

Extent and reproduction of coastal species on plastic debris in the North Pacific Subtropical Gyre

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Supplementary Table 1. Frequency (% of biofouled debris) and life history characteristics of observed coastal and pelagic taxa.

Column labels are defined as follows: Phylum = phylum name; Taxon = species or taxon name; Frequency = percentage of biofouled debris on which the taxon was observed; Mobility (sessile or mobile); Reproduction (sexual or asexual); Fertilization (internal or external); Development (direct, planktonic = lecithotrophic or planktotrophic planktonic); Trophic Level (omnivore, detritivore, herbivore, carnivore); Feeding Mechanism (surface feeder, deposit feeder, filter feeder, suspension feeder, predator).

Phylum	Taxon	Frequency	Adult Mobility	Reproduction	Fertilization	Larval Development	Trophic Position	Feeding Mechanism	References
Coastal Taxa									
Arthropoda	<i>Stenothoe gallensis</i>	36.90%	Mobile	Sexual	Internal	Direct	Omnivore	Grazer	JTMD NEMESIS [42]; Ambrose and Anderson 1990 [67]
Cnidaria	<i>Aglaophenia</i> aff. <i>pluma</i>	25.20%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	Svoboda & Cornelius 1991 [68]; Choong et al. 2018 [30]
Arthropoda	<i>Ianiropsis serricaudis</i>	24.30%	Mobile	Sexual	Internal	Direct	Omnivore	Grazer	JTMD NEMESIS [42]
Arthropoda	<i>Calliopius pacificus</i>	19.40%	Mobile	Sexual	Internal	Direct	Carnivore	Predator	Macdonald et al. 2010 [69]
Bryozoa	<i>Aetea</i> sp. A	17.50%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [AETEA] [42]; Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Arthropoda	<i>Elasmopus rapax</i>	14.60%	Mobile	Sexual	Internal	Direct	Detritivore	Grazer	Ambrose and Anderson 1990 [67]; Ferreira et al. 2019 [72]
Cnidaria	<i>Anthopleura</i> sp. A	12.60%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Carnivore	Suspension feeder/Predator	Bocharova & Kozevich 2011 [ANTHOZOA] [73]
Cnidaria	<i>Anthopleura</i> sp. B	8.70%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Carnivore	Suspension feeder/Predator	Bocharova & Kozevich 2011 [ANTHOZOA] [73]
Cnidaria	<i>Diadumene lineata</i>	7.80%	Sessile	Sexual/Asexual	External	Planktonic	Carnivore	Suspension feeder/Predator	JTMD NEMESIS [42]
Annelida	<i>Spirorbidae</i> sp.	7.80%	Sessile	Sexual	Internal	Planktonic	Omnivore	Suspension feeder	Terlizzi et al. 2000 [74]
Cnidaria	<i>Anemonia erythraea</i>	5.80%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Carnivore	Suspension feeder/Predator	Bocharova & Kozevich 2011 [ANTHOZOA] [73]
Bryozoa	<i>Scruparia ambigua</i>	3.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Cnidaria	<i>Clytia hemisphaerica</i>	2.90%	Sessile	Sexual/Asexual	External	Planktonic	Omnivore	Suspension feeder	Cornelius 1982 [29]; Choong et al. 2018 [30]; Takeda et al. 2018 [75]
Arthropoda	<i>Endeis nodosa</i>	2.90%	Sessile	Sexual	Internal	Benthic	Carnivore	Predator	JTMD NEMESIS [42]
Porifera	<i>?Haliclona</i> sp.	2.90%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Omnivore	Filter feeder	Maldodano & Riesgo 2008 [PORIFERA] [76]
Annelida	<i>Hydroides</i> sp. cf. <i>ezoensis</i>	2.90%	Sessile	Sexual	External	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [42]
Cnidaria	<i>Anthopleura</i> sp. D	1.90%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Carnivore	Suspension feeder/Predator	Bocharova & Kozevich 2011 [ANTHOZOA] [73]
Bryozoa	<i>Catenicella</i> sp.	1.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Bryozoa	<i>Crisia</i> sp.	1.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Bryozoa	<i>Disporella</i> sp.	1.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Arthropoda	<i>Jassa marmorata</i>	1.90%	Mobile	Sexual	Internal	Direct	Omnivore	Suspension feeder/Predator	JTMD NEMESIS [42]
Cnidaria	<i>Plumularia strictocarpa</i>	1.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder/Predator	Hirohito 1995 [77]; Kolzoff 1990 [PLUMULARIA] [79]; JTMD NEMESIS [PLUMULARIA] [42]
Annelida	<i>Nereididae</i> sp.	1.90%	Mobile	Sexual	External	Planktonic	Omnivore	Grazer/Predator	JTMD NEMESIS [NEREIDIDAE] [42]
Bryozoa	<i>?Tubulipora</i> sp.	1.90%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [42]; Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Bryozoa	<i>Aetea anguina</i> ?	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [AETEA] [42]
Bryozoa	<i>Aetea</i> sp. B	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [AETEA] [42]
Bryozoa	<i>Amathia gracilis</i>	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]; Reed 1988 [79]
Arthropoda	<i>Amphilocheidae</i> sp.	1.00%	Mobile	Sexual	Internal	Direct	Omnivore	Grazer/Predator	Guerra-García et al. 2014 [AMPHILOCHIDAE] [80]
Cnidaria	<i>Antennella secundaria</i>	1.00%	Sessile	Sexual/Asexual	Internal	Direct	Omnivore	Suspension feeder	Hirohito 1995 [77]
Bryozoa	<i>Bugula tsunamiensis</i>	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Bryozoa	<i>Callaetea</i> sp.	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]
Mollusca	<i>Crassostrea gigas</i>	1.00%	Sessile	Sexual	External	Planktonic	Omnivore	Filter feeder	JTMD NEMESIS [42]
Bryozoa	<i>Cryptosula pallasiana</i>	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [CRYPTOSULA] [42]
Mollusca	<i>Musculus cupreus</i>	1.00%	Sessile	Sexual	Internal	Direct	Omnivore	Filter feeder	JTMD NEMESIS [42]
Porifera	<i>?Leucosalenia</i> sp.	1.00%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Omnivore	Filter feeder	Maldodano & Riesgo 2008 [PORIFERA] [76]
Porifera	<i>?Sycon</i> sp.	1.00%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Omnivore	Filter feeder	Maldodano & Riesgo 2008 [PORIFERA] [76]
Porifera	<i>?Halichondria</i> sp.	1.00%	Sessile	Sexual/Asexual	Internal/External	Planktonic	Omnivore	Filter feeder	Maldodano & Riesgo 2008 [PORIFERA] [76]
Pelagic Taxa									
Bryozoa	<i>Jellyella</i> spp.	75.70%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]; Taylor & Monks 1997 [81]
Arthropoda	<i>Lepas</i> spp.	65.00%	Sessile	Sexual	Internal	Planktonic	Omnivore	Suspension feeder/Predator	Howard & Scott 1959 [82]; Patel 1959 [83]; Bieri 1966 [84]; Moyse 1987 [85]
Arthropoda	<i>Planes</i> spp.	40.80%	Mobile	Sexual	Internal	Planktonic	Omnivore	Grazer/Predator	Frick et al. 2011 [44]
Arthropoda	<i>Caprella andreae</i>	25.20%	Mobile	Sexual	Internal	Direct	Omnivore	Grazer/Predator	JTMD NEMESIS [CAPRELLA] [42]
Cnidaria	<i>Obelia griffini</i>	25.20%	Sessile	Sexual/Asexual	Internal	Planktonic	Omnivore	Suspension feeder	JTMD NEMESIS [42]
Arthropoda	<i>Plagusia</i> sp.	7.80%	Mobile	Sexual	Internal	Planktonic	Omnivore	Grazer/Predator	Frick et al. 2011 [44]
Annelida	<i>Amphinome rostrata</i>	2.90%	Mobile	Sexual	Internal/External	Planktonic	Carnivore	Predator	Donlan & Nelson 2003 [1]
Mollusca	<i>Fiona pinnata</i>	1.90%	Mobile	Sexual	Internal	Planktonic	Carnivore	Predator	Bieri 1966 [84]; Holleman 1972 [86]; Trickey 2013 [87]
Bryozoa	<i>Arbopercula angulata</i>	1.00%	Sessile	Sexual/Asexual	Internal	Planktonic	Herbivore	Suspension feeder	Bock 1982 [BRYOZOA] [70]; Weaver et al. 2018 [BRYOZOA] [71]

Supplementary Table 2. Biogeography and taxonomy of rafted taxa.

Column labels are defined as follows: Taxon = species or taxon name (+, not found on JTMD); Probable Biogeographic Origin of Rafting Populations = Biogeographic region where taxa is native (NWP = Northwest Pacific Ocean; NEP = Northeast Pacific Ocean; SIO = Southern Indian Ocean; * = presumptive origin, see Methods); Notes and References = General notes about taxa and literature references (JTMD = Japanese tsunami marine debris)

Taxon	Probable Biogeographic Origin of Rafting Populations	Notes and References
PORIFERA (sponges)		
? <i>Haliclona</i> sp. A	*NWP	Mat-forming white encrusting species.
? <i>Leucosolenia</i> sp.	*NWP	<i>Leucosolenia eleanor</i> Urban, 1906 on JTMD [88]; white, branching, encrusting. Amphipacific.
? <i>Sycon</i> sp.	*NWP	<i>Sycon</i> spp. on JTMD [88]. Erect white vase sponge. Amphipacific taxa.
? <i>Halichondria</i> sp.	*NWP	<i>Halichondria</i> spp. on JTMD [88]. Yellow and orange encrusting mat. Amphipacific taxa.
CNIDARIA (hydroids and sea anemones)		
<i>Aglaophenia</i> aff. <i>pluma</i>	NWP	On JTMD [22]; NEP records require confirmation [32].
<i>Plumularia strictocarpa</i>	NWP	<i>Plumularia</i> spp. on JTMD [88]. <i>P. strictocarpa</i> can be difficult to distinguish from <i>P. setacea</i> without gonothecae. Distribution in North Atlantic associated with pelagic <i>Sargassum</i> . Reported from Japan [80].
<i>Clytia hemisphaerica</i>	*NWP	On JTMD [22]. May be a species complex. Amphipacific taxa.
+ <i>Antennella secundaria</i>	NWP	Not found on JTMD [22, 80]
<i>Diadumene lineata</i>	NWP	On JTMD [22, 89]. Introduced to NEP.
<i>Anthopleura</i> sp. A	NWP	Molecular and morphological study suggest affinities to Northwest Pacific <i>Anthopleura</i> sp. Clade J as described in Daly et al. (2017) [90]. Does not match any known NEP anemone. Black/purple body with vertical lines of white verrucae on column.
<i>Anthopleura</i> sp. B	NWP	Molecular and morphological study suggest affinities to Northwest Pacific <i>Anthopleura</i> sp. Clade J as described in Daly et al. (2017) [90]. Does not match any known NEP anemone. Tan with vertical lines of grey/purple verrucae along column. Morphology matches <i>Anthopleura</i> on JTMD [22].
+ <i>Anemonia erythraea</i>	NWP/SIO	Molecular data attribute this species to <i>Anemonia erythraea</i> in Clade SA with origins in the Southern Indian Ocean as described in Daly et al. (2017) [90]. However, <i>A. erythraea</i> is also described from Japan [91]. Smooth, tan body column lacking prominent verrucae found in <i>Anthopleura</i> sp. A and <i>Anthopleura</i> sp. B.
<i>Anthopleura</i> sp. D	NWP	Molecular and morphological study suggest affinities to Northwest Pacific <i>Anthopleura</i> sp. Clades J and A as described in Daly et al. (2017) [90]. A large anemone with mottled brown column lacking prominent verrucae found in <i>Anthopleura</i> sp. A and <i>Anthopleura</i> sp. B; white stripes along pedal disc.
ANNELIDA (polychaete worms)		
Spirorbidae sp.	*NWP	On JTMD [22]
<i>Hydroides</i> sp. cf. <i>ezoensis</i>	NWP	On JTMD [22]
Nereididae sp.	*NWP	Family represented on JTMD [22]
ARTHROPODA (crustaceans and sea spiders)		
<i>Stenothoe gallensis</i>	NWP	On JTMD as <i>Stenothoe crenulata</i> -complex [22, 92].
+ <i>Elasmopus rapax</i>	NWP	Not found on JTMD [22, 92]. Introduced to NEP.
<i>Jassa marmorata</i>	NWP	On JTMD [22]. North Atlantic native, introduced to NEP.
<i>Calliopius pacificus</i>	*NWP	On JTMD (Carlton, unpublished). Equal antennae. No telson. Amphipacific taxa.
+Amphilochidae sp.	*NWP	Not found on JTMD [22]. Equal, short antennae. Rounded telson. Amphipacific taxa.
<i>Ianiropsis serricaudis</i>	NWP	On JTMD [22]. Introduced to NEP [94].
<i>Endeis nodosa</i>	NWP	On JTMD [22, 94]. Adults; juvenile <i>Endeis</i> sp. also present.
MOLLUSCA (bivalves)		
<i>Crassostrea gigas</i>	NWP	On JTMD [22]. Introduced to NEP.
<i>Musculus cupreus</i>	NWP	On JTMD [22]
BRYOZOA		
<i>Crisia</i> sp.	NWP	<i>Crisia</i> spp. on JTMD [22, 95]
<i>Disporella</i> sp.	*NWP	<i>Disporella</i> cf. <i>novaehollandiae</i> on JTMD [22, 95]
? <i>Tubulipora</i> sp.	NWP	<i>Tubulipora</i> spp. on JTMD [22, 95]
<i>Scruparia ambigua</i>	NWP	On JTMD [22, 95]
<i>Catenicella</i> sp.	NWP	On JTMD [22, 95]
+ <i>Aetea</i> sp. A	*NWP	A corrugated stalk <i>Aetea</i> not found on JTMD [22, 95]
+ <i>Aetea</i> sp. B	*NWP	Not found on JTMD [22, 95]. NWP Aetidae are poorly known (a previously undetected genus in the NWP, <i>Callaetea</i> , being discovered on JTMD). <i>Aetea</i> sp. B appears reminiscent of NEP <i>A. pseudoanguina</i> [96], but our material consists of only 3 zooids.
<i>Aetea anguina</i>	NWP	On JTMD [22, 95]
<i>Callaetea</i> sp.	NWP	On JTMD, apparently an undescribed species [22, 95]
<i>Bugula tsunamensis</i>	NWP	On JTMD [22, 95]
<i>Cryptosula pallasiana</i>	NWP	On JTMD [22, 95] Introduced to NEP.
+ <i>Amathia gracilis</i>	*NWP	(= <i>Bowerbankia gracilis</i>). Not found on JTMD [22, 95]

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