25.4 ± 9.6). Habitat and Distribution: bathypelagic at depth range 450–2,300 m. Circumglobal, widely distributed in the Atlantic, most Indian submarine ridges, Subantarctic, North Pacific and tropical western and eastern Pacific oceans. Vulnerability: DD (IUCN), MHV (FishBase).

Conocara macropterum (Vaillant, 1888)—Longfin smooth-head

41 specimens were caught at depths between 1,674 and 1,809 m. Length data were available for all specimens ranging from 17 to 39 cm TL (30.7 ± 4.7). Habitat and Distribution: epibenthic at about 800–2,677 m depth, usually

at 1,200–1,800 m. Known from widely scattered localities on both sides of the Atlantic Ocean, in eastern Atlantic from 54°N to 45°S and in western Atlantic in Bahamas, Gulf of Mexico and off Brazil. Vulnerability: DD (IUCN), MHV (FishBase).

ORDER STOMIIFORMES

Family Gonostomatidae

Gonostoma elongatum Günther, 1878—Elongated bristlemouth fish

8 specimens were caught at depths between 740 and 916 m. Length data were available for 4 specimens ranging from 18 to 24 cm TL. Habitat and Distribution: meso- to bathypelagic, depth range 0–4,740 m, usually between 100–200 m and 500–800 m at night and 25–600 m and 1,250–1,500 m during the day. Worldwide distribution, in tropical and subtropical Atlantic, Indian and Pacific oceans. In the eastern Atlantic, from off eastern Greenland, Iceland and Spain south to the Gulf of Guinea, being more common south of 40°N. Vulnerability: DD (IUCN), MV (FishBase).

Sigmops bathyphilus (Vaillant, 1884)—Spark anglemouth

3 specimens between 10 and 12 cm TL were caught at depths between 1,536 and 1,809 m. Habitat and Distribution: bathypelagic, juveniles and adults at 700–3,000 m with marked stratification of size with depth. Temperate and subtropical latitudes of the Atlantic, Pacific and eastern Indian oceans. Scattered records from 65°N to Namibia and South Africa in the eastern Atlantic. Vulnerability: DD (IUCN), MV (FishBase).

Cyclothone pallida Brauer, 1902—Tan bristlemouth

1 specimen of 6 cm TL was caught at a depth of 1,674 m. Habitat and Distribution: oceanic, meso- to bathypelagic, at a depth range of 16–4,663 m, usually 600–1,800 m. Worldwide distribution, in tropical and subtropical Atlantic, Indian and Pacific oceans. Vulnerability: DD (IUCN), MV (FishBase).

Family Sternoptychidae

Sternoptyx diaphana Hermann, 1781—Diaphanous hatchetfish (Fig. 9)

One specimen of 4 cm TL was caught at a depth of 771 m. Habitat and Distribution: bathypelagic, oceanodromous at depth range 400–3,676 m, usually 500–800 m. Mainly in tropical regions of Atlantic, Pacific and Indian oceans. Scattered records southwest of Ireland and also from Spain to Angola in the eastern Atlantic. Vulnerability: DD (IUCN), LV (FishBase).

Argyropelecus hemigymnus Cocco, 1829—Half-naked hatchetfish

23 specimens were caught at depths between 765 and 1,460 m. Length data were available for 22 specimens ranging from 2 to 4 cm TL. Habitat and Distribution: oceanic and mesopelagic, from 100 to 4,054 m depth, mainly at 250–650 m. Worldwide distribution in tropical and subtropical waters of all oceans. Vulnerability: LC (IUCN), LV (FishBase).

Argyropelecus olfersii (Cuvier, 1829)—No common name

5 specimens were caught at depths between 771 and 1,674 m. Length data were available for 4 specimens ranging from 9 to 11 cm TL. Habitat and Distribution: oceanic, mesopelagic with adults and juveniles at 200–800 m during daylight and from 100 (sometimes shallower) to 600 m at night. Restricted in the northeastern Atlantic Ocean between 35°N and 65°N, probably with a bipolar distribution, and in the southern Pacific Ocean between 30° S and 50° S from Chile to New Zealand. Vulnerability: DD (IUCN), LV (FishBase).

Argyropelecus aculeatus Valenciennes, 1850—Lovely hatchetfish

1 specimen of 8 cm TL was caught at a depth of 791 m. Habitat and Distribution: oceanic and mesopelagic

species at 100–600 m depth, concentrated at 300–600 m during daylight and 100–300 m at night. Atlantic Ocean, essentially absent from the tropical Atlantic; Pacific from north of New Guinea to Japan and off eastern Australia and Chile and central Indian Ocean from about 10°S to 40°S. Vulnerability: DD (IUCN), LMV (FishBase).

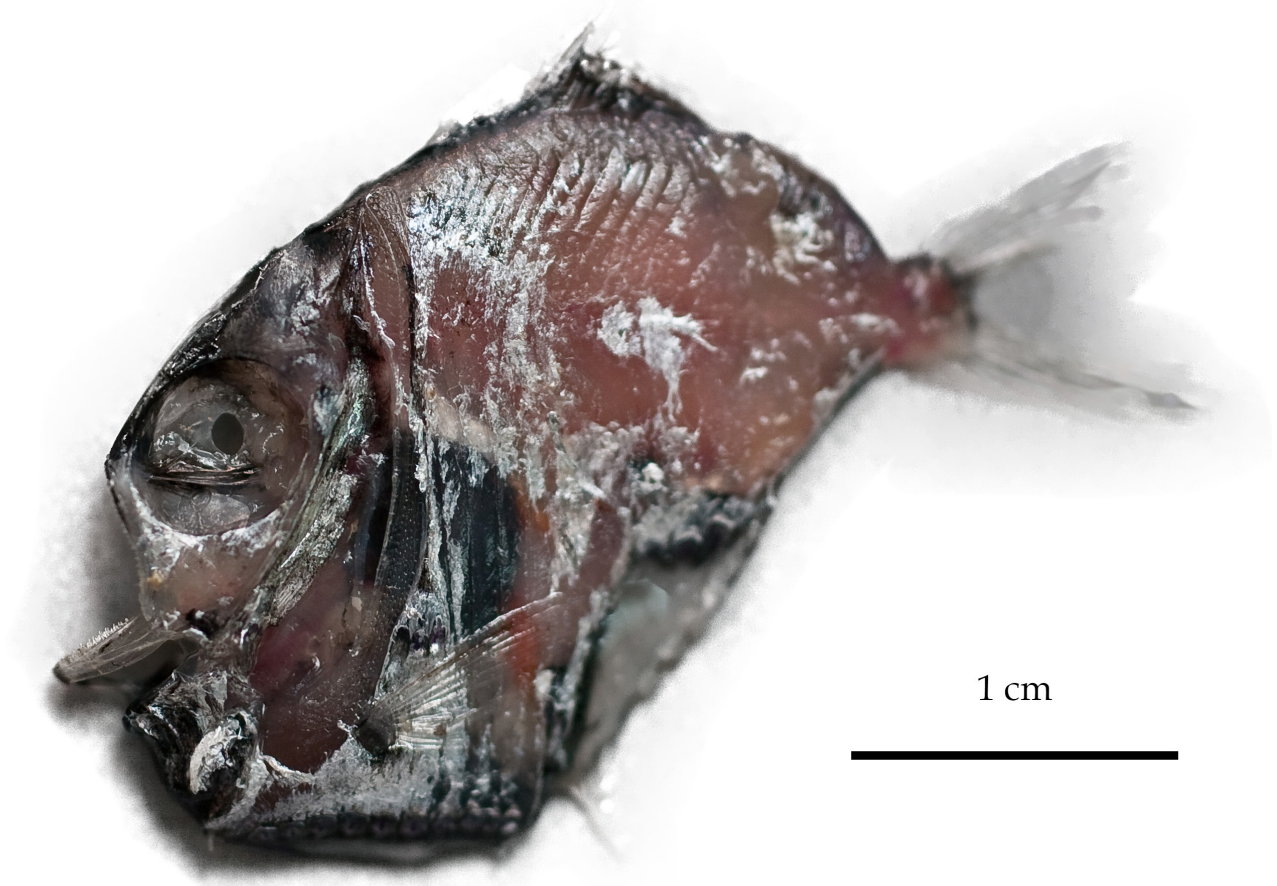


FIGURE 9. *Sternoptyx diaphana*.

Argyropelecus gigas Norman, 1930—Hatchetfish

124 specimens between 6–11 cm TL were caught by bottom trawl during the 1998 surveys. They were identified as *A. gigas*, but we consider this identification, at least in part, as dubious. The size of the specimens, which is larger in *A. gigas*, was used in the first surveys as one important criterion to differentiate *Argyropelecus* species. However, in posterior surveys, we found a similar size range in *A. olfersii*. Habitat and Distribution: bathypelagic at depth range 300–1,000 m, usually 400–600 m. Circumglobal, except northeastern Pacific Ocean. Vulnerability: DD (IUCN), LMV (FishBase).

Maurolicus muelleri (Gmelin, 1789)—Pearlsides

1 specimen of 5 cm TL was caught at a depth of 1,094 m. Habitat and Distribution: mesopelagic, abundant near continental shelf-slope breaks and seamounts, rare in the open ocean. Found to depths of at least 1,524 m, migrating in the water column at depths of 150–250 m during daylight and to about 50 m at night. Tropical, subtropical, sub-Arctic, and sub-Antarctic waters of the Pacific and Atlantic oceans, and the Mediterranean Sea. In the eastern Atlantic it occurs from Iceland and Norway to Senegal and also from Democratic Republic of the Congo to Namibia. Vulnerability: DD (IUCN), LV (FishBase).

Valenciennellus tripunctulatus (Esmark, 1871)—Constellationfish (Fig. 10)

1 specimen was caught at 790 m depth. Biometry and meristic: 34 mm TL, 29 mm SL. Photophores: VAV: 5; PV: 15; OA: 4; AC: 3+3+3+2+4; IP: 3+4. Habitat and Distribution: oceanic and mesopelagic, between 100 and 700

m depth, with marked stratification of size with depth. Worldwide in tropical and temperate waters. Scattered records from the eastern Atlantic, Iceland, Ireland, from Portugal to Namibia, and in the Mediterranean Sea. Vulnerability: DD (IUCN), LV (FishBase).



FIGURE 10. *Valenciennellus tripunctulatus*.

Family Phosichthyidae

Polymetme corythaeola (Alcock, 1898)—Rendezvous fish

124 specimens were caught at depths between 720 and 896 m. Length data were available for 82 specimens ranging from 10 to 21 cm TL (16.8 ± 2.7). Habitat and Distribution: bathypelagic off continental and island slopes and seamounts in the Atlantic, eastern Pacific and Indo-West Pacific oceans. Vulnerability: DD (IUCN), LV (FishBase).

Family Stomiidae

Stomias boa (Risso, 1810)—Scaly dragonfish

7 specimens were caught at depths between 728 and 914 m. Length data were available for 5 specimens ranging from 18 to 35 cm TL. Habitat and Distribution: meso- to bathypelagic at depth range 200–1,500 m, but may migrate to near-surface waters at night. Atlantic, Southeast Pacific and sub-Antarctic region of the Indian oceans and western Mediterranean Sea. Vulnerability: DD (IUCN), MV (FishBase).

Chauliodus sloani Bloch & Schneider, 1801—Sloane's viperfish

56 specimens were caught at depths between 715 and 1,685 m. Length data were available for 42 specimens ranging from 6 to 35 cm TL (23.3 ± 7.1). Habitat and Distribution: bathypelagic, depth range 400–2,800 m. Cosmopolitan in temperate and tropical zones of all oceans, from about 63° N to 50° S and in the Mediterranean Sea. Vulnerability: DD (IUCN), MV (FishBase).

Photostomias guernei Collett, 1889—Loosejaw (Fig. 11)

4 specimens were caught at depths between 847 and 866 m. Length data were available for 3 specimens ranging from 10 to 12 cm TL. Biometry and meristic: 107 mm TL, 99 mm SL; HL: 18.2; PO: 3.0; POL: 13.1; ED: 2.0; IOL: 4.0; PD: 84.8; LD: 12.1; PA: 83.8; LA: 13.1; PV: 46.5; LV: 42.4; H: 12.1; D: 22; A: 27. Photophores: OA: 37; IC: 55. Habitat and Distribution: mesopelagic during daylight to epipelagic at night, at depth range 1,138–3,100 m. Amphi-Atlantic, in temperate and northern subtropical waters of the North Atlantic. Kenaley & Hartel (2005) reported this species south to 3°58'N in the eastern Atlantic, but Quéro *et al.* (2003) recorded this species in Portugal and south of Spain. The specimens captured in the Galicia Bank could constitute a new northern limit for this species in the eastern Atlantic. Vulnerability: DD (IUCN), LV (FishBase).

Melanostomias bartonbeani Parr, 1927—Scaleless black dragonfish

1 specimen was caught at a depth of 877 m. Biometry and meristic: 187 mm TL, 169 mm SL; HL: 14.2; BL:

18.9; H: 9.5; D: 13; A: 18; P: 5; V: 7. Photophores: PV: 24. Habitat and Distribution: Meso- to bathypelagic at depth range 25–2,000 m. Nearly cosmopolitan in tropical and subtropical oceanic waters, apparently absent from the eastern Indian and western Central Pacific oceans. In the eastern Atlantic from 56°N to south of Guinea Bissau and also from Namibia to South Africa. Vulnerability: DD (IUCN), MV (FishBase).



FIGURE 11. *Photostomias guernei*.

Flagellostomias boureei (Zugmayer, 1913)—Longbarb dragonfish

1 specimen was caught at depths between 768 and 786 m. Biometry and meristic: 216 mm TL; 208 mm SL; HL: 13.0; PO: 4.3; POL: 5.8; ED: 2.9; IOL: 2.9; BL: 29.8 (broken); PD: 87.5; LD: 8.2; PA: 83.7; LA: 13.9; PV: 13.5; PD: 83.7; LV: 13.5; LP: H: 9.6; D: 13; A: 28; P: 10; V: 12. Habitat and Distribution: meso- to bathypelagic at depth range 0–3,000 m. Circumglobal in tropical through temperate seas. In the eastern Atlantic from 58°N to 40° S. Vulnerability: DD (IUCN), MV (FishBase).

Malacosteus niger Ayres, 1848—Stoplight loosejaw

6 specimens were caught at depths between 739 and 1,683 m. Length data were available for 3 specimens ranging from 12 to 15 cm TL. Biometry and meristic: 140 mm TL; 130 mm SL; HL: 30.0; PO: 3.1; POL: 22.3; ED: 4.6; PD: 79.2; LD: 14.6; PA: 80.8; LA: 14.6; H: 17.7; D: 17; A: 19; P: 3; V: 6. Habitat and Distribution: meso- to bathypelagic at depth range 500–3,886 m, usually 915–1,830 m. It has been suggested that this species does not undergo substantial diel vertical migration and remains below 500 m depth. Widely distributed in all oceans, mainly between 66°N and 30°S; unknown in the Mediterranean Sea. Vulnerability: DD (IUCN), LMV (FishBase).

Borostomias antarcticus (Lönnberg, 1905)—Snaggletooth

1 specimen of 21 cm TL was caught at a depth of 870–896 m. Habitat and Distribution: species widely distributed in all oceans. Vulnerability: DD (IUCN), MV (FishBase).

ORDER AULOPIFORMES

Family Ipnopidae

Bathypterois dubius Vaillant, 1888—Spiderfish

29 specimens were caught at depths between 773 and 1,809 m. Length data were available for 22 specimens between 7 and 23 cm TL. Habitat and Distribution: bathydemersal at depth range 260–2,800 m, usually at 2,100–2,300 m. Eastern Atlantic Ocean from the British Isles to Sierra Leone, Azores and the Mediterranean Sea; one record from the western North Atlantic Ocean. Vulnerability: DD (IUCN), MHV (FishBase).

Family Paralepididae

Arctozenus risso (Bonaparte, 1840)—Ribbon barracudina (Fig. 12)

1 specimen was caught at a depth of 1,100 m. Biometry and meristic: 168 mm TL, 159 mm SL; HL: 21.4; PO: 10.7; POL: 7.5; ED: 3.1; IOW: 1.9; PD: 66.7; LD: 2.5; PA: 83.0; LA: 14.5; PP: 22.6; PV: 70.4; LP: 8.2; LV: 3.8; H:

6.9; D: 10; A: 32; V: 8. Habitat and Distribution: pseudoceanic and meso- to bathypelagic at depth range 0–2,200 m, usually 200–1,000 m. Circumglobal including the Mediterranean Sea. Vulnerability: DD (IUCN), LMV (FishBase).



FIGURE 12. *Arctozenus risso*.

Magnisudis atlantica (Krøyer, 1868)—Duckbill barracudina

2 specimens of 21 and 42 cm TL were caught at a depth of 764 and 892 respectively. Habitat and Distribution: oceanic, meso- and bathypelagic at depth range 0–5,499 m. Circumglobal in warm to cold temperate seas but not present in eastern tropical Pacific Ocean. Vulnerability: DD (IUCN), MHV (FishBase).

Family Bathysauridae

Bathysaurus ferox Günther, 1878—Deep-sea lizardfish (Fig. 13)

1 specimen of 31 cm TL was caught at a depth of 1,685 m. Habitat and Distribution: bathydemersal, depth range 600–3,500 m, usually 1,000–2,500 m. Atlantic and Indo-West Pacific. In the eastern Atlantic Ocean, from Iceland to Guinea and also off South Africa. Vulnerability: DD (IUCN), MHV (FishBase).



FIGURE 13. *Bathysaurus ferox*.

ORDER MYCTOPHIFORMES

Family Neoscopelidae

Neoscopelus macrolepidotus Johnson, 1863—Large-scaled lanternfish

2 specimens of 20 and 21 cm TL were caught at depths of 757 and 780 m respectively. Biometry and meristic: 219 mm TL, 178 mm SL; HL: 28.7; PO: 7.9; POL: 16.3; ED: 4.5; IOW: 6.7; PD: 42.7; LD: 12.9; PA: 74.2; LA: 11.8; LP: 27.0; LV: 15.2; H: 22.5; D: 13; A: 12; P: 19; V: 8; Gr: 3+8. Habitat and Distribution: bathypelagic, non-migratory, over continental and island slopes at depth range 300–1,180 m. Circumglobal in tropical through subtropical seas, but not in most parts of the Indian Ocean. In the eastern Atlantic, from the Bay of Biscay to western Sahara and also in Namibia. Vulnerability: DD (IUCN), MV (FishBase).

Neoscopelus microchir Matsubara, 1943—Shortfin neoscopelid (Fig. 14)

287 specimens were caught at depths between 729 and 896 m. Length data were available for 176 specimens ranging from 18 to 37 cm TL (27.4±3.9). The main biometric and meristic data for this species and area were previously reported by Bañón *et al.* (2002). Habitat and Distribution: Atlantic and Indo-West Pacific oceans. In the eastern Atlantic Ocean, from the Galicia Bank to Morocco and South Africa: DD (IUCN), MV (FishBase).



FIGURE 14. *Neoscopelus microchir*.

Family Myctophidae

Myctophum punctatum Rafinesque, 1810—Spotted lanternfish

1 specimen of 9 cm TL was caught at a depth of 749 m. Habitat and Distribution: high-oceanic, mesopelagic at depth range 0–1,000 m; nyctoepipelagic at the surface and down to 125 m and between 225–1,000 m during the day. North Atlantic Ocean, from 69°N to 15°N and in the Mediterranean Sea. Vulnerability: DD (IUCN), LMV (FishBase).

Benthoosema glaciale (Reinhardt, 1837)—Glacier lanternfish

3 specimens were caught at depths between 790 and 796 m. Habitat and Distribution: pelagic-oceanic, non-migratory, at depth range 0–1,407 m, usually 300–400 m. North Atlantic Ocean, between 81°N – 11°N and 76°W – 29°E. In the eastern Atlantic Ocean, from Greenland to Guinea and in the Mediterranean Sea. Vulnerability: DD (IUCN), LMV (FishBase).

Ceratoscopelus maderensis (Lowe, 1839)—No common name

1 specimen of 8 cm TL was caught at 1,079 m depth. Habitat and Distribution: mesopelagic and high-oceanic species, between 12–1,500 m depth, 650–700 m during the day and between 51–250 m at night. Temperate-subtropical Atlantic Ocean and in the Mediterranean Sea. In the eastern Atlantic Ocean, from about 57° N to the Mauritanian upwelling area. Vulnerability: DD (IUCN), LMV (FishBase).

Electrona rissoi (Cocco, 1829)—Electric lanternfish (Fig. 15)

2 specimens of 6 and 7 cm TL were caught at a depth of 762 and 782 m respectively. Biometry and meristic: 62 mm TL, 57 mm SL; HL: 36.8; PO: 7.0; POL: 15.8; ED: 14.0; IOW: 5.3; PD: 50.9; LD: 15.8; PA: 63.2; LA: 26.3, LP: 24.6; LV: 15.8; H: 29.8; D: 13; A: 19; P: 16; V: 9; Gr: 9+19. Photophores: PVO: 2; PLO: 1; PO: 5; VLO: 1; SAO: 3; VO: 4; AO: 11. Habitat and Distribution: high-oceanic and mesopelagic. Disjunct, circumtropical, in warm latitudes of Atlantic, Indian and Pacific oceans and in the Mediterranean Sea. Vulnerability: DD (IUCN), LV (FishBase).

Lampadena speculigera Goode & Bean, 1896—Mirror lanternfish

1 specimen of 10 cm TL was caught at depths between 755 and 759 m. Habitat and Distribution: oceanic and mesopelagic, depth range 0–1,000 m, between 475–950 m during the day and between 60–750 m at night. North Atlantic Ocean and southern circumglobal, between 66°N – 48°S. Vulnerability: DD (IUCN), MV (FishBase).

Notoscopelus kroeyeri (Malm, 1861)—Lancet fish

3 specimens between 12 and 14 cm TL were caught at depths between 749 and 766 m. Habitat and Distribution: epi- to bathypelagic and high-oceanic, from 325 to deeper than 1,000 m during the day and at surface

and down to 125 m during the night. North Atlantic Ocean, between the Arctic Circle and 37°N in the east and between 60°N and 40°N in the west. Vulnerability: DD (IUCN), MV (FishBase).



FIGURE 15. *Electrona rissoi*.

ORDER GADIFORMES

Family Macrouridae

Trachyrincus scabrus (Rafinesque, 1810)—Roughsnout grenadier

69 specimens were caught at depths between 711 and 1,101 m. Length data were available for 17 specimens ranging from 2.5 to 20 cm PAL. Habitat and Distribution: bathydemersal at depth range 300–1,700 m. North Atlantic Ocean and the Mediterranean Sea. In the eastern Atlantic, from Scotland to South Africa. Vulnerability: DD (IUCN), LMV (FishBase).

Hymenocephalus italicus Giglioli, 1884—Glasshead grenadier

56 specimens were caught at depths between 731 and 868 m. Length data were available for 16 specimens ranging from 3 to 5.5 cm PAL. Habitat and Distribution: benthopelagic at depth range 100–1,400 m. Atlantic and western Indian oceans and in the Mediterranean Sea. In the eastern Atlantic Ocean, from the Gulf of Biscay to Angola and South Africa. Vulnerability: DD (IUCN), LMV (FishBase).

Coelorinchus caelorinchus (Risso, 1810)—Hollowsnout grenadier

9 specimens were caught at depths between 749 and 1,041 m. Length data were available for 7 specimens ranging from 1 to 10 cm PAL. Habitat and Distribution: benthopelagic at depth range 90–1,250 m, usually 200–500. North Atlantic Ocean and the Mediterranean Sea. In the eastern Atlantic Ocean, from Iceland and Faroe Islands to Mauritania. Vulnerability: DD (IUCN), HV (FishBase).

Coelorinchus labiatus (Koelher, 1896)—Spearsnouted grenadier

117 specimens were caught at depths between 1,094 and 1,809 m. Length data were available for 117 specimens ranging from 8.5 to 18 cm PAL (12.3±2.2). Habitat and Distribution: bathydemersal at depth range 460–2,220 m. North Atlantic Ocean and the Mediterranean Sea. In the eastern Atlantic, from Iceland to Mauritania. Vulnerability: DD (IUCN), MHV (FishBase).

Coryphaenoides rupestris Gunnerus, 1765—Roundhead rat-tail

34 specimens were caught at depths between 720 and 1,536 m. Length data were available for 13 specimens ranging from 5 to 13 cm PAL. Habitat and Distribution: bathypelagic at depth range 180–2,600 m, in continental, island, and seamount slopes. North Atlantic Ocean, from Iceland and Norway to western Sahara in the eastern Atlantic Ocean. Vulnerability: EN (IUCN), HHV (FishBase).

Coryphaenoides guentheri (Vaillant, 1888)—Günther's grenadier

40 specimens were caught at depths between 1,470 and 1,809 m. Length data were available for 40 specimens ranging from 3 to 13 cm PAL (8.1±2.1). Biometry and meristic: 320 mm TL, 316 mm SL; HL: 16.5; PO: 4.4; POL: 7.6; ED: 4.4; IOW: 3.8; BL: 1.6; PD1: 20.3; PD2: 34.8; LD1: 4.7; LD2: 65.2; PA: 28.2; LA: 71.8; PP: 19.3; PV: 19.6; LP: 12.3; LV: 8.2; H: 12.7; D1: II+9; P: 22; V: 7; Gr: 2+6. Habitat and Distribution: bathydemersal at depth range 831–2,830 m. North Atlantic Ocean and Mediterranean Sea. In the eastern Atlantic Ocean, from Iceland and Denmark Strait to Mauritania and Gabon. Vulnerability: DD (IUCN), MHV (FishBase).

Coryphaenoides mediterraneus (Giglioli, 1893)—Mediterranean grenadier

10 specimens were caught at depths between 1,470 and 1,809 m. Length data were available for all specimens ranging from 3.5 to 17.5 cm PAL. Habitat and Distribution: bathypelagic at depth range 883–4,262 m. North Atlantic Ocean and in the Mediterranean Sea. In the eastern Atlantic Ocean, from Iceland and western Scotland to Mauritania. Vulnerability: DD (IUCN), HV (FishBase).

Malacocephalus laevis (Lowe, 1843)—Rough rat-tail

924 specimens were caught at depths between 709 and 916 m. Length data were available for 378 specimens ranging from 3 to 12 cm PAL (6.7±1.7). Habitat and Distribution: bathydemersal at depth range 200–1,000 m, usually 300–750 m. Atlantic and Indo-West-Central Pacific oceans. In the eastern Atlantic Ocean, from Iceland and Faroe Islands to South Africa. Vulnerability: DD (IUCN), HV (FishBase).

Nezumia aequalis (Günther, 1878)—Common Atlantic grenadier

3,645 specimens were caught at depths between 737 and 1,470 m. Length data were available for 544 specimens ranging from 1 to 9 cm PAL (4.3±1.3). Habitat and Distribution: benthopelagic at depth range 200–2,320 m, usually 200–1,000 m. North Atlantic Ocean and the Mediterranean Sea. In the eastern Atlantic, from the Faroe Bank Channel to northern Angola. Vulnerability: DD (IUCN), MV (FishBase).

Family Bathygadidae

Gadomus longifilis (Goode & Bean, 1885)—Treadfin grenadier

3 specimens ranging from 27 to 29 cm TL were caught at depths between 1,450 and 1,683 m (Bañón *et al.*, 2013a). Habitat and Distribution: benthopelagic, between 520 and 2,165 m depth. Amphi-Atlantic in tropical and subtropical North Atlantic Ocean. In western Atlantic, from Greenland to the Gulf of Mexico and Caribbean Sea and from the northwest of Spain to the Gulf of Guinea in the eastern Atlantic. Vulnerability: DD (IUCN), MV (FishBase).

Gadomus dispar (Vaillant, 1888)—No common name

6 specimens ranging from 17 to 36 cm TL were caught at depths between 764 and 1,051 m (Bañón *et al.*, 2013a). Habitat and Distribution: benthopelagic between 548 and 1,543 m depth. Amphi-Atlantic distribution in tropical and subtropical North Atlantic Ocean. In western Atlantic, from Norfolk Canyon to the Caribbean Sea and in eastern Atlantic from the Cantabrian Sea to Mauritania and Guinea-Bissau. Vulnerability: DD (IUCN), MHV (FishBase).

Bathygadus melanobranchus Vaillant, 1888—Vaillant's grenadier

One specimen of 37 cm TL was caught at depths between 1,185 and 1,187 m (Bañón *et al.* 2013a). Habitat and Distribution: benthopelagic at depths between 450 and 2,650 m, but generally from 700–1,400 m. Amphi-Atlantic distribution, in tropical and subtropical latitudes. In the eastern Atlantic, from the Irish continental slope to Senegal and Gabon. Vulnerability: DD (IUCN), MHV (FishBase).

Family Moridae

Guttigadus latifrons (Holt & Byrne, 1908)—No common name (Fig. 16)

4 specimens ranging 11–13 cm TL were caught at depths between 791 and 851 m. Biometry and meristic: 129

mm TL; 118 mm SL; HL: 23.7; PO: 5.1; POL: 11.0; ED: 7.6; IOW: 8.5; BL: 2.5; PD1: 24.6; PD2: 28.8; LD1: 3.4; LD2: 58.5; PA: 29.7; LA: 58.5; LP: 15.3; LV: 22.0; H: 22.0; D1: 5; D2: 72; A: 68; P: 22; V: 3; Gr: 7+16. Habitat and Distribution: bathydemersal between 770–1,875 m depth. Eastern and southwestern Atlantic Ocean, western Indian Ocean and in the Mediterranean Sea. In the eastern Atlantic, from Ireland and Island to the Azores islands and the Galicia Bank. Vulnerability: DD (IUCN), MV (FishBase).



FIGURE 16. *Guttigadus latifrons*.

Halargyreus johnsonii Günther, 1862—Slender codling

207 specimens were caught at depths between 731 and 1,685 m. Length data were available for 137 specimens ranging from 9–45 cm TL (29.7 ± 9.6). Habitat and Distribution: bathypelagic, antitropical at depth range 450–3,000 m. North Atlantic, South Atlantic, Southwest Pacific, and Southeast Pacific oceans. Patchy distribution in sub-Arctic and sub-Antarctic waters. Vulnerability: DD (IUCN), HV (FishBase).

Physiculus dalwigki Kaup, 1858—Black codling

One specimen of 26 cm TL was caught at depths between 731–738 m (Bañón *et al.* 2002). Habitat and Distribution: benthopelagic at depth range 100–738 m. Eastern Atlantic: Galicia Bank, Great Meteor Bank, Madeira and south along the African coast to about 25°N and in western Mediterranean Sea. Vulnerability: DD (IUCN), MV (FishBase).

Mora moro (Risso, 1810)—Common mora

6,596 specimens were caught at depths between 709 and 1,323 m. Length data were available for 1,310 specimens ranging from 13–67 cm TL (47.9 ± 9.3), with males between 25 and 55 cm (45.7 ± 4.0 , N=431) and females between 35 and 65 cm (54.8 ± 4.5 , N=490). Habitat and Distribution: bathypelagic; depth range 400–2,500 usually 400–1,000 m. Wide distribution along the Atlantic, Pacific and Indian oceans and in the western Mediterranean Sea. In the eastern Atlantic, from Iceland and Faeroes to Cape Bojador, West Africa, and including Azores Islands and Madeira archipelago. Vulnerability: DD (IUCN), HV (FishBase).

Lepidion lepidion (Risso, 1810)—Mediterranean codling

41,585 specimens were caught at depths between 709 and 1,323 m. Length data were available for 3,196 specimens ranging from 11 to 53 cm TL (26 ± 5.2). Following a recent revision of the genus, the Atlantic *L. eques* has been proposed as a junior synonym of the Mediterranean *L. lepidion* (Bañón *et al.* 2013b). Habitat and Distribution: benthopelagic, depth range 127–1,880 m, usually 500–900 m. North Atlantic Ocean and the Mediterranean Sea. Vulnerability: LC (IUCN), MHV (FishBase).

Lepidion guentheri (Giglioli, 1880)—No common name (Fig. 17)

One specimen was caught at a depth of 1,536 m. Biometry and meristic: 697 mm TL; 632 mm SL; HL: 22.2; PO: 5.7; POL: 12.3; ED: 4.1; IOW: 5.1; PD1:25.3; PD2: 29.3; LD1: 2.5; LD2: 62.8; PA: 48.3; LA: 62.8, PV: 19.3; PP: 24.4; LP: 13.9; LV: 30.4; H: 23.1; 1D: 5; 2D: 56; P: 21; V: 6; A:50; Gr: 6+16. Habitat and Distribution: benthopelagic between 750 and 2,196 m depth. Northeastern Atlantic, western coast of Ireland, western and northern coasts of Spain, northern coast of Portugal, the Azores, Madeira, Canary Islands, mid-Atlantic Ridge, and western Mediterranean Sea. Vulnerability: DD (IUCN), HHV (FishBase).

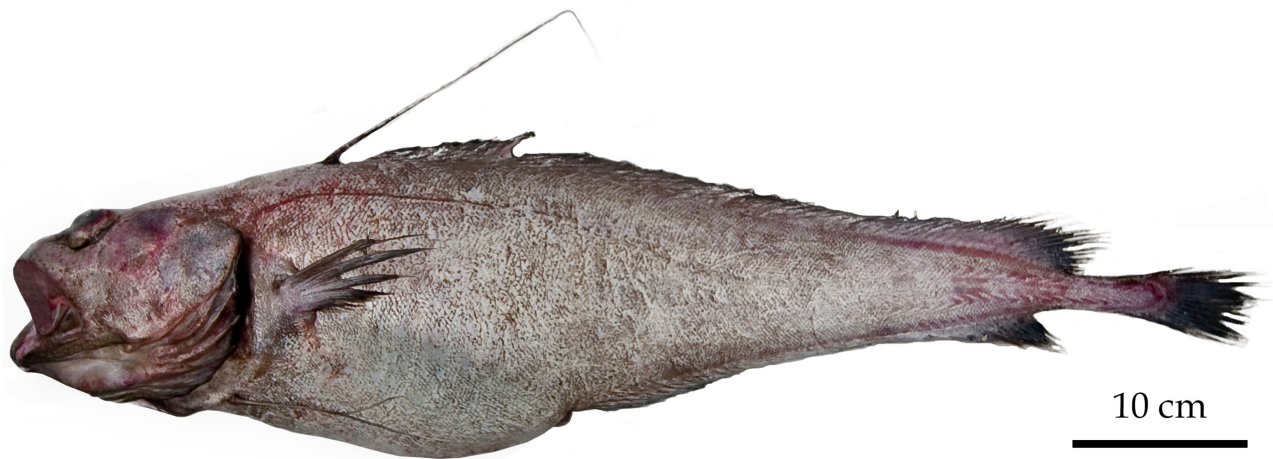


FIGURE 17. *Lepidion guentheri*.

Antimora rostrata (Günther, 1878)—Blue antimora

One specimen of 16 cm TL was caught at a depth of 1,750 m. Habitat and Distribution: bathypelagic at depth range 350–3,000 m, usually 1,300–2,500 m. Circumglobal, except North Pacific. In the eastern Atlantic, from Iceland to South Africa. Vulnerability: DD (IUCN), HHV (FishBase).

Family Melanonidae

Melanonus zugmayeri Norman, 1930—Arrowtail

38 specimens were caught at depths between 773 and 1,470 m. Length data were available for 28 specimens ranging from 13 to 28 cm TL. Habitat and Distribution: oceanic and bathypelagic at depth range 0–3,000 m. Circumglobal in tropical and subtropical seas. Vulnerability: DD (IUCN), LV (FishBase).

Family Gadidae

Micromesistius poutassou (Risso, 1827)—Blue whiting

165 specimens were caught at depths between 709 and 892 m. Length data were available for 102 specimens ranging from 12 to 40 cm TL (29.2 ± 4.7). Habitat and Distribution: oceanic and bathypelagic at depth range 150–3,000 m, usually 300–400 m. Northeastern Atlantic from 26°N to 82°N, with smaller populations in the northwestern Atlantic and the Mediterranean Sea. Vulnerability: DD (IUCN), LMV (FishBase).

Family Lotidae

Gaidropsarus granti (Regan, 1903)—Azores rockling

2 specimens of 33 and 17 cm TL were caught at depths of 782 and 866 m respectively (Bañón *et al.* 2002, 2010). Habitat and Distribution: demersal from 20 to over 800 m depth. Eastern Atlantic, in the Galicia Bank, Canary and the Azores Islands and in the eastern Mediterranean Sea. Vulnerability: DD (IUCN), MV (FishBase).

Family Phycidae

Phycis blennoides (Brünnich, 1768)—Greater forkbeard

560 specimens were caught at depths between 709 and 952 m. Length data were available for 111 specimens ranging from 20 to 79 cm TL (38.6 ± 16.1). Habitat and Distribution: benthopelagic over sandy and muddy bottoms

at depth range 10–1,047 m, usually 100–450 m, with juveniles more coastal, over the continental shelf while adults migrate along the slope. Eastern Atlantic, from Norway and Iceland to Mauritania and in the Mediterranean Sea. Vulnerability: DD (IUCN), HV (FishBase).

Family Merlucciidae

Merluccius merluccius (Linnaeus, 1758)—European hake

One specimen, a female of 61 cm TL was caught at a depth of 795 m. Habitat and Distribution: demersal to benthopelagic over sandy and muddy bottoms at depth range 30–1,075 m, usually 50–370 m. Eastern Atlantic, from Norway and Iceland to Mauritania and in the Mediterranean Sea. Vulnerability: DD (IUCN), HV (FishBase).

ORDER OPHIDIIFORMES

Family Bythitidae

Cataetyx alleni (Byrne, 1906)—No common name (Fig. 18)

29 specimens were caught at depths between 755 and 916 m. Length data were available for 20 specimens ranging from 9 to 15 cm TL. Habitat and Distribution: bathydemersal, depth range 480–1,851 m, usually below 600 m. Eastern Atlantic, from the southwestern Ireland to Portugal and western Mediterranean Sea. Vulnerability: DD (IUCN), LV (FishBase).



FIGURE 18. *Cataetyx alleni*.

Cataetyx laticeps Koefoed, 1927—No common name

2 specimens of 72 and 82 cm TL were caught at depths of 1,683 and 1,685 m respectively. Habitat and Distribution: bathydemersal or benthopelagic at depth range 500–2,830. North Atlantic Ocean and the Mediterranean Sea. In the eastern Atlantic, from Iceland, scattered localities around the British Isles, France, Azores, and along the coast of West Africa to the Cape of Good Hope. Vulnerability: DD (IUCN), HV (FishBase).

Family Ophididae

Spectrunculus grandis (Günther, 1877)—Pudgy cusk eel (Fig. 19)

One specimen of 55 cm TL was caught at a depth of 1,809 m. Habitat and Distribution: bathydemersal; depth range 800–4,300 m, usually 2,000–3,000 m. Widely distributed in all oceans, between 57°N and 59°S. Vulnerability: DD (IUCN), HHV (FishBase).



FIGURE 19. *Spectrunculus grandis*.

ORDER LOPHIIFORMES

Family Lophiidae

Lophius piscatorius Linnaeus, 1758—Anglerfish

137 specimens were caught at depths between 709 and 916 m. Length data were available for 41 specimens ranging from 17 to 97 cm TL (75.8 ± 14.8) with males between 64 and 92 cm (N=8) and females between 67 and 97 cm (N=10). Habitat and Distribution: bathydemersal on sandy, muddy, gravelly and occasionally rocky bottoms, at depths from 20–2,600 m. Eastern Atlantic, from Iceland and southwestern Barents Sea to Mauritania, including the Mediterranean and Black seas. Vulnerability: DD (IUCN), HHV (FishBase).

Family Chaunacidae

Chaunax pictus Lowe, 1846—Pink frogmouth

63 specimens were caught at depths between 726 and 940 m. Length data were available for 40 specimens ranging from 12 to 41 cm TL (23.6 ± 7.1). Habitat and Distribution: bathydemersal on continental shelves, slopes and seamounts at depth range 200–978 m. Circumglobal in tropical to temperate waters, although Ho & Last (2013) limited its presence to the Atlantic Ocean. Vulnerability: DD (IUCN), LMV (FishBase).

Family Linophryinidae

Linophryne coronata Parr, 1927—Deep-sea anglerfish

One female of 223 mm TL with attached parasitic male of 29 mm TL was caught at depths between 762 and 764 m (Bañón *et al.* 2006b). Habitat and Distribution: meso- to bathypelagic, depth range 0–1,500 m. Scattered records in the Atlantic and northeastern Pacific oceans. Vulnerability: DD (IUCN), LV (FishBase).

ORDER BERYCIFORMES

Family Trachichthyidae

Hoplostethus mediterraneus Cuvier, 1829—Mediterranean slimehead

61,206 specimens were caught at depths between 737 and 1,187 m. Length data were available for 9,177 specimens ranging from 7 to 36 cm TL (21.5 ± 3.4). Habitat and Distribution: benthopelagic at depth range 100–1175 m, usually 500–800 m. Northeastern Atlantic, Indian and South Pacific oceans and in Mediterranean Sea. In the eastern Atlantic, from Ireland to South Africa. Vulnerability: DD (IUCN), HV (FishBase).

Hoplostethus cadenati Quéro, 1974—Black slimehead

47 specimens were caught between 777 and 940 m depth. Length data were available for 22 specimens ranging from 20 to 29 cm TL. Biometry and meristic: 272 and 237 mm TL; 210 and 184 mm SL; HL: 38.1 and 38.6; PO: 9.0 and 10.9; POL: 18.1 and 17.9; ED: 11.0 and 9.8; PD:41.9 and 41.8; LD: 37.1 and 38.0; PA: 65.2 and 64.1; LA: 17.6 and 18.5, LP: 33.3 and 32.6; LV: 21.0 and 19.0; H: 41.4 and 44.6; D: VI+13 and V+14; A: III+10; P: 17; V: I+5 and I+6; Gr: 5+17. Habitat and Distribution: bathypelagic, living near the bottom from 70 to at least 1,000 m depth, usually 200–700 m. Eastern Atlantic and western Indian oceans. In the eastern Atlantic, from northwestern Ireland, northwestern Spain and along the northwestern coast of Africa between 27°30'N and 10°10'N and from 1°26'S to 26°14'S. Vulnerability: DD (IUCN), HV (FishBase).

Hoplostethus atlanticus Collett, 1889—Orange roughy

3 specimens of 21, 24 and 31 cm TL were caught at depths between 1,470 and 1,685 m. Habitat and Distribution: bathypelagic, inhabits deep, cold waters over steep continental slopes, ocean ridges and seamounts, sometimes in dense aggregations, from 180 to 1,809 m depth, usually 400–900 m. Atlantic and Indo-West Pacific oceans, but not in the eastern Pacific. In the eastern Atlantic, from Iceland to Morocco and from Namibia to South Africa. Vulnerability: VU (IUCN, OSPAR), HHV (FishBase).

Family Diretmidae

Diretmichthys parini (Post & Quéro, 1981)—Parin's spiny fin (Fig. 20)

Two specimens were caught at depths between 780 and 1,315 m. Biometry and meristic: 241 and 266 mm TL; 195 and 211 mm SL; HL: 35.9 and 36.5; PO: 6.7 and 9.5; POL: 15.9 and 11.4; ED: 13.3 and 16.1; IOW: 4.6 and 5.2; PD:42.1 and 43.1; LD: 42.1 and 43.1; PA: 60.0 and 61.6; LA: 42.1 and 32.2, LP: 27.2 and 27.5; LV: 28.7 and 29.9; H: 45.6 and 46.0; D: 27 and 29; P: I+17; V: I+6; A: 21 and 23; Gr: 6+1+12. Habitat and distribution: tropical, subtropical and moderate latitudes of the Atlantic, Pacific and Indian oceans at depths ranging from to 270 to more than 2000 m, with juveniles from epipelagic to mesopelagic zone and adults collected close to the bottom (Arronte & Heredia 2006). Vulnerability: DD (IUCN), LMV (FishBase).



FIGURE 20. *Diretmichthys parini*.

Diretmus argenteus Johnson, 1864—Silver spinyfin

Five specimens were caught at depths between 777 and 940 m. Two specimens were 6 and 26 cm TL respectively. Habitat and distribution: bathypelagic at depth range 0–2,000 m, usually 500–700 m. Circumglobal in temperate and tropical seas. In the eastern Atlantic, from Iceland and British Isles to South Africa, including the Canary and Ascension islands. Vulnerability: DD (IUCN), LV (FishBase).

Family Berycidae

Beryx splendens Lowe, 1834—Splendid alfonsino

1,968 specimens were caught at depths between 643 and 914 m. Length data were available for 698 specimens ranging from 21 to 48 cm TL (36.5 ± 4.4). Habitat and Distribution: benthopelagic on continental shelves and slopes, seamounts, and oceanic ridges in a depth range from 25 to 1,300 m, usually 200–800 m. Circumglobal distribution, in temperate to tropical waters excluding the northeastern Pacific. In the eastern Atlantic, from Ireland to South Africa. Vulnerability: DD (IUCN), HV (FishBase).

Beryx decadactylus Cuvier, 1829—Beryx

18 specimens were caught at depths between 643 and 877 m. Length data were available for 11 specimens ranging from 44 to 58 cm TL. Length data available during the exploratory surveys carried out in the 1980s was from 24 to 59 cm TL, but the total number of individuals caught was not reported. Habitat and Distribution: benthopelagic with a worldwide distribution, occurring in tropical, subtropical and some temperate areas of the Atlantic, Pacific and Indian oceans, and in the western Mediterranean Sea. In the eastern Atlantic, from Greenland, Iceland and Norway to western Sahara and South Africa. Vulnerability: DD (IUCN), HHV (FishBase).

Family Oreosomatidae

Neocyttus helgae (Holt & Byrne, 1908)—False boarfish (Fig. 21)

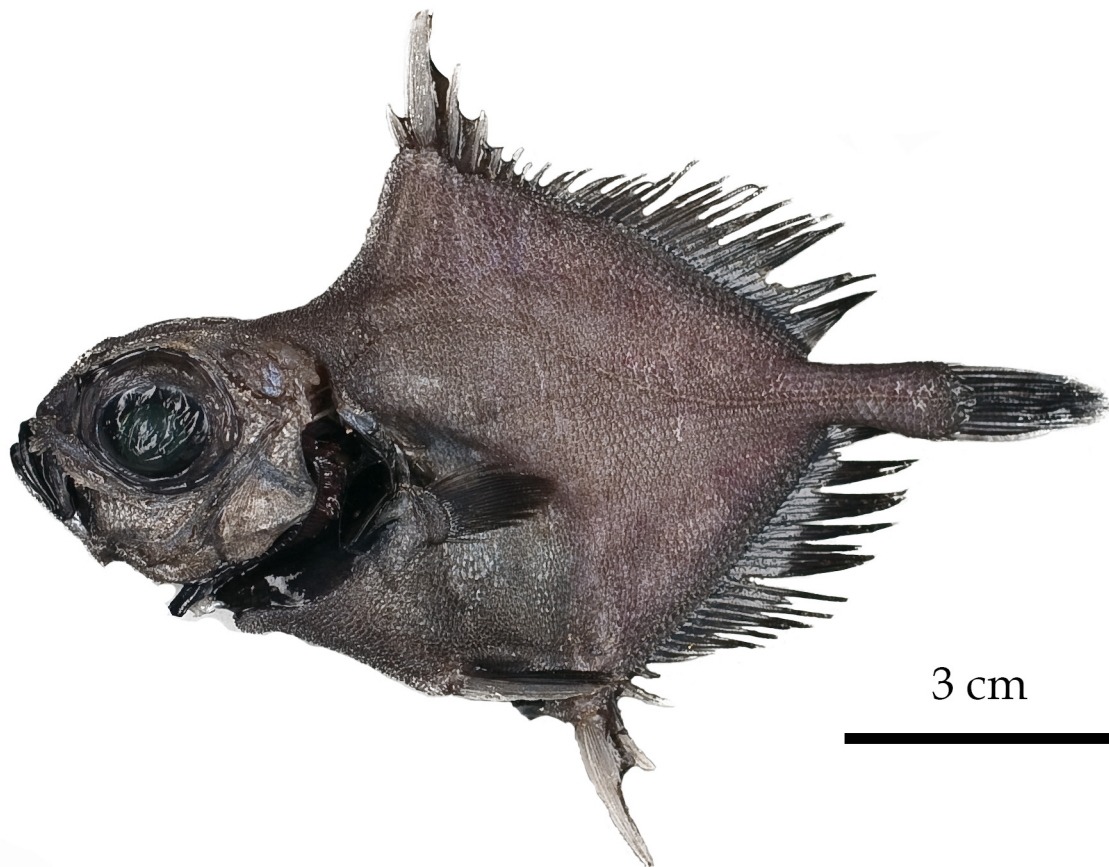


FIGURE 21. *Neocyttus helgae*.

One specimen was caught at depths between 1,410 and 1,427 m. Biometry and meristic: 119 mm TL; 100 mm SL; HL: 35.0; PO: 9.0; POL: 7.0; ED: 19.0; IOW: 12.0; PD: 45.0; LD: 50.0; PA: 48.0; LA: 37.0; PP: 40.0; PV: 39.0; LP: 15.0; LV: 15.0; H: 51.0; D: VII+33; A: IV+31; P: 19; V: I+6; Gr: 5+18; SLL: 80. Habitat and

Distribution: bathypelagic species along the outer continental shelf insular slope and seamounts, strongly associated with habitats of high currents, ripple marks, slopes, reefs of rocks and gorgonians, at depths from 850 to 1,700 m. Northeastern Atlantic, from Iceland to Madeira and northwestern Atlantic. Vulnerability: DD (IUCN), HV (FishBase).

ORDER SYNGNATHIFORMES

Family Syngnathidae

Entelurus aequoreus (Linnaeus, 1758)—Snake pipefish

34 specimens between 11 and 35 cm TL were caught over seabed depths of 766–866 m, probably during the hauling of the bottom trawl. Habitat and Distribution: coastal or oceanic pelagic species. Eastern Atlantic Ocean, from the Azores to Iceland and Norway, including the Baltic Sea. Vulnerability: DD (IUCN), LMV (FishBase).

ORDER SCORPAENIFORMES

Family Sebastidae

Helicolenus dactylopterus (Delaroche, 1809)—Blackbelly rosefish

2 specimens were caught at depths between 704 and 869 m. Only one individual of 37 cm TL was measured. Habitat and Distribution: bathydemersal in soft bottom areas of the continental shelf and upper slope, at depth range 50–1,100 m, usually 150–600 m. Western Atlantic, from Canada to Venezuela and eastern Atlantic, from Iceland and Norway to South Africa and in the Mediterranean Sea. Vulnerability: DD (IUCN), MHV (FishBase).

Trachyscorpia cristulata echinata (Koehler, 1896)—Spiny scorpionfish

1,105 specimens were caught at depths between 709 and 1,323 m. Length data were available for 267 specimens ranging from 12 to 50 cm TL (37.4±8.7). Biometry and meristic: 4 specimens, 392–506 mm TL, 336–418 mm SL; HL: 43.6–47.1; PO: 11.2–14.4; POL: 23.2–24.5; ED: 8.9–10.1; IOW: 4.7–5.5; PD: 33.5–41.1; LD: 46.7–50.3; PA: 68.7–74.2; LA: 11.2–13.2; PP: 42.9–44.3; PV: 39.3–41.8; LP: 21.3–24.9; LV: 14.4–17.6; H: 29.9–32.5; D: XII+9; A: III+5; P: 20–21; V: I+5; Gr: 6+12–13. Habitat and Distribution: bathydemersal on muddy and sandy bottoms between 200 and 2,500 m. Eastern Atlantic, from Ireland to Senegal, Mid-Atlantic Ridge and in the Mediterranean Sea. Vulnerability: DD (IUCN), HHV (FishBase).

Family Liparidae

Paraliparis hystrix Merrett, 1983—No common name

One specimen of 4 cm TL was caught at a depth of 928 m. Habitat and Distribution: bathydemersal at depth range 250–1,150 m. Northeastern Atlantic, west of the British Isles and probably in northwestern Atlantic. Vulnerability: DD (IUCN), LMV (FishBase).

ORDER PERCIFORMES

Family Polyprionidae

Polyprion americanus (Bloch & Schneider, 1801)—Wreckfish

12 specimens were caught at depths between 645 and 740 m. Length data were available for 2 specimens of 119 and 120 cm TL. Length data during the exploratory surveys carried out on the 1980s was to 132 cm for males and to 142 cm for females, but the total number of individuals caught was not reported. The presence of this species associated with floating objects has also been reported. At least one specimen of 51 cm TL was caught in the

surface of the Galicia Bank during the 1980s surveys. Habitat and Distribution: pelagic (juveniles) to demersal (adults), above rocky and muddy/sandy bottoms in continental, oceanic island slopes and seamounts, from 40 to 1,000 m, usually from 100 to 200 m. Circumglobal, including the Mediterranean Sea, mostly in temperate and subtropical latitudes. In the eastern Atlantic, from Norway to South Africa. Vulnerability: DD (IUCN), VHV (FishBase).

Family Epigonidae

Epigonus telescopus (Risso, 1810)—Bulls-eye

2,757 specimens were caught at depths between 643 and 1,323 m. Length data were available for 1,372 specimens ranging from 15 to 77 cm TL (42.3 ± 10.4). Habitat and Distribution: pelagic (juveniles) to bathydemersal or benthopelagic (adults) on soft bottoms, between 75 and 1,200 m depth, usually at 300–800 m. Atlantic and Indo-West Pacific oceans and in the Mediterranean Sea. In the eastern Atlantic it has an antitropical distribution, occurring from Iceland to the Canary Islands and reappearing along the western coast of South Africa. Vulnerability: DD (IUCN), HHV (FishBase).

Epigonus denticulatus Dieuzeide, 1950—Pencil cardinal

One specimen of 16 cm TL was caught at a depth of 847 m. The species is probably more abundant than it appears, having been confused with juveniles of *E. telescopus*. Habitat and Distribution: bathydemersal, inhabiting the continental slope from 200 to 830 m depth, although it occurs usually between 300 and 600 m. Circumglobal in warm seas, including the Mediterranean Sea. In the northeastern Atlantic, it is extended from the Bay of Biscay to the west coast of Africa. Vulnerability: DD (IUCN), LMV (FishBase).

Family Carangidae

Trachurus trachurus (Linnaeus, 1758)—Atlantic horse mackerel

One specimen of 6 cm TL was caught over seabed depth of 771 m, probably during the hauling of the bottom trawl. Habitat and Distribution: pelagic-neritic usually over sandy bottom, at depth range 0–1,050 m, usually 100–200 m. Eastern Atlantic, from Norway to South Africa, round the coast to Maputo and in the Mediterranean Sea. Vulnerability: DD (IUCN), HV (FishBase).

Family Coryphaenidae

Coryphaena equiselis Linnaeus, 1758—Pompano dolphinfish

One specimen was caught over seabed depths of 804–859 m, probably during the hauling of the bottom longline. Biometry and meristic: 455 mm TL; 344 mm SL; FL: 104.7; HL: 23.5; PO: 8.4; POL: 11.0; ED: 4.9; IOW: 8.1; PD: 14.0; LD: 78.2; PA: 53.2; LA: 38.4, LP: 15.4; LV: 15.4; H: 27.0; D: 54; A: 25; P: 19; V: 5; Gr: 0+1+9. Habitat and Distribution: pelagic and oceanic species but may enter coastal waters. Worldwide in tropical and subtropical seas. Vulnerability: LC (IUCN), LMV (FishBase).

Family Bramidae

Brama brama (Bonnaterre, 1788)—Atlantic pomfret

Reported only during the exploratory surveys carried out in the 1980s. Length data of 994 specimens from 34 to 46 cm TL. Habitat and Distribution: pelagic-oceanic at depths between 0–800 m, usually 0–550 m. Worldwide in the Atlantic, Pacific and Indian oceans in tropical, temperate, and sometimes cold waters. In the eastern Atlantic, from Norway to South Africa. Vulnerability: DD (IUCN), HHV (FishBase).

Pterycombus brama Fries, 1837—Atlantic fanfish

One specimen of unknown size but a weight of 750 g was caught over seabed depth of 778–804 m, probably during the hauling of the bottom longline. This species was also recorded during the exploratory surveys carried out in the 1980s, with length sizes between 34 and 41 cm TL, but the total number of individuals caught was not reported. Habitat and Distribution: pelagic-oceanic at depth range 25–400 m. North Atlantic Ocean and Mediterranean Sea. In the eastern Atlantic, from Iceland, British Isles and Norway to the Gulf of Guinea. Vulnerability: DD (IUCN), MHV (FishBase).

Taractes asper Lowe, 1843—Rough pomfret

One specimen of 35 cm TL was caught over seabed depth of 685 m, probably during the hauling of the bottom longline. Habitat and Distribution: pelagic-oceanic at depth range 1–140 m. Circumglobal, antiequatorial, in tropical to temperate waters of Pacific, Indian and Atlantic oceans. In the eastern Atlantic, from Iceland and northern Norway to Madeira. Vulnerability: DD (IUCN), HV (FishBase).

Family Chiasmodontidae

Chiasmodon niger Johnson, 1864—Black swallower

Two specimens, one of them measuring 15 cm TL, were caught at depths between 786 and 857 m. Habitat and Distribution: meso- to bathypelagic species between 150 and 3,900 m, specimens larger than 45 mm usually between 730–1,900 m. Distributed throughout the tropical and temperate eastern and western North Atlantic Ocean and the Gulf of Mexico, from 95°W to 5°E and 46°N to 5°S. Vulnerability: DD (IUCN), LV (FishBase).

Family Blenniidae

Blennius ocellaris Linnaeus, 1758—Butterfly blenny (Fig. 22)

One specimen of 13 cm TL was caught at depths between 762 and 799 m. Habitat and Distribution: demersal at a depth range 10–400 m. Northeastern Atlantic, from the English Channel to Morocco, also known from the Mediterranean and Black Sea. Vulnerability: DD (IUCN), LMV (FishBase).



FIGURE 22. *Blennius ocellaris*.

Family Gempylidae

Nesiarchus nasutus Johnson, 1862—Black gemfish

One specimen of 46 cm TL was caught at depths between 731–739 m. Habitat and Distribution: larvae and

juveniles are epipelagic to mesopelagic and adults benthopelagic to mesopelagic at depth range 200–1,200 m. Dwell on the continental slope or underwater rises, migrating to midwater at night. Worldwide distribution in tropical and subtropical seas except in the eastern Pacific and northern Indian oceans. In the eastern Atlantic it occurs from Iceland and Norway to the Gulf of Guinea. Vulnerability: DD (IUCN), HHV (FishBase).

Ruvettus pretiosus Cocco, 1833—Oilfish

One specimen was caught at depths between 658–768 m. Biometry and meristic: 958 mm TL; 810 mm SL; FL: 105.4; HL: 26.4; PO: 9.4; POL: 12.6; ED: 4.8; IOW: 6.2; PD: 23.7; LD: 65.4; PA: 68.3; LA: 20.4, LP: 19.4; LV: 8.3; H: 19.1; D: XIV+17+2'; A: I+16+2'; P: 15; V: I+5; Gr: 6+1+9. Habitat and Distribution: benthopelagic at continental slopes, around oceanic islands and submarine rises at depth range 100–800 m, usually 200–400 m. Widely distributed throughout the tropical and temperate waters of the world's oceans. Vulnerability: DD (IUCN), VHV (FishBase).

Family Trichiuridae

Aphanopus carbo Lowe, 1839—Black scabbardfish

21 specimens were caught at depths between between 720 and 1,094 m. Length data were available for 17 specimens ranging from 35 to 136 cm TL. All specimens were identified as *A. carbo*. However, this species can be easily confused with the sympatric *A. intermedius*. Thus, the presence of the latter species in the catches cannot be ruled out. Habitat and Distribution: bathypelagic at depth range 200–1,700 m, usually 700–1,300 m. It is present at both sides of the North Atlantic Ocean, at least between 69°N and 26°N. In the eastern Atlantic Ocean, it occurs from the strait of Denmark to western Sahara, including the Canary Islands and the Madeira Archipelago and numerous submarine banks and seamounts. Vulnerability: DD (IUCN), HHV (FishBase).

Benthodesmus simonyi (Steindachner, 1891)—Simony's frostfish

36 specimens were caught at depths between 652 and 877 m. Length data were available for 20 specimens ranging from 73 to 117 cm TL. Habitat and Distribution: benthopelagic and oceanic at depth range 200–900 m. Distributed on the continental slope and underwater rises; juveniles are mesopelagic. Both sides of the North Atlantic, off Newfoundland (Canada), Bermuda, New England (USA), Middle Atlantic Ridges, Iceland, Norway, Portugal, Madeira, and Canary Islands. Vulnerability: DD (IUCN), HV (FishBase).

Family Centrolophidae

Centrolophus niger (Gmelin, 1789)—Blackfish

13 specimens were caught at depths between 735 and 868 m. Length data were available for 11 specimens ranging from 46 to 89 cm TL. Habitat and Distribution: oceanic, epipelagic or mesopelagic species with juveniles occurring in surface waters; depth range 40–1,050 m, usually 300–700 m. Circumglobal, including the western Baltic Sea, North Sea and the Mediterranean Sea, but absent in the northern Pacific Ocean. Vulnerability: DD (IUCN), VHV (FishBase).

Schedophilus medusophagus (Cocco, 1839)—Cornish blackfish

One specimen of 56 cm TL was caught at 766 m depth. Habitat and Distribution: mesopelagic species between 3 and 900 m depth. Present in temperate waters of the North Atlantic Ocean and western Mediterranean Sea. In the eastern Atlantic Ocean, it occurs from Iceland and Ireland to Morocco, including the Azores and Madeira Islands. Vulnerability: DD (IUCN), MV (FishBase).

Family Xiphiidae

Xiphias gladius Linnaeus, 1758—Swordfish

This species was reported only during the exploratory surveys on the 1980s. Length data from 190 to 322 cm

TL, but the number of individuals were not reported. Habitat and Distribution: pelagic-oceanic species preferring temperatures from 18°C to 22°C at depths ranging between 0–800 m, usually 0–550 m. Worldwide distributed in the Atlantic, Pacific, and Indian oceans in tropical, temperate, and sometimes cold waters. Vulnerability: LC (IUCN), HHV (FishBase).

ORDER PLEURONECTIFORMES

Family Soleidae

Bathysolea profundicola (Vaillant, 1888)—Deepwater sole

19 specimens were caught at depths between 731 and 868 m. Length data were available for 8 specimens ranging from 17 to 23 cm TL. Habitat and Distribution: bathypelagic, between 200 and 1,350 m depth. Eastern Atlantic, from southern Ireland to Angola and the Mediterranean Sea. Vulnerability: DD (IUCN), LV (FishBase).

Discussion

The present checklist includes 139 species of marine fishes from the Galician Bank that represent 14.6 % of the 955 species listed for the European Atlantic waters by Quéro *et al.* (2003). Biogeographically, the Atlantic group is the most important (113 species, 81.3%), followed by the Lusitanian (17 species, 12.2%), the Boreal (6 species, 4.3%), the African (2 species, 1.4%) and the Macaronesian group (1 species, 0.7%).

The diversity in species composition and their relative abundance are dependent on the sampling effort, the type of fishing gears employed, and the gear efficiencies. Thus, commercial bottom trawl gears operating over the shallower sedimentary areas of the Galicia Bank recorded both the highest species richness and abundance values.

The pelagic fish species are presumably underestimated. The abundance and composition of mesopelagic fishes, mainly lantern fishes (Myctophidae) and cyclothionids (Gonostomatidae), are probably underestimated because there was no specific sampling protocol aimed towards these groups and many of the specimens caught were damaged during the trawling and could not be identified to species level. Likewise, the epipelagic fishes were only sampled during the exploratory surveys carried out in the 1980's, with surface longline. The recorded species were captured either during these exploratory surveys (e.g., *X. gladius*, *I. oxyrinchus*) or accidentally during the hauling of the bottom gears (e.g., *C. equiselis*, *P. violacea*).

Despite all these factors, the resulting list constitutes a good representation of the fish fauna inhabiting the Galicia Bank, which includes species of demersal and benthic domains and the three vertical oceanic zones (epi-, meso- and bathypelagic zones).

The ecology of seamounts is mainly determined by oceanographic, ecological and fisheries factors (Pitcher 2008). According to this, among the oceanographic factors, the summit peak depth and the proximity to the continental shelf seem to be the most evident geographic features that could explain, in first instance, the fish fauna composition of the Bank.

Seamounts can be classified, according to the water depth that the summit reaches in shallow seamounts, reaching the euphotic zone, intermediate seamounts, with summits below the euphotic zone but within the upper 400 m layer and deep seamounts with peaks below 400 m depth (White & Mohn 2004). The Galicia Bank, with a summit at 625 m of depth, can be classified as a deep seamount; its ichthyofauna is mainly constituted by deep-water fishes, which can be defined as fishes that spend most of the time at depths exceeding 400 m deep (Gordon 2001). Most of the 62 families of fishes occurring in the Galicia Bank, including the most speciose families Macrouridae, Centrophoridae, Moridae, and Alepocephalidae, and others such as Bathygadidae and Halosauridae, are typical components of the deep fish fauna (Table 2). This is also in agreement with the definition of seamount fishes, which are mostly deep-sea fishes with occasional visitors from the epipelagic realm or from the continental shelf or slope (Froese & Sampang 2004).

Globally, macrourids, scorpaenids, morids, squalids, alepocephalids and serranids are reported to be the most diverse families among seamount fishes while scorpaenids, morids, serranids, macrourids, and squalids are the most abundant ones (Wilson & Kaufmann 1987). In the case of the Galicia Bank, Macrouridae, with 9 species, is

the most diverse family followed by Moridae, Stomiidae and Sternoptychidae with 7 species, whereas Trachichthyidae and Moridae are the most abundant, with 61,257 and 48,395 specimens, respectively. This is due to the higher abundance of the trachichthid *H. mediterraneus* (61,206 individuals) and the morid *L. lepidion* (41,585 individuals).

TABLE 2. Families, number of species and percentage of fishes in the Galicia Bank format of point.

Family	No. species	Fauna (%)	Family	No. species	Fauna (%)
Chimaeridae	3	2.2	Macrouridae	9	6.5
Hexanchidae	1	0.7	Bathygadidae	3	2.2
Centrophoridae	5	3.6	Moridae	7	5.0
Etmopteridae	3	2.2	Melanonidae	1	0.7
Somniosidae	4	2.9	Gadidae	1	0.7
Oxynotidae	1	0.7	Lotidae	2	1.4
Dalatiidae	1	0.7	Phycidae	1	0.7
Pentanchidae	5	3.6	Merluccidae	1	0.7
Pseudotriakidae	1	0.7	Bythitidae	3	2.2
Carcharhinidae	2	1.4	Lophiidae	1	0.7
Rajidae	2	1.4	Chaunacidae	1	0.7
Dasyatidae	1	0.7	Linophrynidae	1	0.7
Halosauridae	5	3.6	Trachichthyidae	3	2.2
Notacanthidae	2	1.4	Diretmidae	2	1.4
Synphobranchidae	1	0.7	Berycidae	2	1.4
Congridae	2	1.4	Oreosomatidae	1	0.7
Derichthyidae	1	0.7	Syngnathidae	1	0.7
Nemichthyidae	1	0.7	Sebastidae	2	1.4
Serrivomeridae	1	0.7	Liparidae	1	0.7
Eurypharyngidae	1	0.7	Polyprionidae	1	0.7
Bathylagidae	1	0.7	Epigonidae	2	1.4
Alepocephalidae	5	3.6	Carangidae	1	0.7
Gonostomatidae	3	2.2	Coryphaenidae	1	0.7
Sternoptychidae	7	5.0	Bramidae	2	1.4
Phosichthyidae	1	0.7	Chiasmodontidae	1	0.7
Stomiidae	7	5.0	Blenniidae	1	0.7
Ipnopidae	1	0.7	Gempylidae	2	1.4
Paralepididae	2	1.4	Trichiuridae	2	1.4
Bathysauridae	1	0.7	Centrolophidae	2	1.4
Neoscopelidae	2	1.4	Xiphiidae	1	0.7
Myctophidae	6	4.3	Soleidae	1	0.7

Seamount fishes are also defined as fish that have been reported as occurring on seamounts (Morato *et al.* 2004). The number of seamount fishes occurring worldwide has increased from 450 species (Wilson & Kaufman 1987) to 795 species (Morato *et al.* 2006). A comparison between our results and the latter checklist showed that 80.6% (112 out of 139) of species recorded in the Galicia Bank can be considered as seamount fishes. An updated list of seamount fishes would probably increase this high percentage.

According to Pitcher (2008), the proximity or distance of the seamount to the continental shelf is another important factor affecting the ichthyofaunal composition. This feature was one of the main factors explaining the biological variability of seamounts in the New Zealand region (Rowden *et al.* 2005). In the northeastern Atlantic,

the Galicia Bank is considered a coastal seamount, together with the Ampere, Gorringer, Josephine and Seine Banks, in contrast with oceanic seamounts, including the Atlantis, Hyeres, Irving, Meteor and Plato Banks, located offshore (Gofas 2007; Surugiu *et al.* 2008). Nevertheless, some results on inter-seamount invertebrate faunal similarity highlight the separation of the Galicia Bank due to its isolated northern position and deep plateau (Surugiu *et al.* 2008).

Of the 139 fish species reported in this paper, 99 (71.2%) have been also reported in the continental shelf and slope of Galician waters whereas the remaining 40 species (28.8%) are exclusive of the Galicia Bank. This difference could be mainly ascribed to a relatively more intensive sampling of the Galicia Bank compared to the deep-water areas of the Galician coast. In fact, all of the fish species captured in the Galicia Bank have been also reported in other areas of the North-eastern Atlantic, indicating the lack of endemic species in the Bank.

Seamounts have been frequently described as biological islands harbouring unique or characteristic fauna with high rates of endemism. However, many of these characterizations have been questioned in the last few years (McClain 2007), and the levels of endemic species on seamounts may vary between individual seamounts, regions, and taxa, and may, in some cases, be limited to species with a low dispersal ability (Secretariat of the Convention on Biological Diversity 2008). A recent study suggested that seamount fish faunas are not unique to seamounts but are, in fact, similar to the fauna inhabiting the surrounding region (Lundsten *et al.*, 2009), which is in agreement with our results.

Among the ecological factors pointed out by Pitcher (2008), the presence of corals was related to the presence and abundance of seamount fishes. Corals provide an important source of three-dimensional structures in the predominantly sedimentary habitats of deeper waters, acting as refuge habitat for many fish species (Söffker *et al.* 2011). Many fishes show spatial co-occurrence with deep-water corals, and fish catches have been found to be higher in and around deep-water coral reefs (Clark *et al.* 2006). Studies on *Lophelia* coral reefs in the northeastern Atlantic have recorded the presence of 25 fish species (Costello *et al.* 2005). In the case of the Galicia Bank, the main areas of cold-water coral mounds and reefs have been identified between 620 and 1,125 m depth (Somoza *et al.* 2014). Although the relationships among fishes and corals in the Galicia Bank were not analysed, most of the fish species (about 100) were captured within this range of depth, which seems to indicate a positive relationship between corals and the presence and abundance of fishes. Moreover, *N. helgae* and *G. latifrons*, two fish species particularly associated with coral reef habitats off Ireland (Söffker *et al.* 2011), were also present in the bank.

Seamount communities are highly vulnerable to impacts from fisheries, and recovery from fishing impacts is a lengthy process (Schlacher *et al.* 2010). Thus, the fishing activity is another feature to be considered when evaluating the conservation status of seamounts in relation to threats (Pitcher 2008). Evidence of fishing activity in the Galicia Bank were observed by the presence of derelict fishing gear, mainly gill nets. The first fishing activities in the area were reported in 1971, initially with bottom longlines and later with bottom gillnets (*volantas*) targeting *L. piscatorius*, *P. americanus*, *E. telescopus*, *Beryx splendens* and *P. blennoides*. In the late 1970s and early 1980s a fishery with pelagic longline targeting *X. gladius* and *B. brama* was developed. During the 1990s, there was also some fishing activity targeting deep-water sharks with bottom longline. Some attempts to fish by bottom trawling were also recorded in the area. However, the scarcity of sedimentary areas suitable for trawling combined with the low catch rate of commercial species and the high presence of corals discouraged the development of this fishery.

During the last few years, the fishing activity in the Galicia Bank has been greatly reduced because of multiple aspects, such as the great distance from homeports together with the prohibition of fishing during weekends since 2002, the scarcity of high-value species, and the zero catches for deep-water sharks set by the European Union since 2010. Nowadays, only 3 vessels are sporadically moving to the bank, targeting *L. piscatorius* with gillnets. In general terms, the fishing activity carried out in the bank has been low and has progressively decreased. This low level of fishing activity, especially the absence of bottom trawling, has preserved the benthic environment of the Galicia Bank, with well-preserved deep-sea biotopes of conservation importance such as coral communities.

Regarding the occurrence of singular fish species, the presence of *B. ocellaris* in the bank at 762–799 m depth set a new deep record for the species. *B. ocellaris* is a demersal species usually distributed between 10 and 400 m depth that typically closes its lifecycle in coastal waters without apparent dependence on seamounts. However, this species has been recently captured in the Concepción Bank seamount, at 390 m depth (IEO 2013). Both findings confirm the presence of *B. ocellaris* not only in the continental or island shelves but also in coastal seamounts located near these areas.

The presence in seamounts of unusual species, scarcely known on the continental shelf, has been related to the

hypothesis that seamounts and islands are used as "stepping stones" for the transoceanic dispersal of species (Wilson & Kaufmann 1987). Examples of this could be the cases of *N. helgae* (Moore *et al.* 2008) or *P. dalwigki* (Bañón *et al.* 2002), but also of several species such as *P. splendens*, *G. granti*, *A. oleosa* and *N. microchir*, which have a northward eastern Atlantic distribution along the Canary and Azores Islands and the Galicia Bank (Bañón *et al.* 2011).

TABLE 3. Species list to be threatened according to the OSPAR list of threatened and/or declining species (www.ospar.org), IUCN red list of threatened species (www.iucnredlist.org) and FishBase (www.fishbase.org). Abbreviations: critically endangered (CR), vulnerable (VU), very high vulnerability (VHV), high to very high vulnerability (HHV) and high vulnerability (HV).

Class	Family	Species	OSPAR	IUCN	FishBase
ELASMOBRANCHII	Hexanchidae	<i>Hexanchus griseus</i>	—	—	VHV
	Pentanchidae	<i>Galeus melastomus</i>	—	—	HV
	Pentanchidae	<i>Apristurus aphyodes</i>	—	—	HHV
	Pseudotriakidae	<i>Pseudotriakis microdon</i>	—	—	HHV
	Carcharhinidae	<i>Isurus oxyrinchus</i>	—	VU	VHV
	Carcharhinidae	<i>Prionace glauca</i>	—	—	HHV
	Dalatiidae	<i>Dalatias licha</i>	—	EN	VHV
	Somniosidae	<i>Centroscymnus coelolepis</i>	VU	EN	HV
	Somniosidae	<i>Centroselachus crepidater</i>	—	—	VHV
	Somniosidae	<i>Somniosus rostratus</i>	—	—	VHV
	Somniosidae	<i>Scymnodon ringens</i>	—	—	HV
	Oxynotidae	<i>Oxynotus paradoxus</i>	—	—	HV
	Centrophoridae	<i>Centrophorus granulatus</i>	VU	CR	VHV
	Centrophoridae	<i>Centrophorus squamosus</i>	VU	EN	VHV
	Centrophoridae	<i>Deania calcea</i>	—	EN	HHV
	Centrophoridae	<i>Deania hystricosa</i>	—	—	HHV
	Centrophoridae	<i>Deania profundorum</i>	—	—	HHV
	Rajidae	<i>Dipturus batis</i>	VU	CR	VHV
	Dasyatidae	<i>Pteroplatitrygon violacea</i>	—	—	HHV
	HOLOCEPHALI	Chimaeridae	<i>Chimaera monstrosa</i>	—	—
Chimaeridae		<i>Chimaera opalescens</i>	—	—	HV
Chimaeridae		<i>Hydrolagus affinis</i>	—	—	HHV
ACTINOPTERYGII	Congridae	<i>Conger conger</i>	—	—	VHV
	Polyprionidae	<i>Polyprion americanus</i>	—	—	VHV
	Gempylidae	<i>Ruvettus pretiosus</i>	—	—	VHV
	Centrolophidae	<i>Centrolophus niger</i>	—	—	VHV
	Alepocephalidae	<i>Alepocephalus bairdii</i>	—	—	HHV
	Alepocephalidae	<i>Alepocephalus rostratus</i>	—	—	HHV
	Macrouridae	<i>Coryphaenoides rupestris</i>	—	EN	HHV
	Moridae	<i>Lepidion guentheri</i>	—	—	HHV
	Moridae	<i>Antimora rostrata</i>	—	—	HHV
	Ophididae	<i>Spectrunculus grandis</i>	—	—	HHV
	Lophiidae	<i>Lophius piscatorius</i>	—	—	HHV
	Trachichthyidae	<i>Hoplostethus atlanticus</i>	VU	VU	HHV

During the last two decades, there has been an international concern in order to protect deep-sea ecosystems. Thus, the concept of ‘Ecologically or Biologically Significant Marine Areas’ (EBSAs) has been proposed to identify open-ocean and deep-sea habitats in need of protection (Clark *et al.* 2014). According to this, seamounts are considered as EBSAs due to their importance as refuge locations for threatened, endangered and declining species. Seamount fishes, particularly seamount-aggregating fishes, have a higher intrinsic vulnerability than other groups of fishes due to a longer lifespan, later sexual maturation, slower growth, and lower natural mortality (Morato *et al.* 2004).

Based on life history and ecological characteristics, several authors have placed the seamount fishes at the extreme end of the vulnerability spectrum. Morato *et al.* (2006) indicated that seamount species were more at risk than species that did not occur on seamounts, and that aggregating species were even more vulnerable. Considering the three databases (OSPAR, IUCN and FishBase) used to evaluate this criterion, 9 species (6%) were considered as threatened according to IUCN, 5 species (3%) according to OSPAR and 58 (42%) according to FishBase (Table 3). These differences are mainly due to the different criteria used to estimate the vulnerability. OSPAR criteria are based on the global and regional importance and on the presence of rare, sensitive, declining and key stone species. Those of the IUCN are inferred from several parameters, mainly focusing on species population dynamics, which are not available for most of the listed species (data deficient), whereas FishBase provides vulnerability values for fish mainly based on fish life-history traits. Vulnerability data provided by FishBase are uncorrelated with those provided by IUCN, but both should be used together in studies dealing with fish conservation (Strona 2014). However, whenever data from IUCN are not available or in general macro-ecological studies focusing on large sets of species, the use of FishBase vulnerability data appears to be the best option (Strona *et al.* 2013). Thus, 42% of the fish species recorded in the Galicia Bank should be considered as threatened species. In addition, the high fish biodiversity composed mainly of deep-water species, and their high vulnerability should be strong reasons to declare the Galicia Bank as a MPA by the Spanish government.

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