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MARINE IMPACTS IN THE ANTHROPOCENE

Assessment of deep demersal fish fauna diversity of the Colombian Caribbean Sea

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ABSTRACT. We compiled georeferenced records of deep demersal fishes from the Colombian Caribbean Sea in order to assess the level of survey coverage and geographic completeness of species richness inventories at a scale of 15 min by 15 min cells, in view of threats from fishing and oil and natural gas exploration. We identified a rich fauna with a minimum of 362 species registered. Areas with high observed and predicted species richness were identified. Survey coverage and geographic richness completeness resulted in being deficient with no cell reaching the status of well-sampled spatial unit, being 83% of the Colombian Caribbean Exclusive Economic Zone bottoms unexplored, particularly depths beyond 1,000 m. A plea is made for renewed survey efforts with a focus on the protection of the Colombian Caribbean deep-sea biota.

Key words: Colombian Caribbean, deep fishes, records, soft-bottoms, species richness.

Evaluación de la diversidad de la fauna de peces demersales profundos del Mar Caribe colombiano

RESUMEN. Se recopilieron registros georreferenciados de peces demersales profundos del Mar Caribe colombiano con el fin de evaluar el nivel de cobertura de la prospección y la integridad geográfica de los inventarios de riqueza específica a una escala de celdas de 15 min por 15 min, en vista de las amenazas de la pesca y la explotación de petróleo y gas. Identificamos una rica fauna con un mínimo de 362 especies registradas. Se identificaron áreas con alta riqueza específica observada y predicha. La cobertura de los registros y la completitud geográfica de la riqueza resultaron ser deficientes sin que ninguna celda alcanzara el estado de unidad espacial bien muestreada, estando el 83% de los fondos de la Zona Económica Exclusiva del Caribe colombiano sin explorar, en particular aquellas profundidades superiores a los 1.000 m. Se hace un llamamiento para renovar los esfuerzos de prospección con un enfoque en la protección de la biota de aguas profundas del Caribe colombiano.

Palabras clave: Caribe colombiano, peces de fondo, registros, fondos blandos, riqueza específica.



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INTRODUCTION

With the migration of the fishing frontier into deeper waters and the offshore search for oil and natural gas it is now more important than ever to improve the knowledge on the deep sea biota, particularly with regard to

fishes, since they are candidates for exploitation (e.g., Páramo et al. 2017; Grijalba-Bendeck et al. 2019) or might be affected as bycatch (e.g., Páramo et al. 2012). In Colombian Caribbean waters deep sea research has been sporadic, but three main periods can be distinguished. In the late sixties and early seventies during the past century, research vessels like the Oregon, Oregon II (U.S. Fish and Wild Life Service) and Pillsbury (University of Miami, U.S.A.), as well as several others, conducted trawling both on the continental shelf and notably on the continental slope, plus some trawls occurred at depths beyond 1,000 m. Later on, from the early part of the 20th century, interest in continental slope fauna gained momentum with the Macrofauna I and II campaigns that trawled down to a depth of 500 m (see for instance Saavedra-Díaz et al. 2000; Roa-Varón et al. 2003; Saavedra-Díaz et al. 2004; Roa-Varón et al. 2007). A decade later in the context of exploration for oil and natural gas, demersal fish samples were taken in deeper waters around 800 m (ANH I and II campaigns, Polanco et al. 2010). In searching for new fishery resources, Páramo et al. (2011) conducted trawling at depths between 200 and 550 m during years 2009 and 2010. Since then, to our knowledge, no mayor deep sea trawling surveys have been undertaken in Colombian Caribbean waters.

Paramount in diversity studies (and with a focus on conservation) is the characterization of the geographic distribution of diversity, which goes hand in hand with the assessment of the completeness of sampling of surveys, i.e., whether an asymptote in the species accumulation curve has been reached (Soberón et al. 2007; Hortal et al. 2015). The composition of species lists is necessary but not sufficient for effective diversity management and conservation. In this study we assess the level of survey coverage and geographical completeness of species richness inventories by constructing a spatialized estimate of deep soft-bottom demersal fish fauna diversity in Colombian Caribbean waters, including the San

Andrés and Providencia archipelago and in the process we highlight areas that have been well- and poorly surveyed and those that have never been visited.

MATERIALS AND METHODS

Georeferenced records of demersal deep fishes were obtained from Polanco (2015), García and Armenteras (2015, see sources cited), García (2017a), Acero et al. (2018), Polanco et al. (2019) and the Global Biodiversity Information Facility (GBIF 2020). Only records with associated depth registers deeper than 200 m were included. Validity of taxonomic names was checked against the Catalog of Fishes (Fricke et al. 2019). A database was constructed with the software ModestR (García-Roselló et al. 2013) which allowed further filtering in order to lessen redundancy in the geographic records. Because our interests focused on Colombian Caribbean waters, records in our sources outside the current Colombian Exclusive Economic Zone (EEZ, obtained from Flanders Marine Institute 2019) were excluded.

ModestR produces files directly usable for the module KnowBR (Lobo et al. 2018; Guisande and Lobo 2019) of the application RWizard (Guisande et al. 2014) designed to conduct a search of both well and poorly surveyed spatial units. The study area, i.e. the Colombian Caribbean EEZ, was divided into spatial cells of size 15 min (circa 28 km) by 15 min. We chose this size as being consistent with previous similar analyses (García 2017b, 2018). Further settings were as follow: curve = 'Rational' (Ratkowski 1990) one of the options for adjusting a function to the accumulation of species with records that function as surrogates for effort (Lobo 2008; Lobo et al. 2018); estimator = 1, meaning that we constructed the species accumulation curve using the formula from Ugland et al. (2003); cutoff = 1, meaning that if the quotient

between number of records and number of species is 1 in a given spatial unit it is considered non-informative and completeness is not calculated; cutoffCompleteness = 0, meaning that if the value of completeness is below this value of completeness is not calculated and cutoffSlope = 1, meaning that if the final slope of the accumulation curve is higher than this value, completeness is not calculated.

We used the function SurveyQ (survey quality) of KnowBR to depict well- and poorly-surveyed equal area cells geographically. Default values were used. For well sampled spatial units a slope < 0.02, completeness > 90% and R/S (records over species) > 15. For poorly sampled cells a slope > 0.3, completeness < 50% and R/S < 3.

RESULTS

After filtering, we included a total of 362 species and 6,211 records in the database, these being the basis of the analysis (Appendix 1). A map of the study area, records and the shape of the Parque Nacional Natural Corales de Profundidad (<http://www.parquesnacionales.gov.co>) is shown in Figure 1. The bulk of the records were located between 200 m and 1,000 m representing 98% of all records. In turn, records between 200 m and 300 m represented 52% of all records. Apart from a couple of records in the San Andrés and Providencia archipelago, sampling was concentrated on

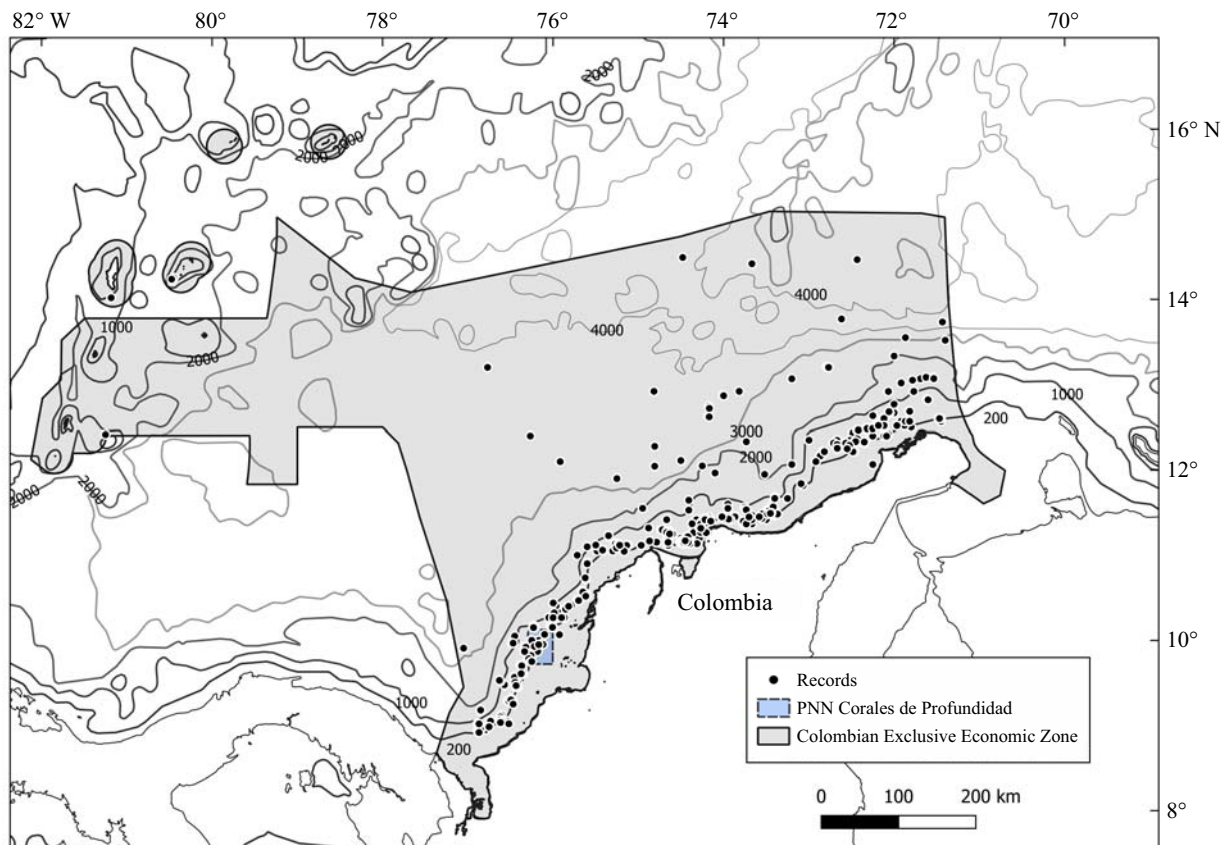


Figure 1. Deep demersal fishes record locations inside the Colombian Caribbean Exclusive Economic Zone and Parque Nacional Natural Corales de Profundidad.

the continental slope with a few records from the abyssal plains (Figure 1). Table 1 shows those species with more than 100 records in the database.

The division of the study area in equal area cells (15 min by 15 min) resulted in 85 cells. Records from each cell revealed some areas where sampling was concentrated. The Gulf of Salamanca, Guajira, Palomino and mixed coralline bottoms showed cells with an elevated number of records while most of the cells received fewer records (Figure 2). Taking into account that cells depicted were the ones with at least one record, it was clear that most of the study area had never been visited (Figure 2). The Colombian Caribbean EEZ below 200 m amounts to circa 385,000 km² while the added cell area is 65,072 km², so around 83% of the deep sea bottom has never been visited. The scarcity of records resulted in 31 out of the 85 cells for which completeness could not be calculated as the R/S quotient was one. Not surprisingly, the observed richness (Figure 3) closely followed the distribution pattern of records in cells with a correlation of 0.9 (Pearson index, $p < 0.001$). The Darien area is added as harboring a high number of demersal fish species (Figure 3).

Completeness ranged from 6.9% to 76.9% in cells with 75.9% of them (41 out of 54 informative cells) showing completeness above 50%; but notice that no cell reached 100% completeness (Figure 4). The ten cells showing completeness above 70% were well- distributed along the coast line (Figure 4), suggesting that the survey effort was not spatially biased in terms of completeness.

No cell attains the status of ‘high quality survey’ (Figure 5); but most cells were labeled as ‘fair quality survey’ cells with a number of inter-dispersed ‘poor quality survey’ cells that is in line with the image in Figure 4.

DISCUSSION

Our focus on the current Colombian EEZ caused 32 species and associated records to be dropped from the database (Appendix 2). These records are located to the west of the San Andrés and Providencia archipelago and offshore Panama outside of Colombian EEZ. Thus, it is doubtful whether the species concerned should be included in deep sea fishes national biodiversity

Table 1. Species with more than 100 georeferenced records in the database. Minimum, maximum and mean depths.

Species	Records	Min depth (m)	Max depth (m)	Mean depth (m)
<i>Dibranchius atlanticus</i>	207	198	1,440	412
<i>Nezumia aequalis</i>	150	223	1,143	392
<i>Coelorinchus caelorhincus</i>	134	200	810	327
<i>Laemonema goodebeanorum</i>	126	223	777	348
<i>Chauliodus sloani</i>	125	191	4,151	433
<i>Synagrops bellus</i>	122	192	810	352
<i>Poecilopsetta inermis</i>	113	229	750	292
<i>Chlorophthalmus agassizi</i>	109	200	776	301
<i>Malacocephalus occidentalis</i>	106	200	801	314
<i>Neoscopelus macrolepidotus</i>	104	276	900	475
<i>Chaunax suttkusi</i>	103	223	801	333

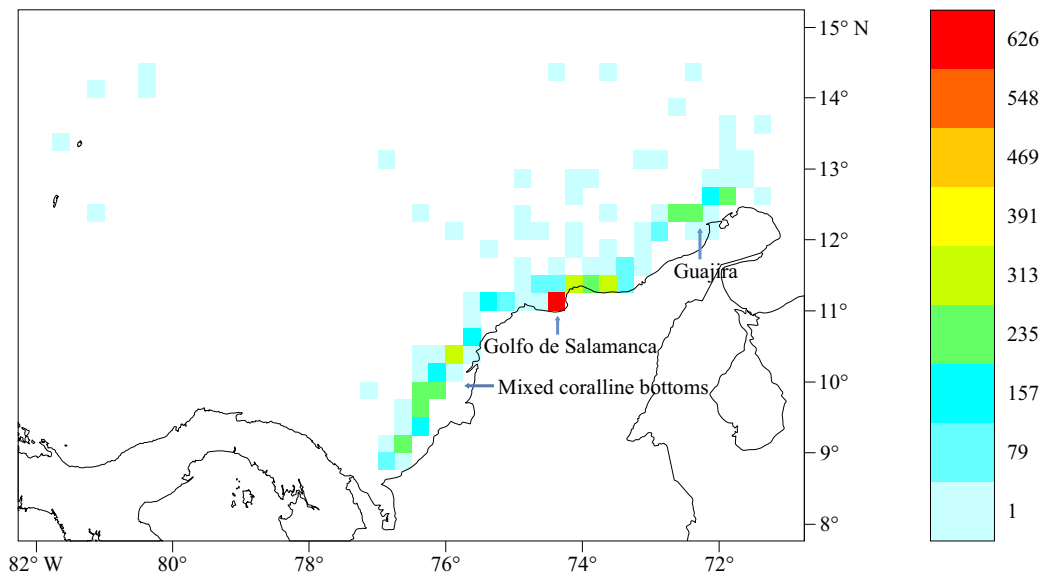


Figure 2. Spatial distribution of deep demersal fishes records in cells of 15 min by 15 min in the Colombian Caribbean Exclusive Economic Zone.

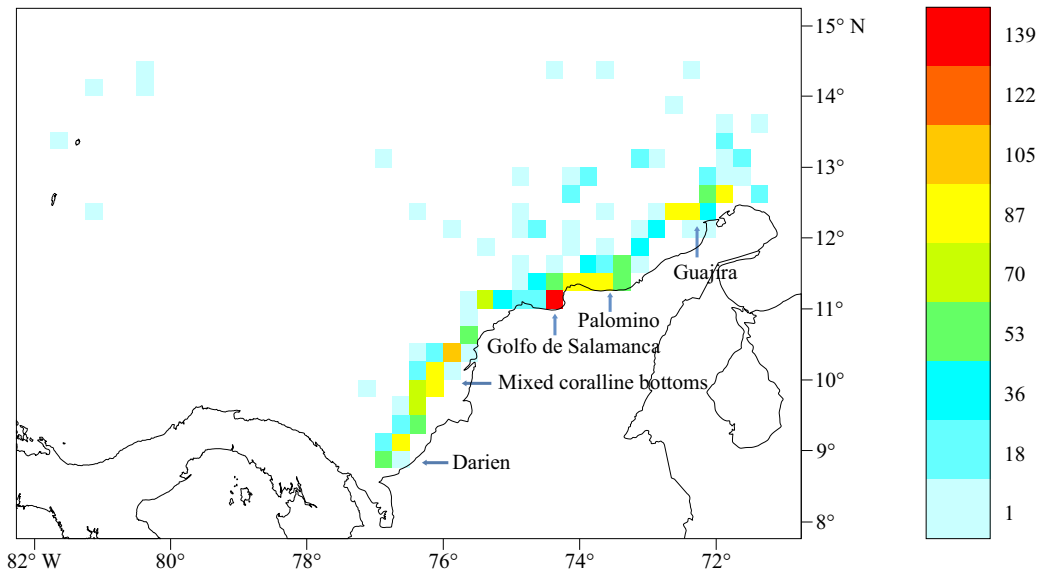


Figure 3. Observed richness of deep demersal fishes in cells of 15 min by 15 min in the Colombian Caribbean Exclusive Economic Zone.

lists, although their presence in waters of the archipelago that belong to Colombia is likely. Notice that Bolaños-Cubillos et al. (2015) and Acero et al. (2019) mention several of the species

excluded here in their species lists for the San Andrés and Providencia archipelago.

The scarceness of surveys and samples east of the archipelago and in depths beyond 1,000 m

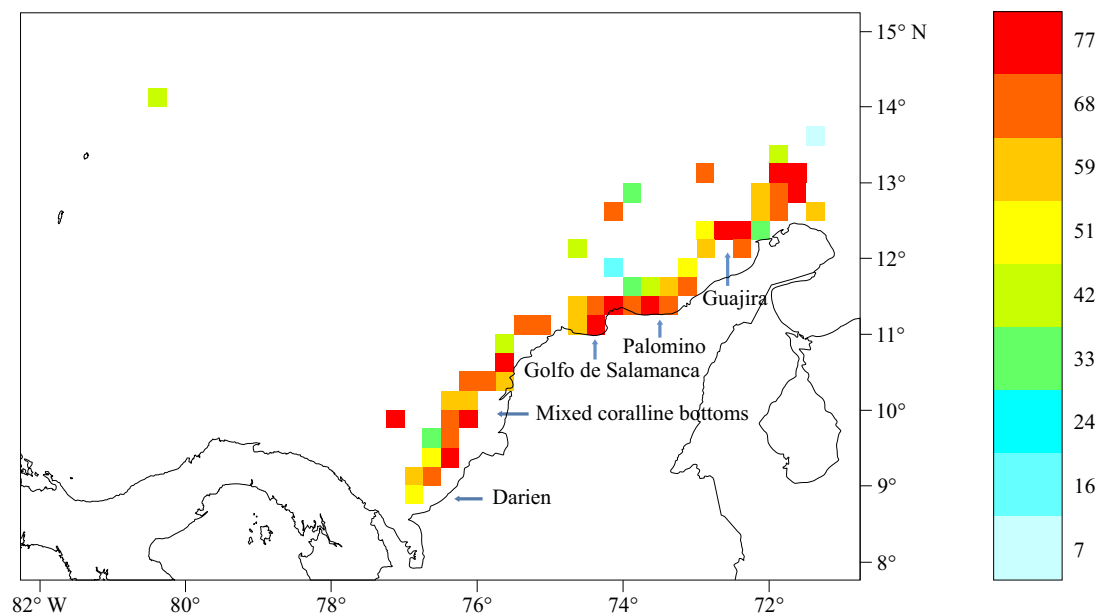


Figure 4 Percentage completeness of deep demersal fishes inventories in cells of 15 min by 15 min in the Colombian Caribbean Exclusive Economic Zone.

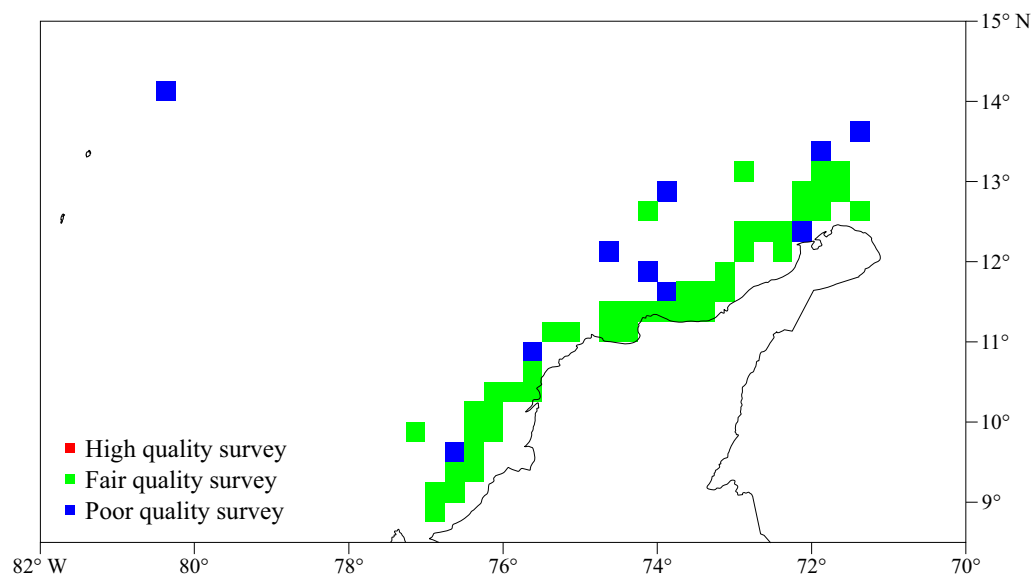


Figure 5 Survey quality status of deep demersal fishes in cells of 15 min by 15 min in the Colombian Caribbean Exclusive Economic Zone.

shown here clearly points to the need of increased survey efforts, including for those unexplored areas as well as renewed survey efforts in areas

visited in the past, as even the upper slope that has received most records is at best ‘fairly-sampled’, according to the criteria here and at our

spatial scale. Nevertheless, this study reveals a rich deep sea fish fauna taking into account that the 362 species in our database are a lower limit of species richness. Considering the values of percentage completeness and the current geographic coverage of surveys, more records for species already in the database, i.e., extension of their presently observed distribution, and more species currently not in the database, are to be expected in future campaigns.

The distribution of records with species follows the usual patterns for large diversity databases: few species with many records and many species with few records. Thus, 49.2% of the species (178 out of 362) show five or fewer records while just 3.0% of the species (11 out of 362) show more than one hundred records (Appendix 1). Interestingly *Epigonus occidentalis* (Goode and Bean 1896) and *E. pandionis* (Goode and Bean 1881), postulated as possible candidates for fishing due to their frequency in trawls (Páramo et al. 2017) do not belong to the most common species in the database but rank low to intermediary in terms of records (Appendix 1). Our time window spans decades while Páramo et al. (2017) are just snap shots of deep demersal fish presence and abundance in a limited depth range. This contrast highlights the usefulness and, indeed, a need for monitoring over long periods and extended areas if we are to understand the dynamics of ecosystems and the biology of the species.

In view of the results it is probably risky to postulate areas for conservation purposes. Observed richness suggests continental slope areas adjacent to the Gulf of Salamanca, Rosario Island archipelago (mixed coralline bottoms), slope areas to the north of Guajira Peninsula and Darien as locations of accumulation of species. Interestingly, the Gulf of Salamanca shelf (< 200 m), since here the slope (> 200 m) is known to harbor significant numbers of elasmobranchs and bony fish species (García 2017b, 2018; but notice that García 2018 includes some slope

records). The ecological and biological reasons for these findings are an open question worth investigating.

The only national natural park dedicated to deep sea biota in the Colombian Caribbean is the Parque Nacional Natural Corales de Profundidad established to protect deep sea coral species. The park includes soft and mixed bottoms from 34 m to 1,240 m depth. Using the module MRFinder of ModestR a species list was composed for the park resulting in 106 species with records inside the park area (Appendix 3). Thus, although not intentionally, Corales de Profundidad might also be protecting a significant fraction of deep demersal fishes in the Colombian Caribbean. The attractive effect of structures on fishes is well-known, thus the presence of coral formations in the general area of the park is probably conducive of high species richness. Notice that cells in the park area and in their vicinity show high observed richness.

This research is one of the first steps in endeavors of studying the diversity of deep sea demersal fish species beyond the compilation of species' names. Much work remains to be done both for scientific and practical purposes with a focus on protecting Colombian Caribbean deep sea biodiversity as derived from this assessment.

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APPENDIX 1

Deep demersal fish species list (> 200 m depth)
of the Colombian Caribbean Sea with records and
depth ranges.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Anguilliformes	Chlopsidae	<i>Robinsia catherinae</i>	1	300	300	300
Actinopterygii	Anguilliformes	Colocongridae	<i>Coloconger meadi</i>	60	218	777	361
Actinopterygii	Anguilliformes	Congridae	<i>Ariosoma balearicum</i>	3	532	857	706
Actinopterygii	Anguilliformes	Congridae	<i>Bathycongrus bullisi</i>	26	229	366	286
Actinopterygii	Anguilliformes	Congridae	<i>Bathycongrus vicinalis</i>	1	366	366	366
Actinopterygii	Anguilliformes	Congridae	<i>Bathyuconger vicinus</i>	9	515	732	627
Actinopterygii	Anguilliformes	Congridae	<i>Japonoconger caribbeus</i>	22	269	549	358
Actinopterygii	Anguilliformes	Congridae	<i>Parabathymyrus oregoni</i>	2	314	315	315
Actinopterygii	Anguilliformes	Congridae	<i>Pseudophichthys splendens</i>	57	204	803	392
Actinopterygii	Anguilliformes	Congridae	<i>Rhynchoconger flavus</i>	3	732	732	732
Actinopterygii	Anguilliformes	Congridae	<i>Xenomystax austrinus</i>	23	458	732	509
Actinopterygii	Anguilliformes	Congridae	<i>Xenomystax bidentatus</i>	16	296	698	405
Actinopterygii	Anguilliformes	Congridae	<i>Xenomystax congroides</i>	18	210	352	237
Actinopterygii	Anguilliformes	Moringuidae	<i>Neoconger mucronatus</i>	3	200	265	243
Actinopterygii	Anguilliformes	Muraenesocidae	<i>Cynoponticus savanna</i>	2	746	746	746
Actinopterygii	Anguilliformes	Muraenidae	<i>Gymnothorax conspersus</i>	9	256	307	262
Actinopterygii	Anguilliformes	Muraenidae	<i>Gymnothorax polygonius</i>	2	200	203	202
Actinopterygii	Anguilliformes	Nemichthyidae	<i>Avocettina infans</i>	3	350	445	360
Actinopterygii	Anguilliformes	Nemichthyidae	<i>Labichthys carinatus</i>	1	940	940	940
Actinopterygii	Anguilliformes	Nemichthyidae	<i>Nemichthys scolopaceus</i>	6	300	3,978	654
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Hoplunnis diomediana</i>	1	453	453	453
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Hoplunnis megista</i>	2	366	366	366
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Hoplunnis tenuis</i>	5	201	366	215
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Nettastoma melanura</i>	5	503	732	621
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Venefica procera</i>	3	613	860	834
Actinopterygii	Anguilliformes	Ophichthidae	<i>Ophichthus cruentifer</i>	4	496	699	548
Actinopterygii	Anguilliformes	Ophichthidae	<i>Ophichthus puncticeps</i>	4	295	900	448
Actinopterygii	Anguilliformes	Synphobranchidae	<i>Atractodenchelys phrix</i>	2	393	500	447
Actinopterygii	Anguilliformes	Synphobranchidae	<i>Dysommia rugosa</i>	2	365	450	429
Actinopterygii	Anguilliformes	Synphobranchidae	<i>Ilyophis brunneus</i>	8	515	1143	692
Actinopterygii	Anguilliformes	Synphobranchidae	<i>Synphobranchus affinis</i>	1	732	732	732
Actinopterygii	Anguilliformes	Synphobranchidae	<i>Synphobranchus oregoni</i>	8	265	515	301
Actinopterygii	Ateleopodiformes	Ateleopodidae	<i>Ijimaia antillarum</i>	30	329	698	423
Actinopterygii	Ateleopodiformes	Ateleopodidae	<i>Ijimaia loppei</i>	1	503	503	503
Actinopterygii	Aulopiformes	Bathysauridae	<i>Bathysaurus mollis</i>	2	1,800	4,151	2,976
Actinopterygii	Aulopiformes	Chlorophthalmidae	<i>Chlorophthalmus agassizi</i>	109	200	776	301
Actinopterygii	Aulopiformes	Chlorophthalmidae	<i>Parasudis truculenta</i>	34	223	561	311
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois bigelowi</i>	38	223	940	456
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois grallator</i>	5	1627	4,151	2,435
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois phenax</i>	6	821	1,800	1,230
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois quadrifilis</i>	5	515	900	683
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois viridensis</i>	17	276	900	475
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathytrophops marionae</i>	1	1,251	1,251	1,251
Actinopterygii	Aulopiformes	Ipnopidae	<i>Ipnots murrayi</i>	3	821	1,800	1,416
Actinopterygii	Aulopiformes	Notosudidae	<i>Scopelosaurus smithii</i>	2	622	622	622
Actinopterygii	Aulopiformes	Synodontidae	<i>Saurida brasiliensis</i>	5	270	613	427
Actinopterygii	Aulopiformes	Synodontidae	<i>Saurida caribbaea</i>	9	200	303	219
Actinopterygii	Aulopiformes	Synodontidae	<i>Saurida normani</i>	3	198	298	251

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Aulopiformes	Synodontidae	<i>Synodus poeyi</i>	1	198	198	198
Actinopterygii	Batrachoidiformes	Batrachoididae	<i>Porichthys plectrodon</i>	5	200	370	241
Actinopterygii	Beloniformes	Hemiramphidae	<i>Hemiramphus balao</i>	2	276	803	406
Actinopterygii	Beryciformes	Anoplogastridae	<i>Anoplogaster cornuta</i>	1	300	300	300
Actinopterygii	Beryciformes	Berycidae	<i>Beryx decadactylus</i>	1	378	378	378
Actinopterygii	Beryciformes	Berycidae	<i>Beryx splendens</i>	2	366	369	367
Actinopterygii	Beryciformes	Diretmidae	<i>Diretmoides pauciradiatus</i>	9	200	732	268
Actinopterygii	Beryciformes	Diretmidae	<i>Diretmus argenteus</i>	6	205	792	454
Actinopterygii	Beryciformes	Holocentridae	<i>Ostichthys trachypoma</i>	6	200	274	236
Actinopterygii	Beryciformes	Trachichthyidae	<i>Gephyroberyx darwinii</i>	8	300	375	322
Actinopterygii	Beryciformes	Trachichthyidae	<i>Hoplostethus mediterraneus</i>	2	288	435	362
Actinopterygii	Beryciformes	Trachichthyidae	<i>Hoplostethus occidentalis</i>	64	329	558	350
Actinopterygii	Cetomimiformes	Barbourisiidae	<i>Barbourisia rufa</i>	1	1,080	1,080	1,080
Actinopterygii	Gadiformes	Bregmacerotidae	<i>Bregmaceros atlanticus</i>	53	200	801	319
Actinopterygii	Gadiformes	Macrouridae	<i>Bathygadus fавosus</i>	21	515	1,440	758
Actinopterygii	Gadiformes	Macrouridae	<i>Bathygadus macrops</i>	96	269	810	422
Actinopterygii	Gadiformes	Macrouridae	<i>Bathygadus melanobranchus</i>	28	365	900	634
Actinopterygii	Gadiformes	Macrouridae	<i>Cetonurus globiceps</i>	5	613	1,097	906
Actinopterygii	Gadiformes	Macrouridae	<i>Coelorinchus caelorhincus</i>	134	200	810	327
Actinopterygii	Gadiformes	Macrouridae	<i>Coelorinchus caribbaeus</i>	96	200	503	276
Actinopterygii	Gadiformes	Macrouridae	<i>Coryphaenoides mexicanus</i>	12	198	1,296	884
Actinopterygii	Gadiformes	Macrouridae	<i>Coryphaenoides zantophorus</i>	25	518	940	636
Actinopterygii	Gadiformes	Macrouridae	<i>Gadomus arcuatus</i>	17	477	1,080	665
Actinopterygii	Gadiformes	Macrouridae	<i>Gadomus dispar</i>	4	457	622	490
Actinopterygii	Gadiformes	Macrouridae	<i>Gadomus longifilis</i>	23	365	1,251	644
Actinopterygii	Gadiformes	Macrouridae	<i>Hymenocephalus aterrimus</i>	1	576	576	576
Actinopterygii	Gadiformes	Macrouridae	<i>Hymenocephalus billsam</i>	2	223	373	361
Actinopterygii	Gadiformes	Macrouridae	<i>Hymenocephalus italicus</i>	91	269	940	368
Actinopterygii	Gadiformes	Macrouridae	<i>Kuronezumia bubonis</i>	3	515	732	586
Actinopterygii	Gadiformes	Macrouridae	<i>Malacocephalus laevis</i>	13	329	612	387
Actinopterygii	Gadiformes	Macrouridae	<i>Malacocephalus occidentalis</i>	106	200	801	314
Actinopterygii	Gadiformes	Macrouridae	<i>Nezumia aequalis</i>	150	223	1,143	392
Actinopterygii	Gadiformes	Macrouridae	<i>Nezumia cyrano</i>	16	453	960	630
Actinopterygii	Gadiformes	Macrouridae	<i>Nezumia suilla</i>	5	365	640	572
Actinopterygii	Gadiformes	Macrouridae	<i>Sphagemacrus grenadae</i>	6	684	1,143	779
Actinopterygii	Gadiformes	Macrouridae	<i>Squalogadus modificatus</i>	4	1,080	1,251	1,139
Actinopterygii	Gadiformes	Macrouridae	<i>Trachonurus sulcatus</i>	10	612	1,251	814
Actinopterygii	Gadiformes	Macrouridae	<i>Trachonurus villosus</i>	3	515	814	714
Actinopterygii	Gadiformes	Macrouridae	<i>Ventrifossa macropogon</i>	7	223	640	411
Actinopterygii	Gadiformes	Macrouridae	<i>Ventrifossa mucocephalus</i>	5	450	732	481
Actinopterygii	Gadiformes	Merlucciidae	<i>Merluccius albidus</i>	47	219	662	297
Actinopterygii	Gadiformes	Merlucciidae	<i>Steindachneria argentea</i>	66	200	770	298
Actinopterygii	Gadiformes	Moridae	<i>Gadella imberbis</i>	32	223	801	374
Actinopterygii	Gadiformes	Moridae	<i>Laemonema goodebeanorum</i>	126	223	777	348
Actinopterygii	Gadiformes	Moridae	<i>Physiculus fulvus</i>	6	275	503	341
Actinopterygii	Gadiformes	Phycidae	<i>Urophycis cirrata</i>	11	270	470	331
Actinopterygii	Lophiiformes	Antennariidae	<i>Fowlerichthys radiosus</i>	1	192	192	192
Actinopterygii	Lophiiformes	Chaunacidae	<i>Chaunax pictus</i>	57	270	810	417
Actinopterygii	Lophiiformes	Chaunacidae	<i>Chaunax suttkusi</i>	103	223	801	333
Actinopterygii	Lophiiformes	Diceratiidae	<i>Bufoceratias wedli</i>	4	405	493	478
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophiodes beroe</i>	2	512	512	512

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophiodes monodi</i>	7	313	520	346
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophiodes reticulatus</i>	11	200	500	240
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophius gastrophysus</i>	17	286	561	347
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophius piscatorius</i>	4	200	500	240
Actinopterygii	Lophiiformes	Melanocetidae	<i>Melanocetus murrayi</i>	7	523	857	562
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Dibranchius atlanticus</i>	207	198	1,440	412
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Dibranchius tremendus</i>	6	1,006	1,463	1,107
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Halieutichthys aculeatus</i>	20	286	295	291
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Malthopsis gnoma</i>	12	280	491	301
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Ogcocephalus declivirostris</i>	3	365	223	221
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Ogcocephalus parvus</i>	6	270	360	308
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Ogcocephalus pumilus</i>	1	290	290	290
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Zalieutes mcgintyi</i>	29	201	498	246
Actinopterygii	Lophiiformes	Oneirodidae	<i>Dolopichthys pullatus</i>	1	4,029	4,029	4,029
Actinopterygii	Lophiiformes	Thaumichthyidae	<i>Thaumichthys binghami</i>	1	1,251	1,251	1,251
Actinopterygii	Myctophiformes	Myctophidae	<i>Bolinichthys supralateralis</i>	26	195	792	361
Actinopterygii	Myctophiformes	Myctophidae	<i>Dasyscopelus selenops</i>	2	275	520	396
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus adenomus</i>	1	567	567	567
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus bertelseni</i>	2	200	200	200
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus dumerilii</i>	26	200	727	299
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus effulgens</i>	2	223	365	330
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus garmani</i>	24	200	1,829	409
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus lucidus</i>	23	191	755	327
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus minax</i>	1	270	270	270
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus rafinesquii</i>	5	320	1,800	633
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus splendidus</i>	13	200	857	262
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus taaningi</i>	1	270	270	270
Actinopterygii	Myctophiformes	Myctophidae	<i>Lampadena luminosa</i>	9	200	730	422
Actinopterygii	Myctophiformes	Myctophidae	<i>Lepidophanes guentheri</i>	21	200	857	302
Actinopterygii	Myctophiformes	Myctophidae	<i>Myctophum nitidulum</i>	16	200	727	340
Actinopterygii	Myctophiformes	Neoscopelidae	<i>Neoscopelus macrolepidotus</i>	104	276	900	475
Actinopterygii	Myctophiformes	Neoscopelidae	<i>Neoscopelus microchir</i>	23	223	803	372
Actinopterygii	Notacanthiformes	Halosauridae	<i>Aldrovandia affinis</i>	5	515	1,097	559
Actinopterygii	Notacanthiformes	Halosauridae	<i>Aldrovandia gracilis</i>	8	395	1,710	1,039
Actinopterygii	Notacanthiformes	Halosauridae	<i>Halosaurus guentheri</i>	32	276	1,143	433
Actinopterygii	Notacanthiformes	Halosauridae	<i>Halosaurus ovenii</i>	88	276	803	406
Actinopterygii	Notacanthiformes	Notacanthidae	<i>Notacanthus chemnitzii</i>	1	724	724	724
Actinopterygii	Notacanthiformes	Notacanthidae	<i>Polyacanthonotus merretti</i>	2	679	857	738
Actinopterygii	Ophidiiformes	Aphyonidae	<i>Barathronus bicolor</i>	22	365	1,251	625
Actinopterygii	Ophidiiformes	Bythitidae	<i>Calamopteryx robinsorum</i>	2	200	201	201
Actinopterygii	Ophidiiformes	Bythitidae	<i>Cataetys laticeps</i>	7	732	1,800	1,119
Actinopterygii	Ophidiiformes	Bythitidae	<i>Diplacanthopoma brachysoma</i>	62	274	776	401
Actinopterygii	Ophidiiformes	Bythitidae	<i>Saccogaster staigeri</i>	1	356	356	356
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Acanthonus armatus</i>	13	2,215	2,564	2,366
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Bassozetus robustus</i>	1	1,240	1,240	1,240
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Bathyonus laticeps</i>	2	1,627	2,983	2,531
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Benthocometes robustus</i>	4	223	303	287
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Dicrolene introniger</i>	37	395	1,296	715
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lamprogrammus brunswigi</i>	2	1,317	1,317	1,317
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lamprogrammus niger</i>	4	515	3978	1,105
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium brevibarbe</i>	18	210	505	277

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium cultratum</i>	2	210	210	210
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium kallion</i>	1	219	219	219
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium profundorum</i>	8	207	404	288
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium robustum</i>	1	200	200	200
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium zophochir</i>	3	210	210	210
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Luciobrotula corethromycter</i>	16	540	821	612
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Monomitopus agassizii</i>	47	365	1,251	528
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites gilli</i>	78	200	500	320
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites marginatus</i>	68	205	670	305
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites monocellatus</i>	4	229	334	257
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites ocellatus</i>	19	192	366	234
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Penopus microphthalmus</i>	1	1,006	1,006	1,006
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Xyelacyba myersi</i>	5	1,251	1,440	1,301
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Alepocephalus australis</i>	8	1,097	1,317	1,146
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Bathytroctes microlepis</i>	2	1,097	1,097	1,097
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Conocara macropterus</i>	10	821	1,463	1,125
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Leptoderma macrops</i>	1	690	690	690
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Narcetes stomias</i>	7	558	1,829	1,509
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Rouleina attrita</i>	4	686	1,271	828
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Talismania antillarum</i>	2	457	457	457
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Talismania homoptera</i>	5	515	640	593
Actinopterygii	Osmeriformes	Alepocephalidae	<i>Xenodermichthys copei</i>	23	360	640	433
Actinopterygii	Osmeriformes	Argentinidae	<i>Argentina brucei</i>	33	198	439	266
Actinopterygii	Osmeriformes	Argentinidae	<i>Argentina striata</i>	72	200	500	266
Actinopterygii	Osmeriformes	Bathylagidae	<i>Dolicholagus longirostris</i>	6	445	857	699
Actinopterygii	Osmeriformes	Microstomatidae	<i>Xenophthalmichthys danae</i>	7	205	505	323
Actinopterygii	Osmeriformes	Opisthoproctidae	<i>Opisthoproctus soleatus</i>	1	374	374	374
Actinopterygii	Perciformes	Acropomatidae	<i>Caraibops trispinosus</i>	15	192	523	220
Actinopterygii	Perciformes	Acropomatidae	<i>Synagrops bellus</i>	122	192	810	352
Actinopterygii	Perciformes	Acropomatidae	<i>Verilus atlanticus</i>	10	192	496	250
Actinopterygii	Perciformes	Acropomatidae	<i>Verilus pseudomicrolepis</i>	12	247	308	262
Actinopterygii	Perciformes	Acropomatidae	<i>Verilus sordidus</i>	2	201	201	201
Actinopterygii	Perciformes	Ariommatidae	<i>Ariomma bondi</i>	3	351	428	383
Actinopterygii	Perciformes	Ariommatidae	<i>Ariomma melanum</i>	2	298	366	355
Actinopterygii	Perciformes	Bathyclupeidae	<i>Bathyclupea argentea</i>	24	402	732	448
Actinopterygii	Perciformes	Bathyclupeidae	<i>Bathyclupea schroederi</i>	16	205	810	387
Actinopterygii	Perciformes	Callionymidae	<i>Synchiropus agassizii</i>	8	274	352	306
Actinopterygii	Perciformes	Callionymidae	<i>Synchiropus dagmarae</i>	1	229	229	229
Actinopterygii	Perciformes	Caproidae	<i>Antigonia capros</i>	37	198	505	240
Actinopterygii	Perciformes	Caproidae	<i>Antigonia combatia</i>	51	192	520	243
Actinopterygii	Perciformes	Carangidae	<i>Decapterus macarellus</i>	3	198	235	226
Actinopterygii	Perciformes	Carangidae	<i>Decapterus tabl</i>	21	200	507	229
Actinopterygii	Perciformes	Carangidae	<i>Selar crumenophthalmus</i>	7	246	2,195	575
Actinopterygii	Perciformes	Carangidae	<i>Selene brownii</i>	3	200	504	403
Actinopterygii	Perciformes	Carangidae	<i>Trachurus lathami</i>	2	207	207	207
Actinopterygii	Perciformes	Emmelichthyidae	<i>Erythrocles monodi</i>	1	201	201	201
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus macrops</i>	13	200	914	613
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus occidentalis</i>	28	366	823	434
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus pandionis</i>	55	223	720	343
Actinopterygii	Perciformes	Gempylidae	<i>Diplospinus multistriatus</i>	8	200	445	298
Actinopterygii	Perciformes	Gempylidae	<i>Lepidocybium flavobrunneum</i>	2	1,251	1,271	1,261

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Perciformes	Gempylidae	<i>Nealotus tripes</i>	5	205	360	262
Actinopterygii	Perciformes	Gempylidae	<i>Neoepinnula americana</i>	13	229	333	249
Actinopterygii	Perciformes	Gempylidae	<i>Promethichthys prometheus</i>	17	298	807	386
Actinopterygii	Perciformes	Gempylidae	<i>Ruvettus pretiosus</i>	3	396	558	461
Actinopterygii	Perciformes	Haemulidae	<i>Haemulon aurolineatum</i>	2	286	286	286
Actinopterygii	Perciformes	Haemulidae	<i>Haemulon boschmae</i>	2	286	295	291
Actinopterygii	Perciformes	Lutjanidae	<i>Lutjanus vivanus</i>	1	324	324	324
Actinopterygii	Perciformes	Lutjanidae	<i>Pristipomoides aquilonaris</i>	1	198	198	198
Actinopterygii	Perciformes	Lutjanidae	<i>Pristipomoides macrophthalmus</i>	3	201	280	220
Actinopterygii	Perciformes	Mullidae	<i>Upeneus parvus</i>	7	219	792	417
Actinopterygii	Perciformes	Opistognathidae	<i>Lonchopisthus lemur</i>	32	200	300	242
Actinopterygii	Perciformes	Opistognathidae	<i>Lonchopisthus micrognathus</i>	2	265	265	265
Actinopterygii	Perciformes	Percophidae	<i>Bembrops anatirostris</i>	41	198	500	314
Actinopterygii	Perciformes	Percophidae	<i>Bembrops gobioides</i>	6	360	540	439
Actinopterygii	Perciformes	Percophidae	<i>Bembrops magnisquamis</i>	1	540	540	540
Actinopterygii	Perciformes	Percophidae	<i>Bembrops ocellatus</i>	22	223	670	410
Actinopterygii	Perciformes	Percophidae	<i>Bembrops quadrisella</i>	3	290	384	380
Actinopterygii	Perciformes	Priacanthidae	<i>Heteropriacanthus cruentatus</i>	4	333	432	406
Actinopterygii	Perciformes	Sciaenidae	<i>Protoscaena bathytatos</i>	12	240	512	340
Actinopterygii	Perciformes	Sciaenidae	<i>Protoscaena trewavasae</i>	8	191	201	199
Actinopterygii	Perciformes	Scombrobracidae	<i>Scombrobrax heterolepis</i>	1	396	396	396
Actinopterygii	Perciformes	Serranidae	<i>Baldwinella aureorubens</i>	25	198	351	249
Actinopterygii	Perciformes	Serranidae	<i>Baldwinella eos</i>	1	316	316	316
Actinopterygii	Perciformes	Serranidae	<i>Bathyanthias cubensis</i>	7	192	280	209
Actinopterygii	Perciformes	Serranidae	<i>Bathyanthias mexicanus</i>	1	300	300	300
Actinopterygii	Perciformes	Serranidae	<i>Bullisichthys caribbaeus</i>	1	219	219	219
Actinopterygii	Perciformes	Serranidae	<i>Hyporthodus flavolimbatus</i>	1	270	270	270
Actinopterygii	Perciformes	Serranidae	<i>Hyporthodus nigritus</i>	2	200	333	267
Actinopterygii	Perciformes	Serranidae	<i>Hyporthodus niveatus</i>	1	316	316	316
Actinopterygii	Perciformes	Serranidae	<i>Plectranthias garrupellus</i>	2	200	200	200
Actinopterygii	Perciformes	Serranidae	<i>Pronotogrammus martinicensis</i>	1	219	219	219
Actinopterygii	Perciformes	Serranidae	<i>Serranus atrobranchus</i>	3	300	370	323
Actinopterygii	Perciformes	Sparidae	<i>Pagrus pagrus</i>	1	207	207	207
Actinopterygii	Perciformes	Symphysanodontidae	<i>Symphysanodon berryi</i>	3	200	280	216
Actinopterygii	Perciformes	Synagropidae	<i>Parascombrops spinosus</i>	28	192	750	243
Actinopterygii	Perciformes	Trichiuridae	<i>Benthodesmus simonyi</i>	15	223	659	302
Actinopterygii	Perciformes	Trichiuridae	<i>Benthodesmus tenuis</i>	45	223	732	371
Actinopterygii	Perciformes	Trichiuridae	<i>Lepidopus altifrons</i>	8	320	366	334
Actinopterygii	Perciformes	Trichiuridae	<i>Lepidopus caudatus</i>	6	240	404	293
Actinopterygii	Perciformes	Trichiuridae	<i>Trichiurus lepturus</i>	3	220	250	239
Actinopterygii	Pleuronectiformes	Bothidae	<i>Chascanopsetta lugubris</i>	7	366	576	417
Actinopterygii	Pleuronectiformes	Bothidae	<i>Monolene atrimana</i>	2	223	373	298
Actinopterygii	Pleuronectiformes	Bothidae	<i>Monolene megalepis</i>	10	206	505	235
Actinopterygii	Pleuronectiformes	Bothidae	<i>Trichopsetta caribbaea</i>	7	192	300	209
Actinopterygii	Pleuronectiformes	Bothidae	<i>Trichopsetta ventralis</i>	2	198	252	225
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus diomedeanus</i>	2	290	316	303
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus ginsburgi</i>	11	296	491	348
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus hernandezi</i>	12	204	300	228
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus marginatus</i>	62	265	698	355
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus piger</i>	17	203	750	276
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus stigmatosus</i>	1	274	274	274

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Pleuronectiformes	Paralichthyidae	<i>Ancylopsetta cycloidea</i>	9	192	269	207
Actinopterygii	Pleuronectiformes	Paralichthyidae	<i>Citharichthys cornutus</i>	5	192	300	207
Actinopterygii	Pleuronectiformes	Pleuronectidae	<i>Poecilopsetta beanii</i>	4	223	333	283
Actinopterygii	Pleuronectiformes	Pleuronectidae	<i>Poecilopsetta inermis</i>	113	229	750	292
Actinopterygii	Polymixiiformes	Polymixiidae	<i>Polymixia lowei</i>	72	200	940	282
Actinopterygii	Polymixiiformes	Polymixiidae	<i>Polymixia nobilis</i>	7	366	512	412
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion ecuadorensis</i>	34	223	810	374
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion gracile</i>	27	191	940	270
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion greyae</i>	53	265	803	334
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion imberbe</i>	1	219	219	219
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion longispatha</i>	38	223	766	414
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion miniatum</i>	42	229	720	291
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion truncatum</i>	18	223	731	348
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Neomerinthe beanorum</i>	3	200	300	260
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Phenacoscorpius nebris</i>	2	300	300	300
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Pontinus longispinis</i>	65	200	491	254
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Pontinus nematophthalmus</i>	9	200	698	288
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Pontinus rathbuni</i>	6	200	324	227
Actinopterygii	Scorpaeniformes	Sebastidae	<i>Helicolenus dactylopterus</i>	3	293	662	366
Actinopterygii	Scorpaeniformes	Sebastidae	<i>Trachyscorpia cristulata</i>	1	540	540	540
Actinopterygii	Scorpaeniformes	Setarchidae	<i>Ectreposebastes imus</i>	5	400	732	550
Actinopterygii	Scorpaeniformes	Setarchidae	<i>Setarches guentheri</i>	53	200	510	273
Actinopterygii	Scorpaeniformes	Triglidae	<i>Bellator brachyichir</i>	3	200	300	209
Actinopterygii	Scorpaeniformes	Triglidae	<i>Bellator egretta</i>	2	200	203	201
Actinopterygii	Scorpaeniformes	Triglidae	<i>Prionotus beanii</i>	1	219	219	219
Actinopterygii	Scorpaeniformes	Triglidae	<i>Prionotus stearnsi</i>	10	213	351	273
Actinopterygii	Stephanoberyciformes	Gibberichthyidae	<i>Gibberichthys pumilus</i>	3	720	732	728
Actinopterygii	Stephanoberyciformes	Stephanoberycidae	<i>Stephanoberyx monae</i>	10	395	1,143	786
Actinopterygii	Stomiiformes	Gonostomatidae	<i>Gonostoma atlanticum</i>	16	200	792	255
Actinopterygii	Stomiiformes	Gonostomatidae	<i>Sigmops elongatus</i>	72	200	2341	452
Actinopterygii	Stomiiformes	Gonostomatidae	<i>Triplophos hemingi</i>	28	300	732	424
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Ichthyococcus ovatus</i>	5	210	755	288
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Pollichthys maui</i>	38	191	857	341
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Polymetme corythaeola</i>	19	275	857	487
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Polymetme thaeocoryla</i>	13	223	274	272
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Yarrella blackfordi</i>	26	283	1,143	625
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyripnus atlanticus</i>	1	260	260	260
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyropelecus aculeatus</i>	48	205	857	479
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyropelecus gigas</i>	1	540	540	540
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Maurollicus muelleri</i>	2	234	493	364
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Polyipnus asteroides</i>	50	205	567	338
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Polyipnus clarus</i>	4	205	265	259
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Polyipnus laternatus</i>	2	366	549	412
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Sternoptyx diaphana</i>	43	197	4,151	585
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Sternoptyx pseudobscura</i>	3	445	857	585
Actinopterygii	Stomiiformes	Stomiidae	<i>Aristostomias grimaldii</i>	2	640	640	640
Actinopterygii	Stomiiformes	Stomiidae	<i>Aristostomias xenostoma</i>	3	600	792	708
Actinopterygii	Stomiiformes	Stomiidae	<i>Astronesthes macropogon</i>	9	225	1,710	412
Actinopterygii	Stomiiformes	Stomiidae	<i>Chauliodus sloani</i>	125	191	4,151	433
Actinopterygii	Stomiiformes	Stomiidae	<i>Eustomias schmidtii</i>	2	450	857	586
Actinopterygii	Stomiiformes	Stomiidae	<i>Heterophotus ophistoma</i>	3	640	732	671

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Actinopterygii	Stomiiformes	Stomiidae	<i>Malacosteus niger</i>	10	400	732	502
Actinopterygii	Stomiiformes	Stomiidae	<i>Melanostomias macrophotus</i>	1	404	404	404
Actinopterygii	Stomiiformes	Stomiidae	<i>Stomias affinis</i>	32	205	857	420
Actinopterygii	Stomiiformes	Stomiidae	<i>Stomias longibarbus</i>	3	225	755	358
Actinopterygii	Tetraodontiformes	Triacanthodidae	<i>Hollardia hollardi</i>	6	329	558	350
Actinopterygii	Tetraodontiformes	Triacanthodidae	<i>Parahollardia lineata</i>	1	369	369	369
Actinopterygii	Tetraodontiformes	Triacanthodidae	<i>Parahollardia schmidt</i>	5	200	360	222
Actinopterygii	Zeiformes	Grammicolepididae	<i>Grammicolepis brachiusculus</i>	8	324	662	442
Actinopterygii	Zeiformes	Grammicolepididae	<i>Xenolepidichthys dalgleishi</i>	25	200	439	245
Actinopterygii	Zeiformes	Parazenidae	<i>Cyttopsis rosea</i>	95	223	732	324
Actinopterygii	Zeiformes	Parazenidae	<i>Parazen pacificus</i>	2	274	352	281
Actinopterygii	Zeiformes	Zeidae	<i>Zenopsis conchifer</i>	2	270	298	284
Actinopterygii	Zeiformes	Zenionidae	<i>Zenion hololepis</i>	72	200	540	385
Elasmobranchii	Carcharhiniformes	Carcharhinidae	<i>Galeocerdo cuvier</i>	1	365	365	365
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Apristurus canutus</i>	2	530	777	592
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Apristurus parvipinnis</i>	2	719	719	719
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Apristurus riveri</i>	3	860	960	889
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Galeus arae</i>	4	256	512	374
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Galeus cadenati</i>	4	256	512	436
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Schroederichthys maculatus</i>	1	274	274	274
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Scyliorhinus boa</i>	19	223	540	298
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Scyliorhinus hesperius</i>	9	290	549	341
Elasmobranchii	Carcharhiniformes	Triakidae	<i>Mustelus canis</i>	2	298	316	307
Elasmobranchii	Rajiformes	Anacanthobatidae	<i>Schroederobatis americana</i>	51	307	803	475
Elasmobranchii	Rajiformes	Rajidae	<i>Breviraja nigriventralis</i>	18	457	732	512
Elasmobranchii	Rajiformes	Rajidae	<i>Breviraja spinosa</i>	4	540	612	575
Elasmobranchii	Rajiformes	Rajidae	<i>Cruriraja rugosa</i>	7	365	732	449
Elasmobranchii	Rajiformes	Rajidae	<i>Dactylobatus clarkii</i>	18	366	512	421
Elasmobranchii	Rajiformes	Rajidae	<i>Dipturus bullisi</i>	9	201	334	302
Elasmobranchii	Rajiformes	Rajidae	<i>Dipturus garricki</i>	3	283	307	301
Elasmobranchii	Rajiformes	Rajidae	<i>Dipturus oregoni</i>	1	396	396	396
Elasmobranchii	Rajiformes	Rajidae	<i>Dipturus teevani</i>	3	240	576	407
Elasmobranchii	Rajiformes	Rajidae	<i>Fenestrata plutonia</i>	1	428	428	428
Elasmobranchii	Rajiformes	Rajidae	<i>Fenestrata sinuomexicanus</i>	2	485	485	485
Elasmobranchii	Rajiformes	Rajidae	<i>Gurgesiella atlantica</i>	34	223	698	498
Elasmobranchii	Squaliformes	Centrophoridae	<i>Centrophorus granulosus</i>	4	200	732	333
Elasmobranchii	Squaliformes	Centrophoridae	<i>Centrophorus squamosus</i>	1	670	670	670
Elasmobranchii	Squaliformes	Dalatiidae	<i>Isistius brasiliensis</i>	1	621	621	621
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus bullisi</i>	1	274	274	274
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus carteri</i>	8	283	343	292
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus hillianus</i>	6	180	540	351
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus perryi</i>	22	283	375	297
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus pusillus</i>	1	288	288	288
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus schultzi</i>	43	269	823	422
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus virens</i>	25	288	503	331
Elasmobranchii	Squaliformes	Somniosidae	<i>Somniosus cf. microcephalus</i>	1	200	200	200
Elasmobranchii	Squaliformes	Squalidae	<i>Squalus cubensis</i>	4	198	274	263
Elasmobranchii	Squatiniiformes	Squatinaidae	<i>Squatina david</i>	2	198	305	252
Elasmobranchii	Torpediniformes	Torpedinidae	<i>Tetronarce nobiliana</i>	6	292	369	329
Holocephali	Chimaeriformes	Chimaeridae	<i>Chimaera cubana</i>	1	234	234	234
Holocephali	Chimaeriformes	Chimaeridae	<i>Hydrolagus alberti</i>	27	223	1,143	477

Appendix 1. Continued.

Class	Order	Family	Species	Records	Min depth	Max depth	Mean depth
Holocephali	Chimaeriformes	Chimaeridae	<i>Hydrolagus mirabilis</i>	3	720	1,296	995
Holocephali	Chimaeriformes	Rhinochimaeridae	<i>Neoharriotta carri</i>	14	288	485	329
Holocephali	Chimaeriformes	Rhinochimaeridae	<i>Rhinochimaera atlantica</i>	2	914	917	916
Myxini	Myxiniiformes	Myxinidae	<i>Eptatretus aceroi</i>	2	705	705	705
Myxini	Myxiniiformes	Myxinidae	<i>Eptatretus ancon</i>	8	476	670	513
Myxini	Myxiniiformes	Myxinidae	<i>Eptatretus wayuu</i>	5	300	303	301
Myxini	Myxiniiformes	Myxinidae	<i>Myxine mccoskeri</i>	72	269	801	446
Myxini	Myxiniiformes	Myxinidae	<i>Myxine robinsoni</i>	2	783	821	793

APPENDIX 2

Species excluded from data base because records fall outside the Colombian Caribbean Exclusive Economic Zone.

Class	Order	Family	Species
Actinopterygii	Anguilliformes	Congridae	<i>Acromycter atlanticus</i>
Actinopterygii	Anguilliformes	Congridae	<i>Bathychongrus thysanochilus</i>
Actinopterygii	Anguilliformes	Congridae	<i>Rhynchoconger gracilior</i>
Actinopterygii	Anguilliformes	Nettastomatidae	<i>Hoplunnis similis</i>
Actinopterygii	Aulopiformes	Giganturidae	<i>Gigantura chuni</i>
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathytrophops sewelli</i>
Actinopterygii	Aulopiformes	Paralepididae	<i>Lestrolepis intermedia</i>
Actinopterygii	Aulopiformes	Paralepididae	<i>Stemonosudis rothschildi</i>
Actinopterygii	Batrachoidiformes	Batrachoididae	<i>Porichthys bathoiketes</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium entomelan</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium marmoratum</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Lepophidium staurophor</i>
Actinopterygii	Osmeriformes	Argentinidae	<i>Argentina stewarti</i>
Actinopterygii	Osmeriformes	Argentinidae	<i>Glossanodon pygmaeus</i>
Actinopterygii	Perciformes	Apogonidae	<i>Paroncheilus affinis</i>
Actinopterygii	Perciformes	Labridae	<i>Decodon puellaris</i>
Actinopterygii	Perciformes	Lutjanidae	<i>Rhomboplites aurorubens</i>
Actinopterygii	Perciformes	Percophidae	<i>Bembrops macromma</i>
Actinopterygii	Perciformes	Serranidae	<i>Serranus phoebe</i>
Actinopterygii	Perciformes	Uranoscopidae	<i>Kathetostoma cubana</i>
Actinopterygii	Pleuronectiformes	Paralichthyidae	<i>Ancylosetta microctenus</i>
Actinopterygii	Pleuronectiformes	Paralichthyidae	<i>Citharichthys dinoceros</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Sonoda megalophthalma</i>
Actinopterygii	Stomiiformes	Stomiidae	<i>Echiostoma barbatum</i>
Actinopterygii	Stomiiformes	Stomiidae	<i>Eustomias acinosus</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Breviraja moulde</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Fenestraja ishiyamai</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Leucoraja garmani</i>
Elasmobranchii	Squaliformes	Etmopteridae	<i>Etmopterus robinsoni</i>
Elasmobranchii	Squaliformes	Squalidae	<i>Squalus mitsukurini</i>
Myxini	Myxiniiformes	Myxinidae	<i>Eptatretus caribbeus</i>
Myxini	Myxiniiformes	Myxinidae	<i>Eptatretus multidentis</i>

APPENDIX 3

Deep demersal species (> 200 m depth) recorded inside the Parque Nacional Natural Natural Park Corales de Profundidad in the Colombian Caribbean.

Class	Order	Family	Genus	Species
Actinopterygii	Anguilliformes	Colocongridae	<i>Coloconger</i>	<i>Coloconger meadi</i>
Actinopterygii	Anguilliformes	Congridae	<i>Bathycongrus</i>	<i>Bathycongrus bullisi</i>
Actinopterygii	Anguilliformes	Congridae	<i>Pseudophichthys</i>	<i>Pseudophichthys splendens</i>
Actinopterygii	Anguilliformes	Congridae	<i>Xenomystax</i>	<i>Xenomystax congroides</i>
Actinopterygii	Aulopiformes	Chlorophthalmidae	<i>Chlorophthalmus</i>	<i>Chlorophthalmus agassizi</i>
Actinopterygii	Aulopiformes	Chlorophthalmidae	<i>Parasudis</i>	<i>Parasudis truculenta</i>
Actinopterygii	Aulopiformes	Ipnopidae	<i>Bathypterois</i>	<i>Bathypterois bigelowi</i>
Actinopterygii	Aulopiformes	Synodontidae	<i>Saurida</i>	<i>Saurida brasiliensis</i>
Actinopterygii	Beryciformes	Trachichthyidae	<i>Hoplostethus</i>	<i>Hoplostethus occidentalis</i>
Actinopterygii	Gadiformes	Bregmacerotidae	<i>Bregmaceros</i>	<i>Bregmaceros atlanticus</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Bathygadus</i>	<i>Bathygadus macrops</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Coelorinchus</i>	<i>Coelorinchus caelorhincus</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Coelorinchus</i>	<i>Coelorinchus caribbaeus</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Gadomus</i>	<i>Gadomus arcuatus</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Hymenocephalus</i>	<i>Hymenocephalus billsam</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Hymenocephalus</i>	<i>Hymenocephalus italicus</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Malacocephalus</i>	<i>Malacocephalus laevis</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Malacocephalus</i>	<i>Malacocephalus occidentalis</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Nezumia</i>	<i>Nezumia aequalis</i>
Actinopterygii	Gadiformes	Macrouridae	<i>Ventrifossa</i>	<i>Ventrifossa macropogon</i>
Actinopterygii	Gadiformes	Merlucciidae	<i>Steindachneria</i>	<i>Steindachneria argentea</i>
Actinopterygii	Gadiformes	Moridae	<i>Gadella</i>	<i>Gadella imberbis</i>
Actinopterygii	Gadiformes	Moridae	<i>Laemonema</i>	<i>Laemonema goodebeanorum</i>
Actinopterygii	Gadiformes	Moridae	<i>Physiculus</i>	<i>Physiculus fulvus</i>
Actinopterygii	Lophiiformes	Chaunacidae	<i>Chaunax</i>	<i>Chaunax pictus</i>
Actinopterygii	Lophiiformes	Chaunacidae	<i>Chaunax</i>	<i>Chaunax suttkusi</i>
Actinopterygii	Lophiiformes	Lophiidae	<i>Lophiodes</i>	<i>Lophiodes monodi</i>
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Dibranchus</i>	<i>Dibranchus atlanticus</i>
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Halieutichthys</i>	<i>Halieutichthys aculeatus</i>
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Malthopsis</i>	<i>Malthopsis gnoma</i>
Actinopterygii	Lophiiformes	Ogcocephalidae	<i>Ogcocephalus</i>	<i>Ogcocephalus declivirostris</i>
Actinopterygii	Myctophiformes	Myctophidae	<i>Dasyscopelus</i>	<i>Dasyscopelus selenops</i>
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus</i>	<i>Diaphus effulgens</i>
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus</i>	<i>Diaphus garmani</i>
Actinopterygii	Myctophiformes	Myctophidae	<i>Diaphus</i>	<i>Diaphus lucidus</i>
Actinopterygii	Myctophiformes	Neoscopelidae	<i>Neoscopelus</i>	<i>Neoscopelus macrolepidotus</i>
Actinopterygii	Myctophiformes	Neoscopelidae	<i>Neoscopelus</i>	<i>Neoscopelus microchir</i>
Actinopterygii	Notacanthiformes	Halosauridae	<i>Halosaurus</i>	<i>Halosaurus guentheri</i>
Actinopterygii	Notacanthiformes	Halosauridae	<i>Halosaurus</i>	<i>Halosaurus ovenii</i>
Actinopterygii	Notacanthiformes	Notacanthidae	<i>Notacanthus</i>	<i>Notacanthus chemnitzii</i>
Actinopterygii	Ophidiiformes	Bythitidae	<i>Calamopteryx</i>	<i>Calamopteryx robbinsorum</i>
Actinopterygii	Ophidiiformes	Bythitidae	<i>Diplacanthopoma</i>	<i>Diplacanthopoma brachysoma</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Benthocometes</i>	<i>Benthocometes robustus</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Monomitopus</i>	<i>Monomitopus agassizii</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites</i>	<i>Neobythites gilli</i>
Actinopterygii	Ophidiiformes	Ophidiidae	<i>Neobythites</i>	<i>Neobythites marginatus</i>
Actinopterygii	Osmeriformes	Argentinidae	<i>Argentina</i>	<i>Argentina striata</i>
Actinopterygii	Perciformes	Acropomatidae	<i>Caraibops</i>	<i>Caraibops trispinosus</i>

Appendix 3. Continued.

Class	Order	Family	Genus	Species
Actinopterygii	Perciformes	Acropomatidae	<i>Synagrops</i>	<i>Synagrops bellus</i>
Actinopterygii	Perciformes	Acropomatidae	<i>Verilus</i>	<i>Verilus atlanticus</i>
Actinopterygii	Perciformes	Acropomatidae	<i>Verilus</i>	<i>Verilus pseudomicrolepis</i>
Actinopterygii	Perciformes	Bathyclupeidae	<i>Bathyclupea</i>	<i>Bathyclupea argentea</i>
Actinopterygii	Perciformes	Bathyclupeidae	<i>Bathyclupea</i>	<i>Bathyclupea schroederi</i>
Actinopterygii	Perciformes	Caproidae	<i>Antigonia</i>	<i>Antigonia capros</i>
Actinopterygii	Perciformes	Caproidae	<i>Antigonia</i>	<i>Antigonia combatia</i>
Actinopterygii	Perciformes	Carangidae	<i>Decapterus</i>	<i>Decapterus tabl</i>
Actinopterygii	Perciformes	Carangidae	<i>Selar</i>	<i>Selar crumenophthalmus</i>
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus</i>	<i>Epigonus macrops</i>
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus</i>	<i>Epigonus occidentalis</i>
Actinopterygii	Perciformes	Epigonidae	<i>Epigonus</i>	<i>Epigonus pandionis</i>
Actinopterygii	Perciformes	Lutjanidae	<i>Pristipomoides</i>	<i>Pristipomoides macrophthalmus</i>
Actinopterygii	Perciformes	Opistognathidae	<i>Lonchopisthus</i>	<i>Lonchopisthus lemur</i>
Actinopterygii	Perciformes	Percophidae	<i>Bembrops</i>	<i>Bembrops anatirostris</i>
Actinopterygii	Perciformes	Percophidae	<i>Bembrops</i>	<i>Bembrops gobioides</i>
Actinopterygii	Perciformes	Percophidae	<i>Bembrops</i>	<i>Bembrops ocellatus</i>
Actinopterygii	Perciformes	Percophidae	<i>Bembrops</i>	<i>Bembrops quadrisella</i>
Actinopterygii	Perciformes	Serranidae	<i>Baldwinella</i>	<i>Baldwinella aureorubens</i>
Actinopterygii	Perciformes	Serranidae	<i>Bathyanthias</i>	<i>Bathyanthias cubensis</i>
Actinopterygii	Perciformes	Serranidae	<i>Hyporthodus</i>	<i>Hyporthodus nigrilus</i>
Actinopterygii	Perciformes	Symphysanodontidae	<i>Symphysanodon</i>	<i>Symphysanodon berryi</i>
Actinopterygii	Perciformes	Trichiuridae	<i>Benthodesmus</i>	<i>Benthodesmus simonyi</i>
Actinopterygii	Perciformes	Trichiuridae	<i>Benthodesmus</i>	<i>Benthodesmus tenuis</i>
Actinopterygii	Pleuronectiformes	Bothidae	<i>Monolene</i>	<i>Monolene atrimana</i>
Actinopterygii	Pleuronectiformes	Bothidae	<i>Monolene</i>	<i>Monolene megalepis</i>
Actinopterygii	Pleuronectiformes	Cynoglossidae	<i>Symphurus</i>	<i>Symphurus marginatus</i>
Actinopterygii	Pleuronectiformes	Paralichthyidae	<i>Ancylopsetta</i>	<i>Ancylopsetta cycloidea</i>
Actinopterygii	Pleuronectiformes	Pleuronectidae	<i>Poecilopsetta</i>	<i>Poecilopsetta beanii</i>
Actinopterygii	Pleuronectiformes	Pleuronectidae	<i>Poecilopsetta</i>	<i>Poecilopsetta inermis</i>
Actinopterygii	Polymixiiformes	Polymixiidae	<i>Polymixia</i>	<i>Polymixia lowei</i>
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion</i>	<i>Peristedion ecuadorensis</i>
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion</i>	<i>Peristedion gracile</i>
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion</i>	<i>Peristedion greyae</i>
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion</i>	<i>Peristedion longispatha</i>
Actinopterygii	Scorpaeniformes	Peristediidae	<i>Peristedion</i>	<i>Peristedion truncatum</i>
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Neomerinthe</i>	<i>Neomerinthe beanorum</i>
Actinopterygii	Scorpaeniformes	Scorpaenidae	<i>Pontinus</i>	<i>Pontinus nematophthalmus</i>
Actinopterygii	Scorpaeniformes	Setarchidae	<i>Setarches</i>	<i>Setarches guentheri</i>
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Polymetme</i>	<i>Polymetme corythaeola</i>
Actinopterygii	Stomiiformes	Phosichthyidae	<i>Polymetme</i>	<i>Polymetme thaeocoryla</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyripnus</i>	<i>Argyripnus atlanticus</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyropelecus</i>	<i>Argyropelecus aculeatus</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Argyropelecus</i>	<i>Argyropelecus gigas</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Maurollicus</i>	<i>Maurollicus muelleri</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Polyipnus</i>	<i>Polyipnus asteroides</i>
Actinopterygii	Stomiiformes	Sternoptychidae	<i>Polyipnus</i>	<i>Polyipnus laternatus</i>
Actinopterygii	Stomiiformes	Stomiidae	<i>Chauliodus</i>	<i>Chauliodus sloani</i>
Actinopterygii	Tetraodontiformes	Triacanthodidae	<i>Parahollardia</i>	<i>Parahollardia schmidtii</i>
Actinopterygii	Zeiformes	Grammicolepididae	<i>Xenolepidichthys</i>	<i>Xenolepidichthys dalgleishi</i>
Actinopterygii	Zeiformes	Parazenidae	<i>Cyttopsis</i>	<i>Cyttopsis rosea</i>

Appendix 3. Continued.

Class	Order	Family	Genus	Species
Actinopterygii	Zeiformes	Zenionidae	<i>Zenion</i>	<i>Zenion hololepis</i>
Elasmobranchii	Carcharhiniformes	Scyliorhinidae	<i>Scyliorhinus</i>	<i>Scyliorhinus boa</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Breviraja</i>	<i>Breviraja spinosa</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Dipturus</i>	<i>Dipturus bullisi</i>
Elasmobranchii	Rajiformes	Rajidae	<i>Gurgesiella</i>	<i>Gurgesiella atlantica</i>
Holocephali	Chimaeriformes	Chimaeridae	<i>Hydrolagus</i>	<i>Hydrolagus alberti</i>
Myxini	Myxiniformes	Myxinidae	<i>Myxine</i>	<i>Myxine mccoskeri</i>