

FAUNA : INVERTEBRATES

Porifera – Sponges

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The state of Porifera in Singapore

There are some 250 distinct sponge species that has been documented across various habitats, including man-made structures, inter-tidal flats, coral reefs, deep seafloor at 200 m depths in the “Singapore Deeps” over the last three decades (see Hooper et al., 2000; Lim & Tan, 2008; De Voogd & Cleary, 2009; Lim et al., 2008 and 2009; Lim et al., 2012). Among these species, 131 species are included in this edition of the Singapore Red Data Book while the remaining half could only be determined to genus level and distinct Operational taxonomic unit (OTU), and hence are excluded from the list. Further taxonomic studies and revisions are required to clarify the systematics before they can be named with certainty. Nevertheless, this list serves as a crucial baseline of sponge biodiversity fauna that could inform us of changes of the fauna due to environmental factors in the future.

Notably, most of these species were recorded after large-scale land reclamations began in the 1960s. Most of these species seem to be well adapted to turbid and sedimented environments. Sponge species which are sensitive to sediments could have disappeared from Singapore waters during the decades of land reclamations before they were recorded. In this current Red List, only the Neptune’s Cup Sponge (*Cliona patera*) is classified as Critically Endangered (CR: D). Historical records from 200 years ago, as documented by John Crawford, the second British Resident of Singapore, depict its once-abundant presence in Singaporean waters (see Crawford, 1830).

However, there had been no record of the sponge in Singapore waters since 1908 (Hanitsch, 1908) for over a hundred years, until its recent rediscovery (Lim et al., 2012). The reasons for the disappearance were unknown but the reclamations of Telok Ayer Bay in 1887 and Telok Ayer Basin in the early 1900s probably played a part to their demise as sponges are sessile and filter-feeding animals which are adversely affected by increased sediment load in the environment. Unfortunately, only a few sponge species were recorded prior to these major changes in the environment, limiting our understanding. The comprehensive information presented in this edition of the Singapore Red Data Book would help better inform us of changes in sponge fauna in response to environmental shifts.

Scientific Name:

Cliona patera
(Hardwicke, 1820)

Common Name:

Neptune's Cup Sponge

Order/Family:

Clionaida/Clionaidae

National Status: Critically Endangered (CR)

Habitat and Ecology: *Cliona patera* is the largest sponge species in Singapore waters that can grow over 1 m in diameter and height. It has a bowl/wine-glass shaped upper body supported by a stalk with rooting processes that anchor the sponge to the seafloor with sandy and coral rubble substrate at around 10–30 m depth in Singapore waters.

Distribution: In Singapore, this species is restricted to the waters off several islands in the Singapore Strait. It has also been reported in the waters of Thailand, Cambodia, and waters off Darwin (Australia).

Threats: Habitat loss and modification, sedimentation, and predation by turtles.

Scientific Interest and Potential Value: *Cliona patera*, also widely known as the Neptune's Cup Sponge, was the one of the first animals described in

Photo: Karenne Tun



Singapore over two centuries ago. The sponge was abundant in Singapore waters according to the second British Resident of Singapore, John Crawfurd, when he was holding office in 1823–26 (Crawfurd, 1830). The sponge was very popular in the past; almost every major natural history museum in the Europe has at least one specimen of the sponge. However, there had been no record of the sponge in Singapore waters since 1908 (Hanitsch, 1908) for over a hundred years until it was rediscovered in 2011 (Lim et al., 2012).

Conservation Measures: A few individuals have been transplanted to the Sisters' Islands Marine Park for protection under maritime and conservation regulations, and they are being monitored regularly.

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Cnidaria (non-Scleractinia)

YAP WEI LIANG NICHOLAS, OH REN MIN, IFFAH IESA

Scientific Name:

Synpeachia temasek Yap, Fautin, Ramos & Tan, 2014

Common Name:

Brown Peachia Anemone

Family:

Haloclavidae Verrill, 1899

National Status: Critically Endangered (CR)

Habitat and Ecology: A burrowing species that is encountered at the lower intertidal to subtidal zones of sandy shores. Because *S. temasek* has only ever been sighted and collected between evening and dawn, it is inferred to be nocturnal. During this time, the animal will extend itself from the substratum to presumably feed; when disturbed, it quickly retracts into the substratum. The larvae of *S. temasek* was inferred to be a parasite of the hydrozoan jellyfish, *Aequorea* sp.

Distribution: This is a rare species, encountered along the northern coastlines of Singapore and one locality in the Singapore Strait i.e. (Cyrene Reef). Globally, it has not been encountered anywhere else.

Threats: Habitat loss and modification, oil spills and extraction from its habitat.

Photo: Ria Tan



Scientific Interest and Potential Value: Due to the presence of a hand-shaped structure near the animal's mouth, and based on reports on closely related species (e.g., *Metapeachia* sp.), the larva of *S. temasek* is thought to be a parasite on jellyfish. Targeted research is needed to confirm this inference, and if true, to understand the impacts of this parasitic relationship on Singapore's marine ecosystem.

Conservation Measures: None have been undertaken yet. This species has not been sighted at its type locality (Changi Beach) since the publication of its formal description in 2014.

Scientific Name:

Cryptodendrum adhaesivum Klunzinger, 1877

Common Name:

Pizza Anemone

Family:

Thalassianthidae Milne Edwards & Haime, 1851

Photo: Yap Wei Liang Nicholas



National Status: Critically Endangered (CR)

Habitat and Ecology: Found at the lower intertidal to subtidal, individuals are tightly attached to narrow, rocky crevices of coral reefs and their fringes. While observations from elsewhere (i.e., Red Sea and Thailand) have reported *C. adhaesivum* to be symbiotically associated with clownfish and anemone shrimps, such relationships with the former were not observed in individuals from Singapore. *Cryptodendrum adhaesivum* harbors dinoflagellates in its tissues.

Distribution: This species is found throughout the Indo-West Pacific: from the Red Sea to Indian Ocean, along

the South China Sea from Australia to Japan, and in French Polynesia.

Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills, warming and extraction.

Scientific Interest and Potential Value: The neurotoxins produced by this species have been the target of pharmacological research elsewhere in the world.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:
Pelocoetes exul
(Annandale, 1907)

Common Name:
Branched Tentacle
Mangrove Anemone

Family:
Haliactiidae Carlgren, 1949

National Status: Critically Endangered (CR)

Habitat and Ecology: Found exclusively in the mangroves. While this species was encountered in mangroves along the northern coastline of mainland Singapore, it was not encountered in similar habitats around Pulau Ubin. Furthermore, *P. exul* does not appear to occur in mangroves of the Singapore Straits. This species burrows in the soft mud, with a preference to be positioned vertically as it extends out of the mud. It is rarely encountered during the day, only extending out of the soft substratum at night. When disturbed, it fires thread-like structures known as 'acontia' that are loaded with stings to defend itself. This species does not harbor dinoflagellates in its tissue.

Distribution: Apart from Singapore, *P. exul* has only been reported from the West and East coasts of India.

Photo: Ria Tan



Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills, invasive displacement.

Scientific Interest and Potential Value: Not known.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:

Stichodactyla mertensii
Brandt, 1835

Common Name:

Merten's Carpet Anemone

Family:

Stichodactylidae Andres, 1883

National Status: Endangered (EN)

Habitat and Ecology: *Stichodactyla mertensii* inhabits the sandy benthos near coral reefs and is typically attached to a rock underneath the substratum. It is a symbiotic host to dinoflagellates, anemone fishes and shrimps. While up to eight species of anemone fishes have been reported to be associated with *S. mertensii* elsewhere, within the context of Singapore, only its relationship with *Amphiprion ocellaris* has been reported.

Distribution: This species has an extensive distribution, spanning across the Indo-West Pacific from the Pacific Islands in the East to the Comoro Islands at the West.

Photo: Yap Wei Liang Nicholas



Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills, warming and extraction.

Scientific Interest and Potential Value: Not known.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:

Heteractis doreensis
(Quoy & Gaimard, 1833)

Common Name:

Snaky Anemone,
Long Tentacle Anemone

Family:

Heteractidae Andres, 1883

National Status: Endangered (EN)

Habitat and Ecology: This species is often encountered in soft, sandy sediments or gravel benthos, with its pedal disc attached to a buried coral fragment or rock underneath the substratum. It is symbiotically associated with dinoflagellates, anemone fishes and shrimps. Elsewhere, up to four species of anemone fishes have been reported to inhabit *H. doreensis*, but in Singapore this relationship has not been observed.

Photo: Yap Wei Liang Nicholas



Distribution: This species occurs in across the Indo-West Pacific: from the south of Japan to the Great Barrier Reef, and along the eastern Indian Ocean.

Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills, warming, and extraction.

Scientific Interest and Potential Value: *Heteractis doreensis* is often marketed and sold to marine aqua hobbyists under the name 'Long Tentacle Anemone'.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:
Heteranthus verruculatus
Klunzinger, 1877

Common Name:
Sand Anemone

Family:
Heteranthidae Carlgren,
1900

National Status: Vulnerable (VU)

Habitat and Ecology: This species exists as two eco-morphotypes: as large, solitary individuals, or as small, clustering clonal ones. Those of the former eco-morphotype tend to be found in deep, rocky crevices, while those of the latter are mostly found extending from sandy substratum (e.g., seagrass meadows; typically found on the roots of seagrass). Clonal individuals reproduce by longitudinal fission; larger solitary individuals are inferred to reproduce sexually. Harbours dinoflagellates in its tissues.

Distribution: This species is distributed widely outside of Singapore: across the Indo-Pacific: from Hawaii, the Indian Ocean to the Red Sea. It is unclear how abundant they may be in these areas; in Singapore

Photo: Yap Wei Liang Nicholas



their distribution is patchy, only occurring in less than five sites along the Singapore Strait.

Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills and warming.

Scientific Interest and Potential Value: Not known.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:

Anthopleura buddemeieri
Fautin, 2005

Common Name:

Pink-spotted Bead Anemone

Family:

Actiniidae Rafinesque, 1815

National Status: Endangered (EN)

Habitat and Ecology: These are attached underneath rocks or in rocky crevices, at very high intertidal zones where it is drier, unusual for a soft-bodied animal that needs to stay moist. Although many individuals are encountered at a locality, they are not densely clustered. Areas where they are found are typically near root runoff from a terrestrial forest; rocks to which they are attached are reddish and clay-like, as with crevices. Inferred to reproduce sexually only, there is presently no evidence to support that it reproduces asexually or that it broods its young. Not associated with dinoflagellates.

Distribution: This species has also been encountered in Papua New Guinea, Fiji and Australia's eastern coastline. Singapore is the westernmost region where this species has been found to occur.

Photo: Yap Wei Liang Nicholas



Threats: Habitat loss and modification and oil spills.

Scientific Interest and Potential Value: Not known.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:

Radianthus crista
(Hemprich & Ehrenberg in
Ehrenberg, 1834)

Common Name:

Leathery Anemone

Family:

Stichodactylidae Andres,
1883

Photo: Yap Wei Liang Nicholas



National Status: Endangered (EN)

Habitat and Ecology: This species is found in rocky crevices of coral reefs, or in soft, sandy sediment with its column buried underneath the substratum. *Radianthus crista* is also found among hard coral thickets (e.g., those of *Acropora* sp.), with its pedal disc usually attached to a coral branch or rubble. It harbors dinoflagellate in its tissues and has been reported to be the host of over 14 species of anemonefishes elsewhere, although the ones in Singapore are rarely found to be associated with any.

Distribution: *Radianthus crista* can be found across the Indo-West Pacific, from the Red Sea to the French Polynesian islands.

Threats: Habitat loss and modification, declining water quality, sedimentation, oil spills, and warming.

Scientific Interest and Potential Value: Like *C. adhaesivum*, the neurotoxins produced by this species have been subjected to many pharmacological studies.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

Scientific Name:
Phyllorhiza punctata
von Lendenfeld, 1884

Common Name:
White-spotted Jellyfish

Family:
Mastigiidae Stiasny, 1920

National Status: Vulnerable (VU)

Habitat and Ecology: While this species is known to be an introduced species elsewhere in the world (i.e., Atlantic), it is native to the Indo-West Pacific. Despite concerns of it being introduced elsewhere, *P. punctata* is involved in many important symbiotic relationships with both micro and macrofauna. For example, it harbours dinoflagellates in its tissues, it is a host to brittle stars, and schools of juvenile fish have also been documented to swim close to this jellyfish for protection.

Distribution: Native to the Indo-West Pacific, this species has been introduced to the rest of the world. In Singapore, the occurrence of this jellyfish is rare.

Photo: Yap Wei Liang Nicholas



Threats: Declining water quality, sedimentation, oil spills, and warming.

Scientific Interest and Potential Value: The symbiotic relationships that this species is involved in could be further investigated.

Conservation Measures: As of writing, there are no conservation measures, either locally or globally, to protect this species.

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Cnidaria (Scleractinia) – Stony Corals

LIONEL NG CHIN SOON, SAMUEL CHAN YONG KIT, ROSA CELIA POQUITA-DU,
HUANG DANWEI

Scleractinians (or stony corals) can be found in Singapore’s shallow coastal waters, in both reef and non-reef habitats, including on urban structures such as marinas and seawalls. Collectively, they contribute habitat and provision resources for thousands of reef-associated species in Singapore’s marine environment. Throughout much of Singapore’s modern history, intensive coastal development and land reclamation have resulted in significant coral reef habitat loss and modification. Turbid conditions have been exacerbated, causing reduced light penetration in the water column and affecting the photosynthetic ability of the corals’ algal symbionts. High sedimentation levels also cause smothering of these sessile organisms or increase the energy expenditure required to clear excess sediment. Corals are susceptible to climate change impacts, with declines in live cover caused by several mass bleaching episodes to date. The ongoing, synergistic risks of local and global stressors necessitate the implementation of active measures to protect all remaining coral species to ensure that reef ecosystem functioning is sustained. These include species recovery programmes for species in decline, habitat creation and restoration efforts to increase habitable spaces, and maritime regulation to reduce potential environmental impacts.

A total of 276 Indo-Pacific stony coral species have been assessed based on contemporary reef survey data, museum collections and literature reviews. Threat statuses for 142 species are proposed—one presumed Nationally Extinct (NEx), one Critically Endangered (CR), seven Endangered (EN), 20 Vulnerable (VU), 26 Near Threatened (NT), and 87 Least Concern (LC). The remaining 134 are considered Data Deficient (DD).

Scientific Name:
Acropora spp. (48 species)

Common Name:
Table corals and staghorn corals

Family:
Acroporidae Verrill, 1901

Both photos: Sam Shu Qin



Left: *Acropora millepora* on the reef crest at Pulau Satumu; Right: *Acropora millepora*, classified as Endangered in the current assessment.

National Status: 6 Endangered (EN), 2 Vulnerable (VU), 3 Least Concern (LC), 37 Data Deficient (DD)

Habitat and Ecology: The genus *Acropora* consists of a large number of species (more than 149 globally, 48 in Singapore) encompassing a variety of growth forms, including plates or corymbose structures. They thrive in shallow, well-lit environments such as at reef flats or upper reef slopes. While they can form major reef structures elsewhere, *Acropora* spp. are generally uncommon in Singapore, existing mainly on reefs that experience stronger currents and good water clarity.

Distribution: Tropical and subtropical shallow seas globally.

Threats: Habitat loss and modification, sedimentation,

climate change. Particularly affected by high turbidity and thermal stress.

Scientific Interest and Potential Value: *Acropora* spp. are generally fast-growing and provide a variety of microhabitats for small animals or juveniles of many reef species. They are also popular in the aquarium trade. As they are not found at many Singapore sites, assessments of population change are difficult. With the exception of three species classified as Least Concern, the general outlook for the genus remains poor.

Conservation Measures: Some species are being propagated in coral nurseries or are under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:
Montipora grisea Bernard, 1897

Common Name:
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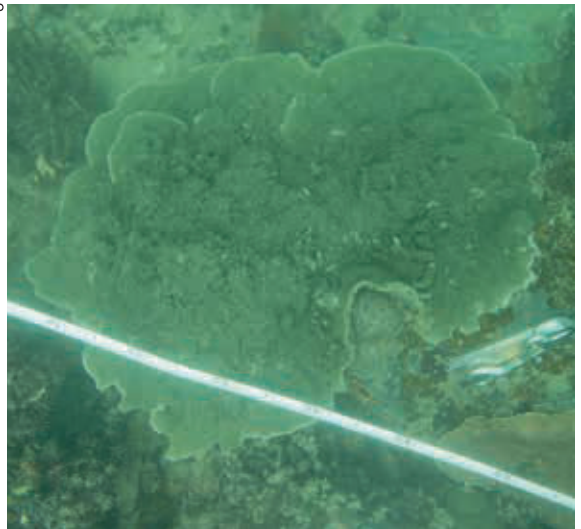
Family:
Acroporidae Verrill, 1901

National Status: Vulnerable (VU)

Habitat and Ecology: Foliose or encrusting colonies. On upper reef slopes.

Distribution: Widely distributed in the Indo-Pacific region.

Photo: Lionel Ng



Montipora grisea recorded during a reef survey at Kusu Island.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Based on recent reef surveys between 2015 and 2019, this species makes up 0.42% of the total coral cover across sites in Singapore.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:
Leptoseris explanata Yabe & Sugiyama, 1941

Common Name:
-

Family:
Agariciidae Gray, 1847

National Status: Vulnerable (VU)

Habitat and Ecology: Foliose colonies with white margins. On lower reef slopes.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Also found in mesophotic reefs elsewhere which indicates

Photo: Huang Danwei



Fine skeletal features of *Leptoseris explanata* at Pulau Tekukor.

their tolerance to low light levels, *Leptoseris* corals are popular in the aquarium trade due to the variety of colour morphs.

Conservation Measures: Under protection by maritime regulations such as those at Pulau Satumu.

Scientific Name:
Pavona cactus (Forskål, 1775)

Common Name:
Cactus coral

Family:
Agariciidae Gray, 1847

Both Photos: Huang Danwei



National Status: Vulnerable (VU)

Habitat and Ecology: Foliose colonies bearing thin, contorted fronds. In turbid, wave-sheltered environments.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Spaces between fronds provide good habitat for small organisms, including a species of squat lobster described in the 1990s.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.



Pavona cactus at Pulau Subar Laut. The fronds are brittle and resemble potato chips.

Scientific Name:

Fimbriaphyllia divisa (Veron & Pichon, 1980)

Common Name:

Frogspawn coral

Family:

Euphylliidae Milne Edwards & Haime, 1857

National Status: Vulnerable (VU)

Habitat and Ecology: Flabello-meandroid, submassive colonies. Polyps are tubular with smaller tubular branches. In turbid environments.

Distribution: Tropical Central Indo-Pacific region.

Threats: Habitat loss and modification, climate change.

Scientific Interest and Potential Value: Corals of the genera *Euphyllia* and *Fimbriaphyllia* are especially

Photo: Huang Danwei



Fimbriaphyllia divisa at Pulau Subar Laut. Partially retracted polyps reveal its flabello-meandroid colony structure.

popular in the aquarium trade because of their fleshy and colourful tentacles. They can generally survive high sedimentation rates.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:

Polyphyllia talpina (Lamarck, 1801)

Common Name:

Mole mushroom coral

Family:

Fungiidae Dana, 1846

National Status: Vulnerable (VU)

Habitat and Ecology: Free-living, elongate colonies. Generally on reef crests and slopes but not found at many sites.

Distribution: Widely distributed in the Central Indo-Pacific region.

Threats: Habitat loss and modification.

Photo: Huang Danwei



Polyphyllia talpina at Pulau Subar Laut. Extended polyps give this free-living coral a furry appearance.

Scientific Interest and Potential Value: Tested as bone implant material in sheep. Known to host small snails, copepods, gall crabs and barnacles. Can generally survive in turbid conditions.

Conservation Measures: Under protection by maritime and conservation regulations such as those at the Sisters' Islands Marine Park.

Scientific Name:

Lobophyllia hataii Yabi, Sugiyama & Eguchi, 1936

Common Name:

Lobed brain coral

Family:

Lobophylliidae Dai & Horng, 2009

National Status: Vulnerable (VU)

Habitat and Ecology: Flabello-meandroid, submassive colonies. On reef slopes.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Photo: Huang Danwei



Lobophyllia hataii off the waters of southwest Pulau Semakau.

Scientific Interest and Potential Value: Based on recent reef surveys between 2015 and 2019, this species makes up 0.05% of the total coral cover across sites in Singapore.

Conservation Measures: None known.

Scientific Name:
Dipsastraea pallida (Dana, 1846)

Common Name:
Knob coral

Family:
Merulinidae Milne Edwards & Haime, 1857

Both Photos: Huang Danwei



Dipsastraea pallida off the waters of southwest Lazarus Island.

National Status: Vulnerable (VU)

Habitat and Ecology: Massive or encrusting colonies.
All reef environments.

Distribution: Widespread in the tropical Indian and Pacific Oceans.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Population has declined significantly.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:
Favites flexuosa (Dana, 1846)

Common Name:
-

Family:
Merulinidae Milne Edwards & Haime, 1857

Photo: Huang Danwei



Favites flexuosa off the waters of Pulau Semakau.

National Status: Vulnerable (VU)

Habitat and Ecology: Massive or encrusting colonies.
All reef environments.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Population decline significant.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:

Platygyra lamellina (Ehrenberg, 1834)

Common Name:

Lesser valley coral

Family:

Merulinidae Milne Edwards & Haime, 1857

National Status: Vulnerable (VU)

Habitat and Ecology: Massive or encrusting colonies. All reef environments.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Regains normal pigmentation relatively quickly after bleaching from thermal stress.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Both Photos: Huang Danwei



Platygyra lamellina in waters off Kusu Island.

Scientific Name:

Plerogyra sinuosa (Dana, 1846)

Common Name:

Pearl bubble coral

Family:

Plerogyridae Rowlett, 2020

National Status: Vulnerable (VU)

Habitat and Ecology: Flabello-meandroid, submassive colonies. Sheltered reef environments.

Distribution: Widely distributed in the Indo-Pacific region.

Photo: Huang Danwei



Plerogyra sinuosa with grape-like vesicles in the waters off Pulau Subar Laut.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Population decline significant. Popular in the aquarium trade.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:
Scapophyllia cylindrica Milne
Edwards & Haime, 1849

Common Name:
Columniform crust coral

Family:
Merulinidae Milne Edwards &
Haime, 1857

National Status: Vulnerable (VU)

Habitat and Ecology: Columnar, submassive or encrusting colonies. On reef crests.

Distribution: Tropical Central Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.



Photo: Huang Danwei

Tall columns of *Scapophyllia cylindrica* at Pulau Satumu.

Scientific Interest and Potential Value: Population decline has been significant.

Conservation Measures: Under protection by maritime regulations such as those at Pulau Satumu.

Scientific Name:
Trachyphyllia geoffroyi
(Audouin, 1826)

Common Name:
Open brain coral

Family:
Merulinidae Milne Edwards &
Haime, 1857

National Status: Endangered (EN)

Habitat and Ecology: Flabello-meandroid and fleshy colonies. Free-living and can be found on sandy or silty substrate.



Photo: Huang Danwei

Free-living *Trachyphyllia geoffroyi* on the patch reef of Terumbu Pempang Tengah

Distribution: Widely distributed in the Central Indo-Pacific region.

Threats: Habitat loss and modification, climate change.

Scientific Interest and Potential Value: It is one of the few free-living non-fungiid species and is therefore

evolutionarily important. This brightly coloured species is also highly popular in the aquarium trade. Can generally survive high sedimentation rates.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

Scientific Name:
Seriatopora hystrix Dana, 1846

Common Name:
Thin bird's nest coral

Family:
Pocilloporidae Gray, 1840

National Status: Presumed Nationally Extinct (NEx)

Habitat and Ecology: Branching colonies. Shallow reef environments.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change. While this species still persists in other parts of the region, it has not been detected in Singapore reefs for over half a century, suggesting that its disappearance is likely due to local environmental pressures.



Seriatopora hystrix on a reef at Anilao, the Philippines.

Scientific Interest and Potential Value: Its persistence in neighbouring countries presents an opportunity to further investigate its disappearance from local waters and examine whether it can re-establish if conditions improve.

Conservation Measures: None known

Scientific Name:
Stylophora pistillata (Esper, 1792)

Common Name:
Smooth cauliflower coral

Family:
Pocilloporidae Gray, 1840



Stylophora pistillata on the reef at Pulau Satumu in 2010.

National Status: Critically Endangered (CR)

Habitat and Ecology: Branching colonies. Shallow reef environments.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change. The last standing colony has perished since the mass bleaching event in 2010. However, given that it is still present in neighboring countries,

the possibility that it can return via immigration of propagules remains.

Scientific Interest and Potential Value: Its persistence in neighboring countries presents an opportunity to further investigate its disappearance from local waters and examine whether it can re-establish if conditions improve.

Conservation Measures: None known

Scientific Name:
Porites cylindrica Dana, 1846

Common Name:
Yellow finger coral

Family:
Poritidae Gray, 1840

National Status: Vulnerable (VU)

Habitat and Ecology: Branching or encrusting colonies.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: While feeding can increase in turbid conditions, tissue biomass has also been observed to decrease.

Conservation Measures: None known

Photo: Huang Danwei



Porites cylindrica on the reef crest at Pulau Hantu.

Scientific Name:

Psammocora nierstraszi Van der Horst, 1921

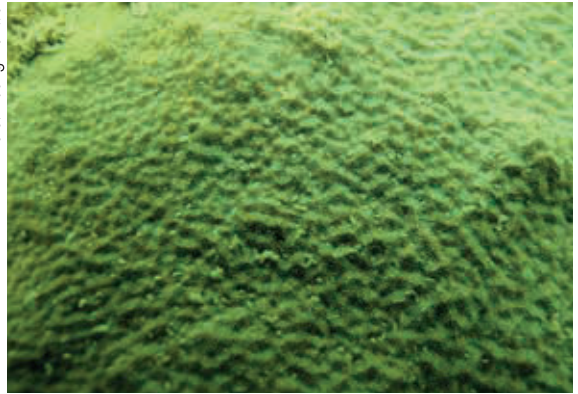
Common Name:

Boulder sandpaper coral

Family:

Psammocoridae Chevalier & L. Beauvais, 1987

Photo: Huang Danwei



Fine skeletal features of *Psammocora nierstraszi* on the reef off Pulau Semakau.

National Status: Vulnerable (VU)

Habitat and Ecology: Submassive or encrusting colonies.

Distribution: Widely distributed in the Indo-Pacific region.

Threats: Habitat loss and modification, sedimentation, climate change.

Scientific Interest and Potential Value: Based on recent reef surveys between 2015 and 2019, this species makes up 0.07% of the total coral cover across sites in Singapore.

Conservation Measures: Under protection by maritime and conservation regulations such as those at Pulau Satumu and the Sisters' Islands Marine Park.

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Polycladida – Flatworms

SAMANTHA J.W. TONG, RENE S.L. ONG

Marine flatworms are unsegmented worms from the phylum Platyhelminthes, *platy-* meaning 'flat' and *helminth-* meaning 'worm'. Many free-living marine flatworms found on Singapore's shores are from the order Polycladida. Polyclads can be found within coral reefs, rocky shores, mudflats, seagrass habitats and among seaweed patches. There is an estimated 128 species of polyclad flatworms recorded in Singapore so far. Despite this relatively high diversity, much information on the ecology of polyclads in Singapore is limited because of a general lack of regular, systematic surveys. This number is also clearly an under representation of the actual polyclad diversity. Many species were sighted less than ten times over the past 20 years, and some were even possibly new to science. Polyclad sightings are largely dependent on the accessibility of the location (e.g. less likely to sample restricted areas or areas that require a permit to enter) and suitable low tides for intertidal sampling. More sampling would yield a better idea of polyclad distribution and abundance in the waters of Singapore.

The lack of continuous sampling efforts hinders building our knowledge on these beautiful marine flatworms. Singapore's shores face many challenges such as coastal developments, high rates of sedimentation and pollution. These may result in the degradation of marine habitats that puts marine lives, including the polyclads, at risk. Although polyclad diets are poorly studied, cotylean diversity is usually higher in areas with higher abundances of ascidians and sponges. Damage to marine habitats in general would also affect the food sources of polyclads. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles given the high rate of coastal urbanisation in Singapore.

Scientific Name:

Pseudobiceros flowersi Newman & Cannon, 1997

Common Name:

Olive flatworm

Order/Family:

Polycladida/Pseudocerotidae

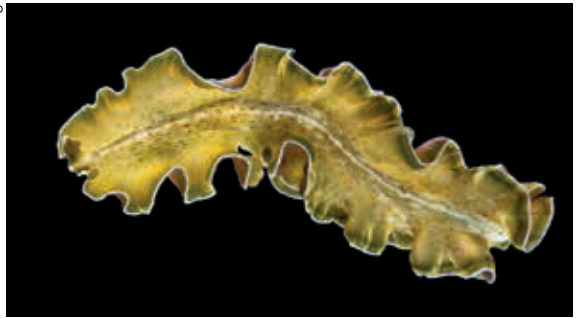
National Status: Data Deficient (DD)

Habitat and Ecology: Subtidal region

Distribution: In Singapore, this species has only ever been recorded at Pulau Semakau. Sightings of this species so far are just that handful in Ong & Tong (2018).

Threats: Habitat loss, habitat modification, oil spills and warming are some typical threats to polyclad flatworms. Furthermore, Singapore's shores face many challenges such as coastal developments, high sedimentation and pollution. These may result in degradation of marine habitats that puts marine lives, including the polyclads, at risk.

Photo: Rene Ong



Scientific Interest and Potential Value: Although polyclad ecology and their diets are poorly studied, cotylean diversity is usually higher in areas with higher abundances of ascidians and sponges. It is reasonable to presume that they play key roles in regulating population dynamics and nutrient cycling.

Conservation Measures: Conservation measures should include area protection, species recovery programme, habitat restoration and habitat creation. Many species were sighted less than ten times over the past 20 years, and some could even be new to science. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles before they are lost to any anthropogenic harm

Scientific Name:

Pseudoceros microcelis Prudhoe, 1989

Common Name:

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Order/Family:

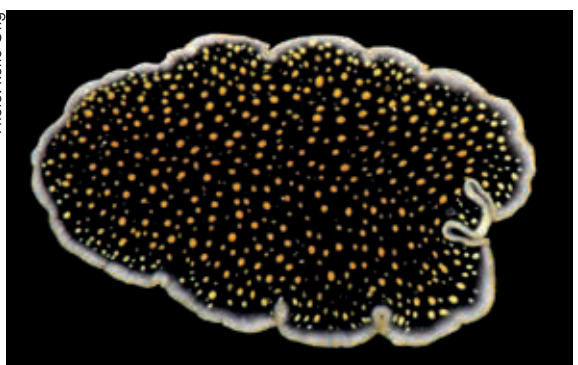
Polycladida/Pseudocerotidae

National Status: Data Deficient (DD)

Habitat and Ecology: Subtidal region

Distribution: In Singapore, this species has only been sighted at Big Sister's Island, Pulau Biola, Pulau Hantu, Pulau Tekukor and Pulau Jong.

Photo: Rene Ong



Threats: Habitat loss, habitat modification, oil spills and warming are some typical threats to polyclad flatworms. Furthermore, Singapore's shores face many challenges such as coastal developments, high sedimentation and pollution. These may result in degradation of marine habitats that puts marine lives, including the polyclads, at risk.

Scientific Interest and Potential Value: This species record in Singapore might be the first record from beyond the type locality at Inhaca Island, Mozambique (Ong et al., 2018). Despite the high diversity of an estimated 128 species of polyclad flatworms recorded in Singapore so far, this number is clearly an underrepresentation of the actual polyclad diversity. Much information on the ecology of polyclads in Singapore is limited because of a general lack of regular, systematic surveys. Polyclad sightings are also largely dependent on the accessibility of the location. More sampling will yield a better idea of polyclad distribution and abundance in our waters.

Conservation Measures: Conservation measures should include area protection, species recovery programme, habitat restoration and habitat creation. Many species were sighted less than ten times over the past 20 years, and some could even be new to science. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles before they are lost to any anthropogenic harm.

Scientific Name:

Pseudoceros paralaticlavus Newman & Cannon, 1994

Common Name:

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Order/Family:

Polycladida/Pseudocerotidae

National Status: Data Deficient (DD)

Habitat and Ecology: Only found at the subtidal zone in Singapore

Distribution: In Singapore, this species has only been sighted at Big Sister's Island and Terumbu Pempang Tengah.

Threats: Habitat loss, habitat modification, oil spills and warming are some typical threats to polyclad flatworms. Furthermore, Singapore's shores face many challenges such as coastal developments, high sedimentation and pollution. These may result in degradation of marine habitats that puts marine lives, including the polyclads, at risk.

Photo: Rene Ong



Scientific Interest and Potential Value: Although polyclad ecology and their diets are poorly studied, cotylean diversity is usually higher in areas with higher abundances of ascidians and sponges. It is reasonable to presume that they play key roles in regulating population dynamics and nutrient cycling.

Conservation Measures: Conservation measures should include area protection, species recovery programme, habitat restoration and habitat creation. Many species were sighted less than ten times over the past 20 years, and some could even be new to science. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles before they are lost to any anthropogenic harm.

Scientific Name:

Thysanozoon nigrum Girard, 1851

Common Name:

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Order/Family:

Polycladida/Pseudocerotidae

National Status: Data Deficient (DD)

Habitat and Ecology: Subtidal region

Distribution: In Singapore, this species has only been sighted at Pulau Hantu, Pulau Salu, Pulau Semakau and Pulau Senang.

Threats: Habitat loss, habitat modification, oil spills and warming are some typical threats to polyclad flatworms. Furthermore, Singapore's shores face many challenges such as coastal developments, high sedimentation and pollution. These may result in degradation of marine habitats that puts marine lives, including the polyclads, at risk.

Scientific Interest and Potential Value: First record of this species in the Indo-Pacific (Ong et al., 2018). Despite the high diversity of an estimated 128 species

Photo: Rene Ong



of polyclad flatworms recorded in Singapore so far, this number is clearly an under representation of the actual polyclad diversity. More sampling will yield a better idea of polyclad distribution and abundance in our waters, and even discover more new records.

Conservation Measures: Conservation measures should include area protection, species recovery programme, habitat restoration and habitat creation. Many species were sighted less than ten times over the past 20 years, and some could even be new to science. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles before they are lost to any anthropogenic harm.

Scientific Name:

Pericelis byerleyana
(Collingwood, 1876)

Common Name:

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Order/Family:

Polycladida/Pericelidae

National Status: Data Deficient (DD)

Habitat and Ecology: Subtidal region, among corals

Photo: Rene Ong



Distribution: This species is rarely sighted in Singapore and was only recorded at Pulau Jong in Ong & Tong (2018). They were sighted once again in October 2020 at Raffles Lighthouse, Kusu Island and Sisters' Islands.

Threats: Habitat loss, habitat modification, oil spills and warming are some typical threats to polyclad flatworms. Furthermore, Singapore's shores face many challenges such as coastal developments, high sedimentation and pollution. These may result in degradation of marine habitats that puts marine lives, including the polyclads, at risk.

Scientific Interest and Potential Value: Although polyclad ecology and their diets are poorly studied, cotylean diversity is usually higher in areas with higher abundances of ascidians and sponges. It is reasonable

to presume that they play key roles in regulating population dynamics and nutrient cycling.

Conservation Measures: Conservation measures should include area protection, species recovery programme, habitat restoration and habitat creation. Many species were sighted less than ten times over the past 20 years, and some could even be new to science. There is an urgent need to protect these habitats, to describe new polyclad species, and to learn more about their biology and ecological roles before they are lost to any anthropogenic harm.

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Marine Annelida – Segmented Worms

LEE YEN-LING, ANG HWEE PENG, CHUAR CHEAH HOAY,
GAYATHRI D/O SIVANANTHAN

Scientific Name:

Chaetopterus appendiculatus

Common Name:

Fairy Tubeworm

Order/Family:

Annelida/Chaetopteridae

Photo: Tan Heek Hui



National Status: Near Threatened (NT)

Habitat and Ecology: The worm prefers shallow waters and muddy shores.

Distribution: In Singapore, this species has been found in the waters off Changi, at Chek Jawa and also from several islands in the Singapore Straits such as Semakau, St John's and Lazarus. It has an almost cosmopolitan distribution across the world.

Threats: The shallow water localities that they are found face hazards from boating activities, high sedimentation, and potential coastal development.

Scientific Interest and Potential Value: Previously, this worm was referred to as *C. variopedatus* and its "Endangered" status was given based on the species'

cosmopolitan distribution in the world but limited occurrence in Singapore. During the Comprehensive Marine Biodiversity Survey (conducted between 2010 till 2016) and other ad hoc sampling trips spanning 2008 till 2015, a number of specimens were obtained across several islands and reefs in the Singapore Straits particularly Semakau and also in the silt-covered shores at the eastern part of Singapore. It is likely that more individuals are present in the wild but due to the silty environment where they are usually found, they may be less visited intertidally or spotted in dives, resulting in sporadic encounters. They do not form dense aggregations and are estimated to have low numbers in the wild. It is now assessed as NT in this RDB3.

Conservation Measures: Key areas where the worm occurs in good numbers should be identified and steps taken to conserve them.

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