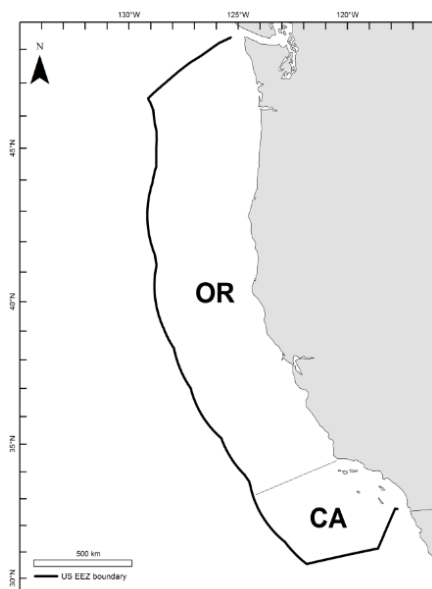


Deep-Sea Coral Taxa in the U.S. West Coast Region: Depth and Geographic Distribution (v. 2020)

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This annex to the U.S. West Coast chapter 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 U.S. waters off Washington, Oregon, and California (Figure 1). Deep-sea corals are defined as azooxanthellate, heterotrophic coral species occurring in waters 50 meters deep or more. Details are provided on the vertical and geographic extent of each species (Table 1). This list is an update of the peer-reviewed 2017 list by Whitmire et al. (2017) and includes taxa recognized through 2019. 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. Data sources (references) listed are those principally used to establish geographic and depth distribution.



Regional geographic distribution within U.S. waters is divided into two biogeographic provinces: the Oregon Province (**OR**), which extends from around the Northern tip of Vancouver Island, Canada, to around Point Arguello/Point Conception, USA; and the California Province (**CA**), which extends south from there to around Magdalena Bay, Mexico.

In summary, we have confirmed the presence of 138 unique coral taxa in U.S. waters off Washington, Oregon, and California. Octocorals were the most speciose (102 taxa total), followed by scleractinians (20 taxa), antipatharians (10 taxa), and stylasterid corals (6 species), some of these taxa unidentified to species. Four new species have been described from the region since the 2017 West Coast deep-sea coral taxa list. Two species (*Muricea californica* and *Muricea fruticosa*) that were included in the 2017 list have been removed, as it appears that they are restricted to depths shallower than 50 meters (Horvath 2019).

Figure 1. U.S. West Coast region, delimiting geographic boundaries considered in this work, divided into the Oregon Province (OR) and the California Province (CA).

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<https://deepseacoraldata.noaa.gov/library/2020-regional-deep-sea-coral-species-list>.

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 off Washington, Oregon, and California. Blue shaded fields indicate newly described species since 2017. Bold text indicates these new descriptions as well as other changes to the list found in Whitmire et al. (2017), including additions or range extensions, with new species 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). “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. Distribution: OR = records from the Oregon Province; CA = records from the California Province.

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Anthozoa				
Subclass Hexacorallia				
Order Antipatharia				
Family Antipathidae	<i>Antipathes dendrochristos</i> Opresko, 2005	OR,CA	91-427	1,2,3,4
Family Cladopathidae	<i>Chrysopathes speciosa</i> Opresko, 2003	OR,CA	225-1400	5,6
	<i>Heteropathes</i> sp. ^a (= <i>Heliopathes</i> sp.)	OR	1700-3200	6,7
	<i>Trissopathes pseudotristicha</i> Opresko, 2003	OR,CA	227-2972	5
Family Schizopathidae ^b	<i>Alternatipathes alternata</i> (Brook, 1889) (= <i>Bathypathes alternata</i> Brook, 1889)	OR	412-4881	6,7,8
	<i>Alternatipathes bipinnata</i> (Opresko, 2005) (= <i>Umbellapathes bipinnata</i> Opresko, 2005)	OR,CA	1205-1718	6,9
	<i>Alternatipathes venusta</i> Opresko & Wagner, 2020	OR	2821	6,10
	<i>Bathypathes patula</i> Brook, 1889	OR	225-4868	6
	*<i>Lillipathes quadribrachiata</i> (van Pesch, 1914)	OR	1363-1545	6
	<i>Lillipathes wingi</i> Opresko, 2005	OR	877-904	6
	<i>Parantipathes</i> sp.	OR,CA	490-2820	6

Higher Taxon	Species	Distribution	Depth Range (m)	References
Order Scleractinia				
Family Caryophylliidae	<i>Caryophyllia (Caryophyllia) arnoldi</i> Vaughan, 1900	OR,CA	40-656	11
	<i>Caryophyllia (C.) diomedea</i> Marenzeller, 1904	CA	225-2200	12,13
	<i>Caryophyllia (C.) quadragenaria</i> Alcock, 1902	CA	54-1669	11,12
	<i>Coenocyathus bowersi</i> Vaughan, 1906	OR,CA	13-708	11,14
	<i>Crispatotrochus foxi</i> (Durham & Barnard, 1952)	CA	82-272	11,15
	<i>Desmophyllum dianthus</i> (Esper, 1794)	OR,CA	37-1330	7,11,14
	<i>Labyrinthocyathus quaylei</i> (Durham, 1947)	OR,CA	37-293	11
	<i>Lophelia pertusa</i> (Linnaeus, 1758) ^c †[= <i>Desmophyllum pertusum</i> (Linnaeus, 1758)]	OR,CA	39-2775	11,14
	<i>Nomlandia californica</i> Durham & Barnard, 1952	CA	82	11,15
	<i>Paracyathus montereyensis</i> Durham, 1947	OR	75-146	11
	<i>Paracyathus stearnsii</i> Verrill, 1869	OR,CA	6-835	11,14
Family Dendrophylliidae	<i>Balanophyllia (Balanophyllia) elegans</i> Verrill, 1864	OR,CA	1-1553	11,14
	<i>Dendrophyllia oldroydae</i> Oldroyd, 1924	CA	40-576	11
Family Flabellidae	<i>Javania californica</i> Cairns, 1994	OR	62-1553	11
	<i>Polymyces montereyensis</i> (Durham, 1947)	OR,CA	69-212	6,16
Family Fungiacyathidae	<i>Fungiacyathus (Bathyactis) marenzelleri</i> (Vaughan, 1906)	OR,CA	1820-6328	11
Family Micrabaciidae	<i>Leptopenus discus</i> Moseley, 1881	OR,CA	3599-5000	11
	* <i>Leptopenus hypocoelus</i> Moseley, 1881	CA	4100	6
Family Oculinidae	<i>Madrepora oculata</i> Linnaeus, 1758	CA	84-490	6,11
	<i>Oculina profunda</i> Cairns, 1991	OR	119-578	6,11

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Anthozoa				
Subclass Octocorallia				
Order Alcyonacea				
Family Acanthogorgiidae	<i>Acanthogorgia gracillima</i> Kükenthal, 1909	CA	160	17,18
	<i>Acanthogorgia</i> sp.	OR,CA	49-2301	18,19,20
	<i>*Calcigorgia japonica</i> Dautova, 2007 ^d	OR	228	6,21
	<i>Calcigorgia spiculifera</i> Broch, 1935	OR	144-1159	20,21
	<i>Muricella complanata</i> Wright & Studer, 1889	OR	521-653	6,18,22
Family Alcyoniidae	<i>Bathyalcyon robustum</i> Versluys, 1906 (= <i>Anthomastus robustum</i>)	OR	2449-3961	7,19
	<i>Eleutherobia rubra</i> (Brundin, 1896)	OR,CA	80-905	6
	<i>Heteropolypus ritteri</i> (Nutting, 1909) (= <i>Anthomastus ritteri</i> Nutting, 1909)	OR,CA	35-3330	7,16,20,23,24
Family Anthothelidae	<i>Anthothela pacifica</i> (Kükenthal 1913)	OR,CA	201-350	17,18,25,26
Family Chrysogorgiidae	<i>Chrysogorgia monticola</i> Cairns, 2007	OR	1711-3015	27
	<i>Chrysogorgia pinnata</i> Cairns, 2007	OR	1968-3275	27
	<i>Iridogorgia</i> sp.	OR,CA	2027-2215	7,27,28
	<i>*Radicipes stonei</i> Cordeiro, Cairns & Pérez, 2017	OR	NR	9,25
Family Clavulariidae	<i>Clavularia grandiflora</i> (Nutting, 1908)	OR	593-1529	7,28
	<i>Clavularia</i> sp. A	OR	0-200	25
	<i>Clavularia</i> sp. H	CA	NR	14,29
	<i>Telesto californica</i> Kükenthal, 1913	CA	55-91	6,14
	<i>Telesto nuttingi</i> Kükenthal, 1913	CA	75-108	6,14
	<i>Telestula ambigua</i> Nutting, 1909	OR	958	24,25
Family Coralliidae	† <i>Coralliidae</i> spp. ^e	OR,CA	628-2447	19,28
	<i>*Hemicorallium regale</i> (Bayer, 1956) (= <i>Corallium regale</i>)	OR	1482	6,18
Family Gorgoniidae ^f	<i>Adelogorgia phyllosclera</i> Bayer, 1958 ^g	CA	9-595	14,17,20,30,31
	<i>Eugorgia daniana</i> Verrill, 1868 (= <i>Leptogorgia daniana</i> (Verrill, 1868))	CA	6-70	31,32
	<i>Eugorgia ljubenkovia</i> Horvath, 2019	CA	30-98	31
	<i>Eugorgia rubens</i> Verrill, 1868 (= <i>Leptogorgia rubens</i> (Verrill, 1868))	OR,CA	50-200+	14,20,31,32
	<i>Leptogorgia chilensis</i> Verrill, 1868	OR,CA	5-231	6,14,17,20,31,33
	<i>Leptogorgia filicrispa</i> Horvath, 2011	CA	20-87	31,34
	<i>Leptogorgia</i> sp. A (likely <i>L. tricolorata</i> Breedy and Cortés, 2011)	CA	36-91	31

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Isididae ^h	<i>Acanella</i> sp.	OR,CA	975-2844	7,19
	<i>Bathygorgia profunda</i> (Wright, 1885)	OR	1405	28
	<i>Isidella tentaculum</i> Etnoyer, 2008	OR,CA	720-2400	7,35
	<i>Keratoisis flabellum</i> (Nutting, 1908)	OR	1829 -2012	16
	<i>Keratoisis philippinensis</i> (Wright and Studer, 1889)	OR	1262-1463	16
	<i>Keratoisis</i> sp.	OR,CA	436-3260	7,36
	<i>Lepidisis</i> sp.	OR,CA	180-3317	6,7
Family Nephtheidae	<i>Gersemia juliepackardae</i> Williams and Lundsten, 2009	OR,CA	519-2034	37
	<i>Gersemia rubiformis</i> (Ehrenberg, 1834) (= <i>Capnella rubiformis</i> , <i>Eunephthya rubiformis</i> , <i>Alcyonium</i> sp. indet. sensu Williams 2013) ⁱ	OR	9-137	25,38
	<i>Neospongodes</i> sp.	OR	1600	16
Family Paragorgiidae	† <i>Paragorgia pacifica</i> Verrill, 1922 (= <i>Paragorgia arborea</i> var. <i>pacifica</i> (Verrill, 1922); <i>Paragorgia arborea</i> (Linnaeus, 1758) – in part – NE Pacific populations)	OR,(CA?)	18-2936	6,17,18,39 40,41
	<i>Paragorgia regalis</i> Nutting, 1912	CA	1031-1840	6,18,39
	<i>Paragorgia stephencairnsi</i> Sanchez, 2005	OR,CA	40-490	6,40,42
	<i>Paragorgia yutlinux</i> Sanchez, 2005	OR,CA	487-861	6,42
	<i>Sibogorgia californica</i> Horvath 2019	OR,CA	300-486	18
	<i>Sibogorgia cauliflora</i> Herrera, Baco & Sánchez, 2010	OR,CA	2493-3042	43
Family Plexauridae ^j	Plexaurid gen. et. sp. indet. ^k	OR	368	16
	<i>Chromoplexaura cordellbankensis</i> Williams & Breedy, 2019	OR	86-107	44
	<i>Chromoplexaura marki</i> (Kükenthal, 1913) (= <i>Euplexaura marki</i> Kükenthal, 1913)	OR,CA	9-200	4,16,17,31,38
	<i>Heterogorgia tortuosa</i> Verrill, 1868	CA	0-130	14,16
	*<i>Placogorgia</i> sp. A	CA	82-145	17,31
	<i>Psammogorgia arbuscula</i> (Verrill, 1866)	CA	64-95	16
	<i>Swiftia farallonesica</i> Williams and Breedy, 2016	OR	181-190	45,46
	<i>Swiftia kofoidi</i> (Nutting, 1909) ^l	OR,CA	91-2393	6,16,17,20,36
	<i>Swiftia pacifica</i> (Nutting, 1912) ^l	OR,(CA)	89-1245	6,17,20,36,47
	<i>Swiftia pusilla</i> (Nutting, 1909) ^m (comb. nov., Breedy and Guzmán, 2015)	CA	166-177	36,48
	<i>Swiftia simplex</i> (Nutting, 1909) (= <i>Psammogorgia simplex</i> Nutting, 1909)	OR,CA	147-2123	6,17,20,28, 36,47,49
	<i>Swiftia spauldingi</i> (Nutting, 1909)	OR	49-342	6,17,20,36,47
	<i>Swiftia torreyi</i> (Nutting, 1909) (= <i>Psammogorgia torreyi</i> Nutting, 1909)	OR,CA	30-1752	6,25,36
	†* <i>Thesea variabilis</i> (Studer 1894) (= <i>Thesea</i> sp. A ⁿ)	CA	27-200	14,36,50
	<i>Thesea</i> sp. B ⁿ	CA	27-200	14,36

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Primnoidae	† <i>Callogorgia kinoshitai</i> (Kükenthal, 1913) (= <i>Callogorgia kinoshitae</i> Kükenthal, 1913)	OR,CA	99-2189	16,36,51
	<i>Calyptrophora</i> sp. cf. of <i>C. antilla</i> Bayer, 2001	OR	1110-1763	27
	<i>Calyptrophora bayeri</i> Cairns, 2007	OR	1683	27,51
	<i>Calyptrophora laevispinosa</i> Cairns, 2007	OR	3107	27,51
	<i>Narella alaskensis</i> Cairns and Baco, 2007	CA	2192-3075	6,52
	<i>Narella bowersi</i> (Nutting, 1908)	OR	1218-2600	27
	<i>Parastenella doederleini</i> (Wright and Studer, 1889)	OR	1390-2380	51
	<i>Parastenella gymnogaster</i> Cairns, 2007	OR	1962-2773	27
	<i>Parastenella pacifica</i> Cairns, 2007	OR	1498-2086	17,27,36
	<i>Parastenella ramosa</i> (Studer, 1894)	OR,CA	619-3427	20,22,27
	<i>Plumarella longispina</i> Kinoshita, 1908	OR,CA	55-735	6,16,17,20,36
	<i>Primnoa pacifica</i> Kinoshita, 1907	OR,(CA?)°	272-279	6,20,36,51
	<i>Thouarella</i> sp. (= <i>Amphilaphis</i> sp.)	OR,CA	114-195	16,53
Family Victorgorgiidae	† <i>Victorgorgia argentea</i> (Studer, 1894) (= <i>Anthothela argentea</i> Studer, 1894)	OR,CA	490-1050	6,26
Family Xeniiidae	<i>Anthelia</i> sp.	OR	1034-1107	16
Order Pennatulacea				
Family Anthoptilidae	<i>Anthoptilum grandiflorum</i> (Verrill, 1879) (= <i>Anthoptilum thomsoni</i> Kölliker, 1880; <i>Anthoptilum simplex</i> Kölliker; <i>Benthoptilum sertum</i> Verrill, 1885)	OR,CA	72-3651	6,16,20,24,54,55
	<i>Anthoptilum lithophilum</i> Williams and Alderslade, 2011	OR,CA	669-2240	7,56
Family Funiculinidae	<i>Funiculina armata</i> (Verrill, 1879)	CA	611-1097	6,54
	<i>Funiculina parkeri</i> (Kükenthal, 1909)	OR,CA	200-1409	6,16,24
	<i>Funiculina quadrangularis</i> (Pallas, 1766)	OR,CA	763-2740	16,20
Family Halipteridae	<i>Halipterus californica</i> (Moroff, 1902) (= <i>Halipterus contorta</i> (Nutting, 1909); <i>Stachyptilum quadridentatum</i> (Nutting, 1909))	OR,CA	46-2780	6,14,16,20,24,28
	<i>Halipterus willemoesi</i> Kölliker, 1870 (= <i>Halipterus septentrionalis</i> (Nutting, 1909))	OR	75-1164	6,16,20
Family Kophobelemnidae	<i>Kophobelemnion affine</i> (Studer, 1894)	OR	2430-2710	24
	<i>Kophobelemnion hispidum</i> Nutting, 1912	OR	NR	25,54
	<i>Kophobelemnion macrospinusum</i> Thomson, 1927 ^a	OR	2434-2499	25,28
Family Pennatulidae	* <i>Pennatula murrayi</i> Kölliker, 1880	OR,CA	2453-3953	7,57
	<i>Pennatula phosphorea</i> Linnaeus, 1758 (= <i>Pennatula phosphorea</i> var. <i>californica</i> (Kükenthal, 1913); <i>Pennatula californica</i> Kükenthal 1913)	OR,CA	519-2825	6,14,16,20,24
	<i>Ptilosarcus gurneyi</i> (Gray, 1860) (= <i>Ptilosarcus quadrangularis</i> (Moroff, 1902))	OR,CA	16-475	6,14,16,20,24,54

Higher Taxon	Species	Distribution	Depth Range (m)	References
Family Protoptilidae	<i>Distichoptilum gracile</i> Verrill, 1882 (= <i>Distichoptilum verrilli</i> (Studer, 1901))	OR,CA	1881-3361	6,16,20,24
	<i>Distichoptilum rigidum</i> (Nutting, 1912) ^r (= <i>Helicoptilum rigidum</i> (Nutting, 1912))	OR	1862-1937	25,54
	<i>Protoptilum nybakkeni</i> Williams & Lipski, 2019^s	OR	2300-3975	58
Family Scleroptilidae	<i>Scleroptilum</i> sp.	OR	109	54
Family Stachyptilidae	<i>Stachyptilum superbum</i> (Studer, 1894)	OR,CA	388-1244	14,20,24
Family Umbellulidae	<i>Umbellula huxleyi</i> K�lliker, 1880	CA	914-927	6,59
	<i>Umbellula lindahli</i> K�lliker, 1875 ^t	OR,CA	41-3873	16,25,28
	<i>Umbellula magniflora</i> (K�lliker, 1880)	OR,CA	854-1084	6,24,28
Family Virgulariidae	<i>Acanthoptilum album</i> Nutting, 1909	OR	10-150	24,60
	<i>Acanthoptilum annulatum</i> Nutting, 1909	OR	146	6,16,59
	<i>Acanthoptilum gracile</i> (Gabb, 1863)	OR,CA	5-1981	20,24,60
	<i>Acanthoptilum scalpellifolium</i> Moroff, 1902	CA	11-79	6,16
	<i>Stylatula elongata</i> (Gabb, 1862)	OR,CA	2-55(820) ^r	24,54,61
	<i>Stylatula gracilis</i> (Gabb, 1862) ^u	OR,CA	50-261	24,61
	<i>Virgularia agassizi</i> Studer, 1894 (= <i>Virgularia cystiferum</i> (Nutting, 1909))	CA	30-1000	14,24
	<i>Virgularia bromleyi</i> K�lliker, 1880 (= <i>Virgularia californica</i> Pfeffer, 1886)	CA	5-90	14

Higher Taxon	Species	Distribution	Depth Range (m)	References
Class Hydrozoa				
Subclass Hydroidolina				
Order Anthoathecata				
Family Stylasteridae	<i>Errinopora pourtalesii</i> (Dall, 1884)	OR	40-658	62
	<i>Stylanthea papillosa</i> (Dall, 1884) (= <i>Stylanthea petrograpta</i> (Fisher, 1938); <i>Stylanthea porphyra</i> Fisher 1931)	OR	0-140	62
	<i>Stylaster californicus</i> (Verrill, 1866)	OR,CA	4-126	16,28,63
	<i>Stylaster parageus columbiensis</i> Cairns and Linder, 2011	OR	246-285	62
	<i>Stylaster venustus</i> (Verrill, 1870)	OR	10-108	62
	<i>Stylaster verrillii</i> (Dall, 1884)	OR	21-393	62

Notes

- a. Two specimens in the National Museum of Natural History – identified as: *Heteropathes cf. pacifica* USNM 1234550, and *Heteropathes* sp. USNM 1234539. Also an image of *Heteropathes* sp. not *H. pacifica*: *Heteropathes* (Opresko DM, 2011). The Deep-Sea Guide (DSG). Monterey Bay Aquarium Research Institute (MBARI). Consulted on: 2019-07-03.
- b. Black corals identified as belonging to the genera *Bathypathes*, *Lillipathes*, *Parantipathes*, and *Umbellapathes* have also been observed off S. California (CA province), but have not been identified to species. L. Lundsten (pers. com.).
- 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, we have retained given *Lophelia pertusa* given the broad recognition of, and extensive literature on, this species under the traditional name.
- d. A specimen collected in Olympic Coast National Marine Sanctuary was initially identified as *Calcigorgia beringi* (included in Whitmire et al. 2017), this was subsequently identified as *C. japonica* by Matsumoto et al. 2019, with *C. beringi* restricted to the Aleutian Islands.
- e. Colonies of unidentified coralliids have been observed in both the Californian and Oregonian provinces. In the previous list these were designated as *Corallium* sp., however, with the resurrection of two additional genera in this family, the family name appears to be more appropriate at this time. Horvath (2019, Part 1) identified one specimen from the Santa Barbara Museum of Natural History (SBMNH) collected in the Channel Islands as likely to be *Hemicorallium ducale* (Bayer, 1955). *Hemicorallium imperiale* (Bayer, 1955) and *H. ducale* have both been collected from Fiberling Guyot, west of the Channel Islands, but outside the U.S. EEZ, and so are likely to also occur within U.S. waters.
- f. Gorgoniidae: In addition to the species listed here, two additional gorgoniid species, *Leptogorgia diffusa* (Verrill, 1868) and *Leptogorgia flexilis* (Verrill, 1868), are found in the Southern California Bight, but appear to be limited to depths shallower than 50 m (Horvath 2019, Part II).
- g. Breedy and Guzman have suggested that the genus *Adelogorgia* be placed in the Family Plexauridae, rather than Gorgoniidae. This revision has not been incorporated in WoRMS.

- h. Isididae: Specimens identified as *Keratoisis* sp. were also observed and collected from Southern California (CA province; NMNH Invertebrate Zoology Collections; SBMNH Invertebrate Zoology Online Collections), but not identified to species.
- i. *Gersemia rubiformis* (Ehrenberg, 1834) was identified by Williams (2013) as belonging in the family Alcyoniidae, genus *Alcyonium*. This change has not yet been reflected in WoRMS, and here we have retained *G. rubiformis*. Ref: Williams GC (2013) New taxa and revisionary systematics of alcyonacean octocorals from the Pacific coast of North America (Cnidaria, Anthozoa). ZooKeys: 15-42. Recent genetic studies (Everett, in prep.) including both molecular barcoding and genotyping by sequencing suggest that individuals identified as *G. rubiformis* in the Northeast Pacific may represent as many as three separate species from both *Gersemia* and *Alcyonium*.
- j. Plexauridae: There remains significant uncertainty over the species listed currently listed under the genera *Swiftia* and *Thesea* (reviewed by Horvath 2019, Part III). In addition to the species listed here, two plexaurid species from the Southern California Bight appear to be limited to depths shallower than 50 m. These include *Muricea californica* Aurivillius, 1931, *Muricea fruticosa* Verrill, 1868.
- k. Plexaurid gen. et. sp. indet. is based on a single specimen at California Academy of Sciences, originally identified as *Echinogorgia* sp. More recently, Gary Williams (CAS) described the specimen as “significantly different than other members of *Echinogorgia*, which is an Indo-Pacific genus” (G. Williams, pers. comm.).
- l. *Swiftia kofoidi* (Nutting, 1909) and *Swiftia pacifica* (Nutting, 1912) are related species that exhibit geographic transitional morphology around Pt. Conception, CA, with most specimens identified as *S. kofoidi* collected from the southern end of the region (especially the CA province), while *S. pacifica* appears most often to the north with a distribution that extends to Alaska (Horvath 2019, Part III).
- m. Type material for *Swiftia pusilla* is limited and in poor condition. Its status as a separate species and placement in the genus *Swiftia* may be problematic. See discussion in Horvath (2019, Part III).
- n. Additional work is needed to determine if *Thesea* sp. A and *Thesea* sp. B represent different species (Horvath 2019, Part III).
- o. One specimen of *Primnoa pacifica* (USNM 57557) listed as collected off La Jolla, CA in 1904.
- p. *Stylatula elongata* is primarily a shallow-water species, with almost all records < 50 m. The depth record of 820 m appears to be based on a single specimen (CAS-IZ 131632) and may be in error.
- q. The MBARI deep-sea guide identifies *Kophobelemnon biflorum* Pasternak, 1960 as a synonym for *Kophobelemnon macrospinosum* Thomson, 1927.
- r. WoRMS identifies *Distichoptilum rigidum* (Nutting, 1912) as a nomen dubium.
- s. The 2017 list included records of an unidentified *Protoptilum* sp. in several collections. This may or may not be the same as the newly described species.
- t. The 2017 list synonymized *Umbellula lindahli* Kölliker, 1875 and the Southern Ocean *Umbellula carpenteri* Kölliker, 1880 based on Broch (1958). Subsequent examination and genetic analysis by Dolan 2008 suggests that these are separate species. A single record of *U. carpenter* was reported from Monterey Canyon, but its identity has not been subsequently confirmed.
- u. Williams and Matsumoto (2015) reviewed the genus *Stylatula*. They indicated that *Stylatula elongata* and *S. gracilis* may represent the same species, or, if valid, *S. gracilis* may only occur from the southern tip of Baja California to Panama.

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