List of Deep-Sea Coral Taxa in the U.S. Caribbean Region: Depth and Geographic Distribution (v. 2021)

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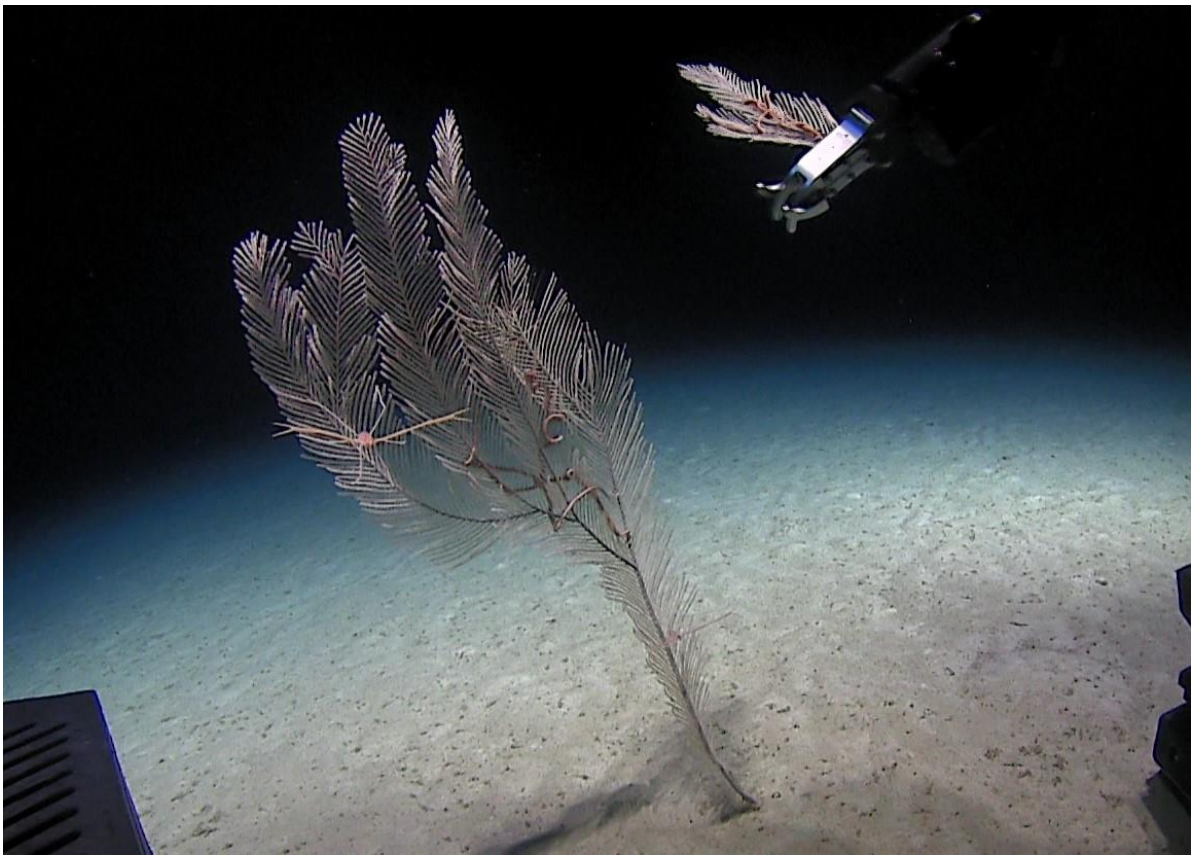

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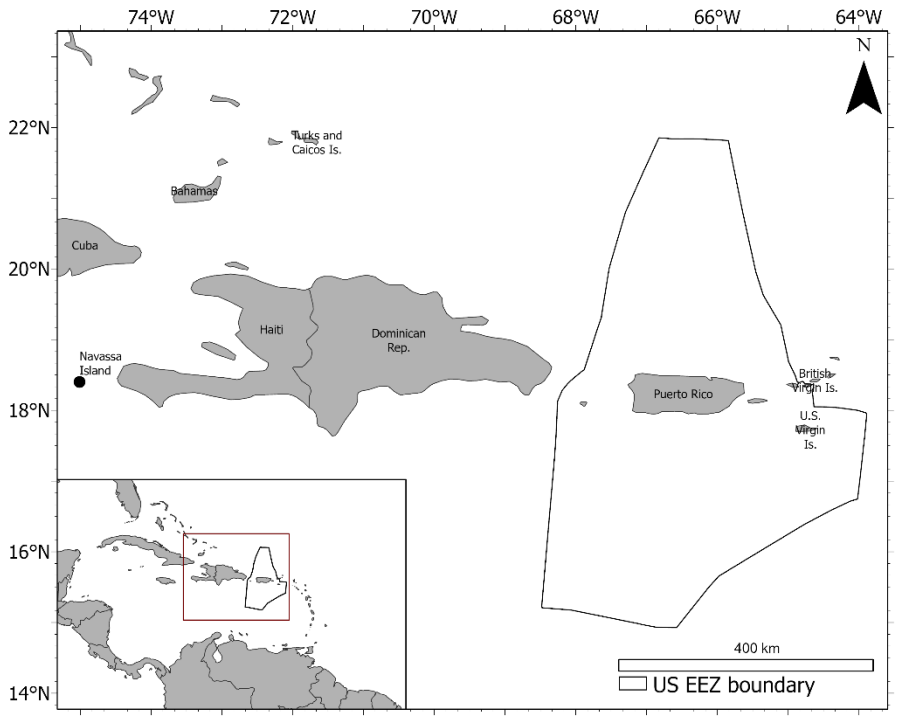
This list is an update of the peer-reviewed 2017 list (Cairns 2017) of azooxanthellate coral taxa that occur predominantly deeper than 50 meters in the U.S. Caribbean region, which consists of Puerto Rico, U.S. Virgin Islands, and Navassa Island (Figure 1). The current list includes species in Phylum Cnidaria, Classes Anthozoa and Hydrozoa recognized through 2021. Table 1 provides details on depth ranges and known geographic distributions within the region. The list is ordered alphabetically by family and species, and authorship and publication dates have been added. Since 2017, two new species have been described from U.S. waters in the region (*Callogorgia lucaya* Cordeiro, Bayer & Cairns, 2018, and *Alloptilella williamsi* López-González, 2022 – indicated with blue shading in the list). Several additional species represent new records in U.S. waters from previously known western Atlantic species, most are unpublished specimens from the National Museum of Natural History collections. Recent collections from deep-water remotely operated vehicle (ROV) surveys in 2018 by NOAA Ship *Okeanos Explorer* included additional specimens, a few of which have been identified and others that may represent species not included here. This updated list now includes 18 species of Antipatharia (two with incomplete taxonomy), 46 species of Scleractinia, 59 species of Octocorallia (53 Alcyonacea and six Pennatulacea – seven and one respectively with incomplete taxonomy), and 16 species of Stylasteridae, for a total of 139 species found in the relatively small geographic region of U. S. Caribbean territories.



Taxonomic names are generally those currently accepted in the World Register of Marine Species (WoRMS), and are arranged by order, and alphabetically within order by family, genus, and species.

Figure 1. The current list covers deep-water corals recorded from U.S. waters around Puerto Rico, the U.S. Virgin Islands, and Navassa Island.

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Cover Photo: A sample is collected by ROV from a large colony of *Callogorgia americana* Cairns & Bayer, 2002 at 554m depth off Puerto Rico in 2018. Image credit: NOAA Ocean Exploration

Table 1. List of known deep-sea coral species in Phylum Cnidaria, Class Anthozoa and Class Hydrozoa, and their reported distributions in U.S. waters around Puerto Rico, the U.S. Virgin Islands, and Navassa Island. Blue shaded fields indicate newly described species since 2017. Bold text indicates changes to the initial 2017 list (Cairns 2017), including additions or range extensions, denoted with an asterisk (*), and changes in taxonomy since 2017 denoted with a cross (†) (e.g., species that were listed in 2017, but have since been given a new name or alternative spelling). Numbered references correspond with citations following the table. Distribution: PR = Puerto Rico; VI = U.S. Virgin Islands; N = Navassa.

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Anthozoa **Subclass Hexacorallia**				
Order Antipatharia				
Family Antipathidae	*Antipathes caribbeana* Opresko, 1996	PR,VI	11-100	1,2,3
	Antipathes gracilis Gray, 1860	PR	219	1
	Antipathes rhipidion Pax, 1908	VI	?	4
	***Antipathes tristis* (Duchassaing, 1870)**	VI	214	5
	Stichopathes luetkeni Brook, 1889 (= *Stichopathes lutkeni*, alternative spelling)	N	14-115	1
	***Stichopathes occidentalis* (Gray, 1857)**	VI	61	1
	Stichopathes pourtalesi Brook, 1889	PR	183	1
Family Aphanipathidae	†***Aphanostichopathes paucispina* (Brook, 1889)** [a] (=*Cirrhipathes paucispina* Brook 1889)	VI	1061	1,5,6
Family Cladopathidae	***Heteropathes* sp.** [b]	PR,VI	1713-2732	7
	***Trissopathes* sp.**	PR	1193	1
Family Myriopathidae	*Plumapathes pennacea* (Pallas, 1766)	PR,VI	3-229	8,9
	Tanacetipathes hirta (Gray, 1857)	PR,VI	13-357	1,8,10
	Tanacetipathes tanacetum (Pourtalès, 1880)	PR	46-915	8
Family Schizopathidae	****Abyssopathes lyra* (Brook, 1889)**	PR	4966	1
	Bathypathes patula Brook, 1889	PR	100-5000	8,9
	Parantipathes tetrasticha (Pourtalès, 1868)	PR,VI	175-428	1,8,10
Family Stylopathidae	*Stylopathes americana* (Duchassaing & Michelotti, 1860) (= *Antipathes americana* Duch. & Mich., 1860)	VI	37-532	10,11,12,13
	Stylopathes columnaris (Duchassaing, 1870) (= *Antipathes columnaris*)	VI	73-567	8,9
Order Scleractinia				
Family Caryophylliidae	*Anomocora fecunda* (Pourtalès, 1871)	VI	37-640	14
	Caryophyllia (Caryophyllia) ambrosia caribbeana Cairns, 1979	N,PR	183-1646	14
	Caryophyllia (C.) antillarum Pourtalès, 1874	VI	150-730	14,15
	Caryophyllia (C.) berteriana Duchassaing, 1850	PR	99-1033	14,15
	Caryophyllia (C.) corrugata Cairns, 1979	VI	183-380	14

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Caryophylliidae cont.	*Caryophyllia (C.) crypta* Cairns, 2000	VI	12-183	15
	Caryophyllia (C.) paucipalata Mosely, 1881	VI	714-843	14
	Cladocora debilis Milne Edwards & Haime, 1849	PR	32-480	15
	Coenocyathus parvulus (Cairns, 1979)	VI	97-399	14,15
	Coenosmilia arbuscula Pourtalès, 1874	VI	74-622	14,15
	Colangia immersa Pourtalès, 1871	PR	1-347	15
	Desmophyllum dianthus (Esper, 1794)	VI	155-2200	14,15
	†***Desmophyllum hourigani* Cairns, 2021** (= *Desmophyllum striatum* Cairns, 1979)	VI	277-823	14,15,16
	Labyrinthocyathus facetus Cairns, 1979	VI	549-860	1
	Lophelia pertusa (Linnaeus, 1758) †[= ***Desmophyllum pertusum* (Linnaeus, 1758)**] [c]	PR,VI	146-1200	14,15
	Oxysmilia rotundifolia (Milne Edwards & Haime, 1848)	PR,VI	46-640	14,15
	Paracyathus pulchellus (Philippi, 1842)	PR	17-250	14,15
	***Phacelocyathus flos* (Pourtalès, 1878)**	PR	20-355	1,14
	Rhizosmilia gerdae Cairns, 1978	PR,VI	123-549	14,15
	Rhizosmilia maculata (Pourtalès, 1874)	PR	1-508	15
	Stephanocyathus (Odontocyathus.) coronatus (Pourtalès, 1867)	N,PR,VI	543-1250	1,14
	Stephanocyathus (Stephanocyathus) diadema (Moseley, 1876)	PR,VI	795-2113	14
	Stephanocyathus (S.) laevifundus Cairns, 1977	N	300-1158	14
	Tethocyathus variabilis Cairns, 1979	PR	320-488	14
	Thalamophyllia riisei (Duchassaing & Michelotti, 1860)	VI	4-914	14,15
	Trochocyathus (Trochocyathus) fossulus Cairns, 1979	VI	205-380	14
	Trochocyathus (T.) rawsonii Pourtalès, 1874	PR	55-700	14,15
Family Deltocyathidae	*Deltocyathus agassizii* Pourtalès, 1867	N	495-907	1
	Deltocyathus calcar Pourtalès, 1874	PR,VI	81-675	14,15
	Deltocyathus eccentricus Cairns, 1979	PR,VI	183-907	14
	Deltocyathus italicus (Michelotti, 1838)	PR,VI	403-2634	14
Family Dendrophylliidae	*Balanophyllia (Balanophyllia) palifera* Pourtalès, 1878	PR	53-708	1,14,15
	Enallopsammia rostrata (Pourtalès, 1878)	N,VI	300-1646	14
	Rhizopsammia goesi (Lindström, 1877)	VI	5-119	15,17
Family Flabellidae	*Flabellum (Ulocyathus) moseleyi* Pourtalès, 1880	PR,VI	216-1097	1,15
	Javania cailleti (Duchassaing & Michelotti, 1864)	N	86-2165	14,15

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Fungiacyathidae	*Fungiacyathus (Bathyactis) crispus* (Pourtalès, 1871)	VI	310-4180	1
	Fungiacyathus (B.) symmetricus (Pourtalès, 1871)	PR,VI	183-1664	14
Family Oculinidae	*Madrepora carolina* (Pourtalès, 1871)	PR,VI	53-801	14,15
	Madrepora oculata Linnaeus, 1758	N,PR,VI	144-1391	14
Family Pocilloporidae	*Madracis asperula* Milne Edwards & Haime, 1849 [d]	PR,VI	24-311	15
	Madracis myriaster (Milne Edwards & Haime, 1849) [d]	N,PR,VI	20-1220	14,15
Family Rhizangiidae	*Astrangia poculata* (Ellis & Solander, 1786)	PR	0-263	14,15
Family Schizocyathidae	*Pourtalocyathus hispidus* (Pourtalès, 1878)	PR	349-1200	14
	Schizocyathus fissilis Pourtalès, 1874	PR	88-640	14,15
Family Stenocyathidae	*Stenocyathus vermiformis* (Pourtalès, 1868)	VI	165-835	14,15

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Anthozoa **Subclass Octocorallia**				
Order Alcyonacea				
Family Acanthogorgiidae	*Acanthogorgia aspera* Pourtalès, 1867	PR	>183	18,19
Family Alcyoniidae	Unidentified Anthomastinae	PR,VI	778-1661	7
Family Anthothelidae	*Iciligorgia schrammi* Duchassaing, 1870	PR	11-358	18
Family Chrysogorgiidae	*Chrysogorgia desbonni* Duchassaing & Michelotti, 1864	PR	155-595	1,20
	Chrysogorgia thyrsiformis Deichmann, 1936	PR,VI	146-526	1,20
	Iridogorgia sp.	N, PR,VI	1857-2737	1,7
	Metallogorgia splendens (Verrill, 1883)	VI	1061	19
Family Clavulariidae	*Carijoa riisei* (Duchassaing & Michelotti, 1860)	PR,VI	1-55	18,19
	Clavularia sp.	PR,VI	724-849	7
	Stereotelesto corallina (Duchassaing, 1870)	PR	23-188	18,21
	Telestula sp.	N	1033	1
Family Coralliidae	**†Coralliidae** [e] (= *Corallium* or *Hemicorallium* sp.)	N, PR,VI	846-1193	1,7
Family Ellisellidae	*Ellisella atlantica* (Toeplitz, 1910)	VI	214-922	19
	Ellisella elongata (Pallas, 1766) (*incl. Ellisella barbadensis* (Duchassaing & Michelotti, 1864))	PR,VI	15-488	18,21,22
	***Ellisella grandis* (Verrill, 1901)** [=*Scirpearia grandis* (Verrill, 1901)]	VI	399	19

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Ellisellidae cont.	*Nicella deichmannae* Cairns, 2007	PR	27-403	23
	Nicella guadalupensis (Duchassaing & Michelotti, 1860)	PR,VI	27-395	19,23
	Nicella obesa Deichmann, 1936	N,PR,VI	174-819	1,19,23
	Nicella toeplitzae Viada & Cairns, 2007	PR	55-329	1
	Riisei paniculata Duchassaing & Michelotti, 1860	PR	110-704	23
Family Gorgoniidae	***Leptogorgia barbadensis* (Bayer, 1961)**	VI	27-76	18
	***Leptogorgia cardinalis* (Bayer, 1961)** [f]	PR	19-77	1
	***Leptogorgia stheno* (Bayer, 1952)** [f]	PR	7-183	1
Family Keratoisididae [g] (Formerly Isididae)	*Acanella arbuscula (Johnson, 1862)* (including *Acanella eburnea* (Pourtalès, 1868))	VI	1033	19
	Keratoisis flexibilis (Pourtalès, 1868)	VI	170-878	24
	Lepidisis longiflora Verrill, 1883 [h]	VI	958-1161	19
Family Nephtheidae	*Stereonephthya portoricensis* (Hargitt, 1901)	PR	>200	3
Family Nidaliidae	†***Chironephthya agassizii* (Deichmann, 1936)** (= *Neospongodes agassizi; Siphonogorgia agassizii*)	VI	214	25
	Nidalia deichmannae Utinomi, 1954 (= *Nidalia rigida* Deichmann, 1936)	VI	80	19
	Nidalia occidentalis Gray, 1835	PR,VI	37-311	1,19
Family Paragorgiidae	***Paragorgia* sp.**	PR	1762	5
Family Plexauridae [i]	*Acanthacis austera* Deichmann, 1936	PR	>200	1
	Bebryce cinerea Deichmann, 1936	PR	>200	1
	†***Caliacis nutans* (Duchassaing & Michelotti, 1864** (= *Thesea nutans* Duchassaing & Michelotti, 1864)	PR	146-293	1
	Lytreia plana (Deichmann, 1936)	PR	104	1
	Paramuricea echinata Deichmann, 1936	VI	1061	19
	Placogorgia rudis Deichmann, 1936	PR	104	1
	Placogorgia tenuis (Verrill, 1883)	PR	>200	1
	Scleracis petrosa Deichmann, 1936	PR	275-1607	1,19,26
	Swiftia exserta (Ellis & Solander, 1786)	PR,VI	18-494	19,27,28
	***Thesea granulosa* Deichmann, 1936**	PR	183	1
	Villogorgia nigrescens Duchassaing & Michelotti, 1860	N,VI	176-275	1,19
Family Primnoidae	*Acanthoprimnoa goesi* (Aurivillius, 1931)	PR,VI	137-595	29
	Acanthoprimnoa pectinata Cairns & Bayer, 2004	PR	194-686	1,29
	Callogorgia americana Cairns & Bayer, 2002 (= *Callogorgia americana americana* Cairns & Bayer, 2002)	PR	183-732	30
	***Callogorgia lucaya* Cordeiro, Bayer & Cairns, 2018**	PR	55-522	31

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Primnoidae cont.	*Narella bellissima* (Kükenthal, 1915)	PR	161-792	32
	Narella pauciflora Deichmann, 1936	PR,VI	738-1473	19,32
	***Narella spectabilis* Cairns & Bayer, 2003**	PR	1485-2265	1
	***Paracalyptrophora duplex* Cairns & Bayer, 2004**	PR	352-555	1
	Primnoella polita Deichmann, 1936	VI	922	33
Family Spongiodermidae	*Diodogorgia nodulifera* (Hargitt & Rogers, 1901)	PR,VI	14-183	5,18,21,34
Family Victorgorgiidae	***Victorgorgia* sp.**	PR	972	7
Order Pennatulacea[j]				
Family Anthoptilidae	*Anthoptilum murrayi* Kölliker, 1880	PR	512	1
Family Funiculinidae	***Funiculina quadrangularis* (Pallas, 1766)**	VI	823-922	5
Family Pennatulidae	***Alloptilella williamsi* López-González, 2022**	VI	559	1,35
Family Protoptilidae	*Protoptilum thomsoni* Kölliker, 1872	PR	329-512	1
Family Umbellulidae	*Umbellula lindahli* Kölliker, 1875	VI	567	1
Family Virgulariidae	***Scytalium herklotsi* López-González, 2021**	PR	489	1,36

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Hydrozoa **Subclass Hydroidolina**				
Order Anthoathecata				
Family Stylasteridae	*Crypthelia glossopoma* Cairns, 1986	VI	198-864	37
	***Crypthelia insolita* Cairns, 1986**	PR	159-720	1
	Crypthelia peircei Pourtalès, 1867	VI	159-837	37
	Crypthelia tenuiseptata Cairns, 1986	VI	761-1061	37
	Distichopora cervina Pourtalès, 1867	PR	68-384	37
	Pliobothrus echinatus Cairns, 1986	PR	164-708	37
	Pliobothrus symmetricus Pourtalès, 1868	PR	150-400	37
	Pliobothrus tubulatus (Pourtalès, 1867)	PR	419-708	37
	Stenohelia profunda Moseley, 1881 [= *Stylaster profundus* (Moseley, 1881); *Stylaster challengeri* Boschma, 1951]	PR,VI	159-2012	37
	Stylaster antillarum Zibrowius & Cairns, 1982	PR	174-653	37
	Stylaster atlanticus Broch, 1936	PR	823	37
	Stylaster complanatus Pourtalès, 1867	VI	183-707	37

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Stylasteridae cont.	*Stylaster duchassaingi* Pourtalès, 1867	VI	46-692	37
	***Stylaster laevigatus* Cairns, 1986**	PR	123-759	1
	Stylaster roseus (Pallas, 1766)	PR	1-373	37
	Stylaster spatula Cairns, 1986	PR	384-549	37

Notes

a. Deepwater specimen originally identified as *Stichopathes pourtalesi* Brook, 1889. Redescribed by Opresko et al. (2021) and placed in the new genus *Aphanostichopathes*.

b. These observations are likely of *Heteropathes americana* (Opresko, 2003), but samples from the U.S. Caribbean have not yet been collected. The holotype of this species is from Jamaica.

c. Transfer of *Lophelia pertusa* to the genus *Desmophyllum* has been proposed recently based on genetic similarity of mitochondrial genomes and microsatellites (Addamo et al. 2016), and this change has been accepted by WoRMS. However, because of the significant morphological difference between these two genera and a difference of opinion even among molecular scientists, we suggest delaying this transfer until additional molecular studies are done on more genes.

d. Apozooxanthellate scleractinian species - Species that has a facultative symbiotic relationship with unicellular photosynthetic dinoflagellates (*Symbiodinium* spp.).

e. Unidentified white coralliids have been reported from the U.S. Caribbean region, including museum specimens (e.g., USNM 56022 & USNM 56181 from Puerto Rico) and video observations (e.g., recent remotely operated vehicle surveys by NOAA Ship *Okeanos Explorer*). In the past these were recorded as *Corallium* sp., however, recent revisions to the family mean that the species could belong to the genera *Corallium* or *Hemicorallium*.

f. Specimens of these species from Puerto Rico were collected at depths shallower than 50m, but elsewhere in the Western Atlantic, the species depth distribution extends well below this depth.

g. Saucier et al. (2021) have revised the phylogeny of the bamboo corals (formerly Isididae), resulting in five families. The bamboo corals described to date from the U.S. Caribbean all belong to in the new family Keratoisididae.

h. Watling & France (2021) indicate that *Lepidisis longiflora* is likely not in the genus *Lepidisis.*

i. One plexaurid, *Pseudoplexaura porosa* (Houttuyn, 1772), which was included in Cairns (2017), has been removed. Sanchez & Wirshing (2005) and Schubert et al. (2016) reported that *Pseudoplexaura porosa* is a zooxanthellate species. The latter also indicate that this species occurs primarily shallower than 50 m, so the previously reported deepest record (283 m) may be incorrect.

j. *Renilla reniformis* (Family Renillidae) occurs in the U.S. Caribbean and was included in the 2017 list. However, although its distribution in the Atlantic is reported to extend below 50m, it is primarily a shallow-water species. The records from Puerto Rico all appear to be less than 10 m, so it has been removed from this list.

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