Preliminary List of Deep-Sea Coral Taxa in the U.S. Mariana Archipelago (v. 2021)

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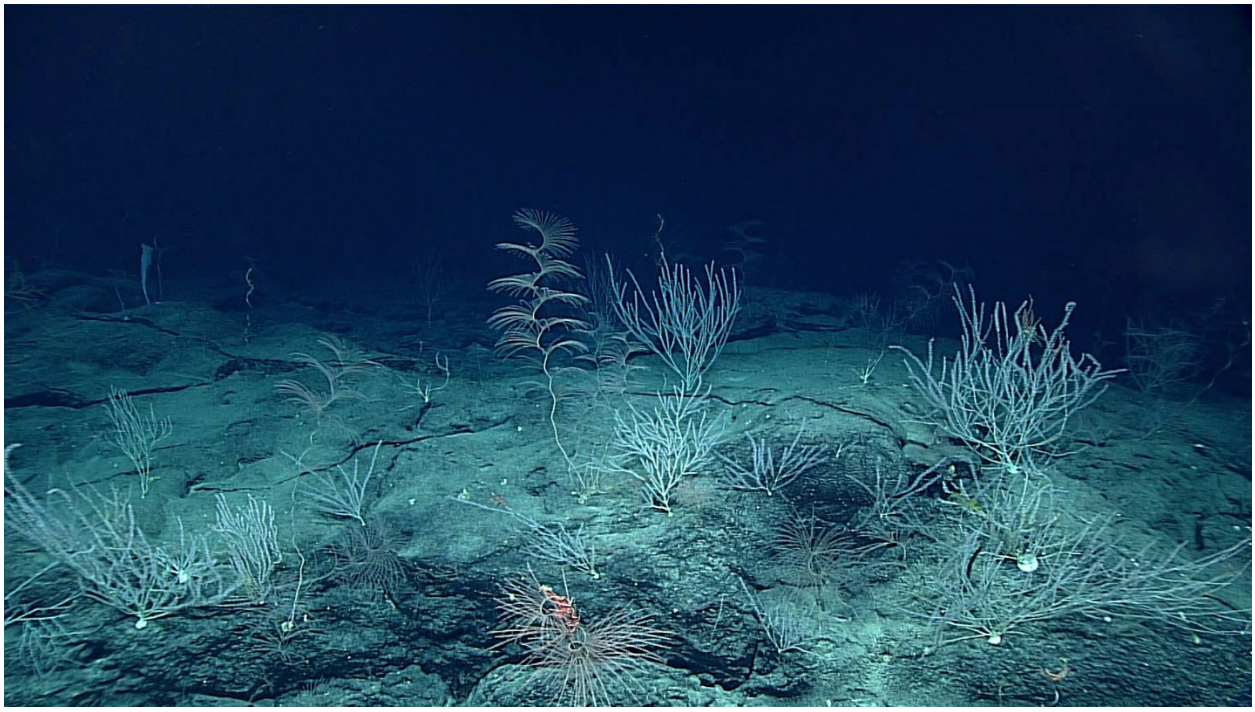

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This annex to the U.S. Pacific Islands chapter (Parrish et al. 2017) in "The State of Deep-Sea Coral and Sponge Ecosystems of the United States" provides a list of deep-sea coral taxa in the Phylum Cnidaria, Classes Anthozoa and Hydrozoa, known to occur in the U.S. waters around Guam and the Commonwealth of the Northern Mariana Islands (Figure 1). Deep-sea corals are defined as azooxanthellate, heterotrophic coral species generally occurring in waters 50 m deep or more. Details are provided on the reported depth range for each taxon (Table 1).

We have relied upon the checklist of Randall (2003) to document the presence of most azooxanthellate scleractinian corals in the region. Dr. Randall donated his coral collection of around 30,000 specimens to the Guam EPSCoR Guam Ecosystems Collaboratorium (GEC) Biorepository. Records on this list of other corals from deeper water list are based largely on new deep-sea explorations in 2016 as part of the National Oceanic and Atmospheric Administration (NOAA) **C**ampaign to **A**ddress **P**acific monument **S**cience, **T**echnology, and **O**cean **NE**eds (CAPSTONE). This Campaign was a 3-year effort from 2015 to 2017 designed to provide critical new information on the deep-water resources within the U.S. national marine monuments, sanctuaries, and adjacent deepwater areas located throughout the Pacific, including the Marianas Archipelago in 2016 (Kelley et al. 2019; Kennedy et al. 2019). NOAA conducted remotely-operated vehicle (ROV) surveys in the Mariana Archipelago in depths from 210 – 6,000 m. **Taxon identifications should be considered preliminary, as many of the taxa are derived only from video observations, and while limited collections were conducted, many of these specimens remain to be analyzed**. Taxonomic names are those currently accepted in the World Register of Marine Species (WoRMS), and are arranged by order, and alphabetically within order by suborder (if applicable), family, genus, and species. Data sources (references) listed are those principally used to establish geographic and depth distribution.

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Cover Photo: A high-density field of corals, including the spiraling *Iridogorgia magnispiralis* (center) and branching bamboo corals (family Keratoisididae) on Pigafetta Seamount. Image credit: NOAA Ocean Exploration

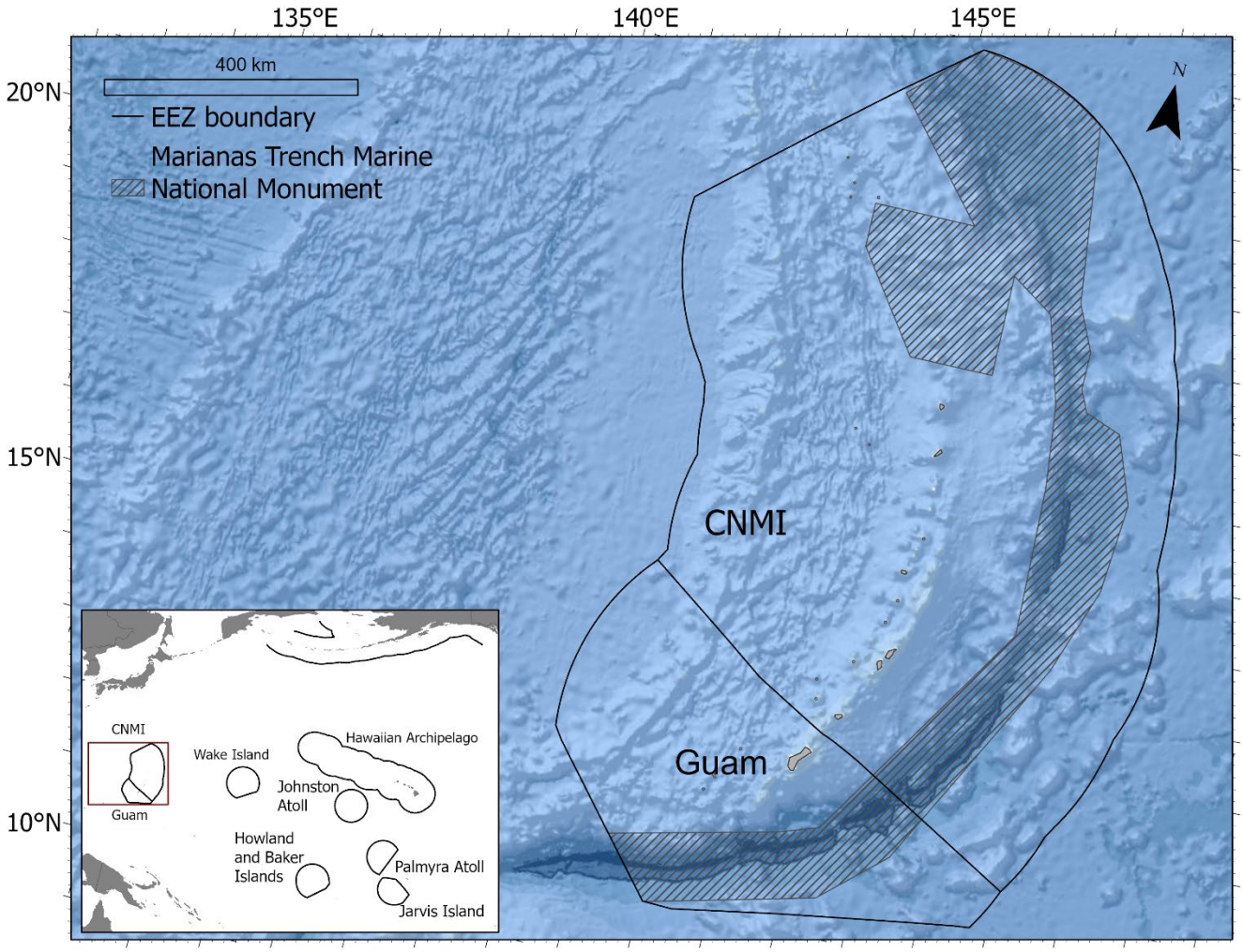

Figure 1. The U.S. exclusive economic zone (EEZ) surrounding the Mariana Archipelago in the Northwest Pacific, comprised of Guam and the Commonwealth of the Northern Mariana Islands (CNMI). The Marianas Trench Marine National Monument (shaded) is also shown.

Table 1. List of known deep-sea coral species in the Phylum Cnidaria, Class Anthozoa and Class Hydrozoa, and their reported distributions in U.S. waters of the Mariana Archipelago Region (U.S. EEZ around Guam and the Commonwealth of the Northern Mariana Islands). Blue fields indicate newly described species since 2017. "NR" indicates a lack of reported distribution or depth information. References are numbered to correspond with citations following the table, along with notes (in superscript letters) pertaining to individual taxa.

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Anthozoa Subclass Hexacorallia				
Order Antipatharia				
Family Antipathidae[a]	*Antipathes* sp. cf. *A. ceylonensis*	CNMI	124-137	1
	Antipathes sp. cf. *A. chota* Cooper, 1903	CNMI	128	1
	Antipathes sp. cf. *A. griggi* Opresko, 2009 (= *Antipathes* cf. *dichotoma* Pallas, 1766)	Guam	25-75	2
	Antipathes sp. cf. *A. flabellum* Pallas, 1766[b]	CNMI	80-130	1
	Antipathes sp. cf. *A. pseudodichotoma* Silberfeld, 1909	CNMI	146-238	1
	Antipathes sp. cf. *A. sarothrum* Pax, 1932	CNMI	80-130	1
	Antipathes sibogae (van Pesch, 1914)	CNMI	124-135	1
	Antipathes speciosa (Brook, 1889)	CNMI	37-366	1
	Cirrhipathes anguina (Dana, 1846) [c]	CNMI	15-46	1,2
	Cirrhipathes spiralis (Linnaeus, 1758)	CNMI	109-136	2
	Stichopathes sp.	Guam, CNMI	55-442	1,3
Family Aphanipathidae	*Acanthopathes cf. humilis* (Pourtalès, 1867)	CNMI	117-238	1
	Acanthopathes undulata (van Pesch, 1914)	CNMI	116-237	1,2
Family Cladopathidae	*Heteropathes* cf. *pacifica*	CNMI	1201-1336	3
	Hexapathes sp.	CNMI	419-1313	1,3
	Trissopathes sp.	Guam, CNMI	472-2249	3
Family Myriopathidae[1]	*Antipathella* sp. cf. *A. subpinnata* (Ellis & Solander, 1786)	CNMI	202	1
	Cupressopathes cf. *abies (Linnaeus, 1758)*	Guam, CNMI	317-307	3
	Myriopathes myriophylla (Pallas, 1766)	CNMI	80-130	1
	Myriopathes cf. *ulex* (Ellis & Solander, 1786)	CNMI	124-238	1,2
Family Schizopathidae	*Bathypathes patula* Brook, 1889 [d] (includes *Bathypathes seculata* Opresko, 2005)	CNMI	2181-2212	3
	***Bathypathes pseudoalternata* Molodtsova, Opresko & Wagner, 2022**[e]	CNMI	417-1809	4
	Lillipathes sp.	CNMI	2168	3
	Parantipathes sp.	CNMI	261-527[f]	3
	Schizopathes sp.	CNMI	2536-2594	3
	Stauropathes sp.	CNMI	1608-2166	3
	Umbellapathes sp.	CNMI	1714-1878	3
Family Stylopathidae	*Stylopathes* sp. cf. *S. columnaris* (Duchassaing, 1870)	CNMI	37-366	1

Higher Taxon	Species	Distribution	Depth Range (m)	References
Order Scleractinia				
Family Agariciidae	*Dactylotrochus cervicornis* (Moseley, 1880)	Guam	128-137	1,5
Family Anthemiphylliidae	*Anthemiphyllia dentata* (Alcock, 1902)	NR (Guam or CNMI)	215-1032	5,6
Family Caryophylliidae	*Anomocora* sp. cf. *A. carinata* Cairns, 1991	NR	NR	5
	Aulocyathus sp. cf. *A. recidivus* (Dennant, 1906)	NR	NR	5
	Bourneotrochus stellulatus (Cairns, 1984)	NR	210-566 g	5
	Caryophyllia (Caryophyllia) atlantica (Duncan,1873)	NR	1505-1968 g	5
	Caryophyllia sp.	Guam, CNMI	127-1944	2,3,5
	Concentrotheca sp.	NR	NR	5
	Conotrochus brunneus (Moseley, 1880) [=*Conotrochus funicolumna* (Alcock, 1902)]	NR	80-1078	5,6
	Crispatotrochus rubescens (Moseley, 1880)	NR	110-634 g	5
	Desmophyllum dianthus (Esper, 1794)	Guam	575	1,3
	Heterocyathus aequicostatus Milne Edwards & Haime, 1848	NR	0-268 g	5
	Heterocyathus alternatus Verrill, 1865	NR	0–319 g	5
	Heterocyathus sulcatus (Verrill, 1866)	NR	11-419 g	5
	Labyrinthocyathus sp.	NR	NR	5
	Paracyathus sp.	NR	NR	5
	Polycyathus sp.	CNMI	146-310	1,2
	Thalamophyllia tenuescens (Gardiner, 1899) (=*Desmophyllum tenuescens* Gardiner, 1899)	Guam	NR	1
	Trochocyathus (Trochocyathus) cooperi (Gardiner, 1905)	NR	25-124 g	5
Family Deltocyathidae	*Deltocyathus* sp.	NR	NR	5
Family Dendrophylliidae	*Balanophyllia (Balanophyllia) gigas* Moseley, 1880	NR	90-640	5,6
	Balanophyllia sp.	Guam, CNMI	124-273	1,2,3,5
	Cladopsammia eguchii (Wells, 1982)	NR	1-469 g	5
	Dendrophyllia sp.	Guam, CNMI	239-501	1,2,3,5
	Eguchipsammia sp.	CNMI	279-565	3,5
	Enallopsammia rostrata (Pourtalès, 1878) [= *Enallopsammia amphleioides* (Alcock, 1902)]	Guam, CNMI	292-1267	3,5
	Heteropsammia cochlea (Spengler, 1781)	NR	6-762 g	5
	Rhizopsammia sp.	CNMI	447	3,5

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Flabellidae	*Flabellum (Flabellum) pavoninum* Lesson, 1831	CNMI	408-475	3
	Javania sp.	NR	NR	5
	Placotrochides scaphula Alcock, 1902	NR	462-1628 [g]	5
	Polymyces wellsi Cairns, 1991	CNMI	1610	3
	Truncatoflabellum sp. cf. *T. pusillum* Cairns, 1989	NR	85-460	5,6
Fungiacyathidae	*Fungiacyathus(Bathyactis)* sp. *cf. F. (B.) turbinolioides Cairns, 1989*	NR	600-930	5,6
	Fungiacyathus (Fungiacyathus) paliferus (Alcock, 1902)	NR	67-823	5
Family Gardineriidae	*Gardineria* sp.	CNMI	124-135	2
Family Guyniidae	*Guynia annulata* Duncan, 1872	NR	28-653 [g]	5
Family Micrabaciidae	*Stephanophyllia complicata* Moseley, 1876	NR	20-1240 [g]	5
	Stephanophyllia fungulus Alcock, 1902	NR	15-653 [g]	5
	Stephanophyllia neglecta Boschma, 1923	NR	49-608 [g]	5
Family Oculinidae	*Cyathelia axillaris* (Ellis & Solander, 1786)	NR	15-366 [f]	5
	Madrepora oculata Linnaeus, 1758	Guam	576	1,3,5
	Madrepora porcellana (Moseley, 1880) (=*Neohelia porcellana* Moseley, 1880)	NR	55-757 [g]	5
Family Pocilloporidae	*Madracis asanoi* Yabe & Sugiyama, 1936	NR	107-161 [g]	5
	Madracis sp. [h]	CNMI	98-237	2
Family Rhizangiidae	*Culicia stellata* Dana, 1846 (=*Culicia japonica* Yabe & Eguchi, 1936)	NR	5-100 [g]	5
Family Turbinoliidae	*Idiotrochus kikutii* (Yabe & Eguchi, 1941)	NR	97-645 [g]	5
	Peponocyathus australiensis (Duncan, 1870)	NR	59-494 [g]	5
Order Zoantharia				
Family Parazoanthidae	*Kulamanamana haumeaae* Sinniger, Ocaña & Baco, 2013 (= *Gerardia* sp.)	Guam, CNMI	345-475	3

Class Anthozoa Subclass Octocorallia				
Order Alcyonacea				
Family Acanthogorgiidae	*Acanthogorgia* sp.	Guam, CNMI	222-599	1
	Muricella sp.	CNMI	200-298	1
Family Alcyoniidae	*Anthomastus tahinodus* d'Hondt, 1988	CNMI	1997-2015	3
	Eleutherobia sp.	CNMI	255	3
	Paraminabea sp.	CNMI	245	3
	Pseudoanthomastus sp.	Guam, CNMI	314-1927	3
Family Chrysogorgiidae	*Chrysogorgia* sp. cf. *C. averta* Pante & Watling, 2011	Guam	1161-1201	3
	Chrysogorgia sp. cf. *C. campanula* Madsen 1944	CNMI	1842	1,7

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Chrysogorgiidae cont.	*Chrysogorgia chryseis* Bayer & Stefani, 1988	CNMI	1967-2265	3
	Chrysogorgia geniculata (Wright & Studer, 1889)	Guam, CNMI	413-2252	3
	Chrysogorgia stellata Nutting, 1908	Guam, CNMI	403-1319	3
	Iridogorgia magnispiralis Watling, 2007	CNMI	1608-2032	3
	Metallogorgia melanotrichos (Wright & Studer, 1889)	CNMI	1606-2000	3
	Ramuligorgia militaris (Nutting, 1908)[i] (=*Pleurogorgia militaris* Nutting, 1908)	Guam, CNMI	1708-2533	3
	Rhodaniridogorgia sp.	CNMI	1710-1785	3
Family Clavulariidae	*Clavularia* sp.	CNMI	504-536	3
Family Coralliidae	*Hemicorallium laauense* (Bayer, 1956)	CNMI	493-641	3
	Hemicorallium sp.[j]	Guam, CNMI	1178-2256	3
	Pleurocorallium konojoi (Kishinouye, 1903)	CNMI	NR	8
	Pleurocorallium sp.	Guam	313-351	3
Ellisellidae	*Ellisella* sp.	CNMI	109-127	1
	Junceella sp.	CNMI	98-164	1
	Nicella sp.	CNMI	116-398	1,3
	Verrucella sp.	Guam, CNMI	98-227	1
	Viminella sp.	CNMI	252-288	1,3
Family Gorgoniidae	*Eunicella* sp.	CNMI	345-398	3
Family Keratoisididae[k] (Formerly Isididae, in part)	*Acanella weberi* Nutting, 1910	CNMI	1750-2034	3
	Eknomisis sp.	CNMI	1736-1766	3
	Isidella trichotoma Bayer, 1990 [=*Acanella trichotoma* (Bayer, 1990)]	CNMI	1961-2210	3
	Lepidisis sp.	Guam, CNMI	298-2956	1,3
	Orstomisis sp.	CNMI	415-457	3
Family Keroeididae	*Keroeides gracilis Whitelegge, 1897*	CNMI	98-164	1
Family Melithaeidae	*Melithaea* sp.	CNMI	109-127	1
Family Nephtheidae	*Dendronephthya* sp.	CNMI	116-146	1,8
	Scleronephthya sp.	CNMI	254-374	3
Family Paragorgiidae	*Paragorgia coralloides* Bayer, 1993	CNMI	1927-2008	3
Family Parisididae	*Parisis* sp.	CNMI	116-456	1,3
Family Plexauridae	*Astrogorgia* sp.	Guam, CNMI	24-164	1,9
	Bebryce sp.	Guam, CNMI	98-327	1
	Euplexaura sp.	CNMI	284-297	3
	Paracis sp.	Guam, CNMI	245-595	1
	Swiftia sp.	CNMI	294-481	3
	Villogorgia sp.	Guam, CNMI	98-327	1,3
Family Primnoidae	*Callogorgia gilberti* (Nutting, 1908)	CNMI	258-437	3

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Primnoidae cont.	*Callogorgia robusta* (Versluys, 1906)	Guam, CNMI	301-472	3
	Calyptrophora angularis (Nutting, 1908)	CNMI	1992-2018	3
	Calyptrophora clarki Bayer, 1951	CNMI	286	1,3,10
	Calyptrophora distolos Cairns, 2018	Guam	2994–3737	1,3,10
	Calyptrophora pileata Cairns 2009	CNMI	254-291	3
	Candidella gigantea (Wright & Studer, 1889)	CNMI	1753-2252	3
	Candidella helminthophora (Nutting, 1908)	CNMI	449	3
	Macroprimnoa ornata Cairns 2018	Guam	3066–3676	1,3,10
	Narella alata Cairns & Bayer, 2007 [2008]	Guam, CNMI	481-599	3
	Narella bowersi (Nutting, 1908)	CNMI	1936-2068	3
	Narella dichotoma (Versluys, 1906)	Guam, CNMI	1193-2181	3
	Narella hypsocalyx Cairns, 2012	CNMI	375	3
	Narella macrocalyx Cairns & Bayer, 2007 [2008]	CNMI	2181-2258	3
	Narella muzikae Cairns & Bayer, 2007 [2008]	Guam	523	3
	Narella vermifera Cairns & Bayer, 2007	CNMI	499-503	3
	Paracalyptrophora sp.	Guam, CNMI	232-549	3
	Thouarella (Euthouarella) hilgendorfi (Studer, 1879)	CNMI	285	3
Family Subergorgiidae	*Subergorgia* sp.	Guam, CNMI	24-153	1
Family Victorgorgiidae	*Victorgorgia alba* (Nutting, 1908) (= *Anthothela nuttingi* Bayer, 1956)	Guam, CNMI	373-1779	3
Order Pennatulacea[1]				
Family Anthoptilidae	*Anthoptilum* sp.	Guam, CNMI	535-1904	3
Family Kophobelemnidae	*Kophobelemnon* sp.	CNMI	461-484	3
Family Pennatulidae	*Ptilella* sp.[m]	CNMI	241-469	3
Family Umbellulidae	*Umbellula* sp.	Guam, CNMI	1609-3697	3

Higher Taxon	Species	Distribution	Depth Range (m)	References
Phylum Cnidaria Class Hydrozoa				
Order Anthoathecata				
Family Stylasteridae	*Calyptopora* sp.	CNMI	859-877	1,3
	Conopora unifacialis Cairns, 1991	CNMI	910	1,3
	Crypthelia sp.	Guam, CNMI	875-2963	3,5
	Distichopora spp.[n]	CNMI	8-375	1,2,3,5
	Errina sp.	NR	NR	5
	Lepidopora sp.	CNMI	254-344	3,5
	Lepidotheca hebetis Cairns, 2015	CNMI	287-355	3
	Stylaster sp.	Guam, CNMI	55-914	1,3,5

Notes:

a. Grigg & Eldredge (1975) also recorded a species from CNMI identified as *Antipathes tanacetum* (=*Tanacetipathes tanacetum* (Pourtalès, 1880)), however this is a Western Atlantic species.

b. WoRMS lists the status of *Antipathes flabellum* Pallas, 1766 as *nomen dubium.*

c. Although records of *Cirrhipathes anguina* (Dana, 1846*)* from the Marianas are all less than 50m deep, elsewhere in the Pacific this species has been reported to extend below 100m.

d. Horowitz et al. (2018) provide evidence that Bathypathes seculata Opresko, 2005 is the juvenile stage of Bathypathes patula Brook, 1889, thus warranting synonymization.

e. A number of black corals in the family Schizopathidae from both the Atlantic and Pacific with alternating bilateral pinnules had previously been identified as *Bathypathes alternata*. Molodtsova and Opresko (2017) redescribed Brook's species as *Alternatipathes alternata* (Brook, 1889), and indicated that it appeared to be limited to the Pacific and Indian Oceans, where it was found at depths between 2670–5089 m. Molodtsova et al. (in press) have now described the coral found predominantly at shallower depths as *Bathypathes pseudoalternata* and identified specimens from the Marianas region.

f. A different species, tentatively identified as *Parantipathes* sp. was also observed in deeper water (1323-1332 m) on Guam Seamount.

g. Randall (2003) did not include depths for these records. Depth ranges are those for these species reported elsewhere in the Pacific, principally by Kitahara and Cairns (2021) and Cairns (1994).

h. Randall (2003) also lists *Madracis* cf. *pharensis* (Heller, 1868) and three additional unidentified species, which may be zooxanthellate or azooxanthellate, as occurring in this region, but does not include depth information.

i. Cairns et al. (2021) redescribed *Pleurogorgia militaris* Nutting 1908, placing it in a new genus, *Ramuligorgia*.

j. A similar *Hemicorallium* sp. observed in the Hawaiian Archipelago was previously designated as *Hemicorallium nr. laauense* (Bayer, 1956) based on its "*H. laauense*-like" morphology, but which occurred in deeper water than *H. laauense*.

k. Saucier et al. (2021) have revised the phylogeny of the bamboo corals (formerly Isididae), resulting in five families. The bamboo corals described from Wake all appear to belong in the new family Keratoisididae.

l. Several additional taxa of pennatulaceans were observed but require collections to be identified,

m. This unidentified shallow pennatulid was originally identified as *Pennatula* sp., however it has more than a single row of autozooids and therefore belongs in the resurrected genus *Ptilella* based on García-Cárdenas et al. (2019). A single deeper observation (1246m) from the Guam area may be different species.

n. Randall (1983) lists *D. violacea* and *D. gracilis,* along with three unidentified species, but does not provide depth information. Both *D. violacea* and *D. gracilis* appear to be shallow species – the single Smithsonian record of *D. violacea* (USNM 1609221) was collected from 8m depth.

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