

Echinodermata – Sea Stars, Feather Stars, Brittle Stars, Sea Cucumbers and Sea Urchins

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Scientific Name:

Iconaster longimanus (Möbius, 1859)

Common Name:

Icon star

Order/Family:

Asteroidea: Goniasteridae

National Status: Vulnerable (VU)

Habitat and Ecology: Found on lower reef slopes and coral rubble/sediment of the adjacent seabed, usually deeper than 30m in clear ocean waters but in the more turbid waters of Singapore and the nearby Riau Archipelago at depths of 5–20+ m. Feeds on epilithic growth. Some individuals are infested with the gastropod parasite *Thyca*, as illustrated here.

Distribution: A tropical, central Indo-Pacific sea star commonly found sub-tidally on and around many reefs fringing the Southern Islands, as well as the adjacent islands of the Riau Archipelago. In Singapore it is considered vulnerable for reasons given below.

Threats: Living on and near the slopes of fringing reefs, it is directly threatened by reclamation activities and by enhanced sedimentation that reclamation causes. Additionally, this species is listed on marine aquaria

Photo: David J.W. Lane



websites and its attractive appearance may lead to over-collection as live aquarium specimens or as dried curios.

Scientific Interest and Potential Value: The female produces large eggs which show abbreviated development, omitting the planktonic bipinnaria stage. Eggs possess some kind of chemical defence against predation. As a locally abundant and long-lived sea star this species is an important ecological component of the marine benthic community in Singapore waters.

Conservation Measures: Incorporation of prime Southern Islands *Iconaster* sites into a Marine Protected Area network. Minimising siltation through best dredging practices. Eco-education for SCUBA divers as even casual collection of this attractive, long-lived species – as curios – could result in significant population losses.

Scientific Name:
Fromia monilis (Perrier, 1869)

Common Name:
Peppermint seastar

Order/Family:
Asteroidea: Goniasteridae

National Status: Endangered (EN)

Habitat and Ecology: A species discovered in Singapore waters in 1992 on offshore reef slope rocky substrata.

Distribution: A species typical of open ocean Indo-West Pacific coral reefs. Found locally only on offshore reefs such as Sultan Shoal.

Threats: One local reef site (Sultan Shoal) has been impacted by nearby port reclamation activity. Other offshore reefs where this species occurs have restricted access, but low numbers put it at risk of local extinction. Consequently, its status is revised from Vulnerable to Endangered.

Photo: David J.W. Lane



Scientific Interest and Potential Value: Recently transferred to the Goniasteridae, this species is typical of oceanic reef systems in the Indo-West Pacific and locally it is restricted to offshore reefs with better water quality.

Conservation Measures: Restricted access at some sites affords a measure of protection but conservation objectives would be enhanced by inclusion of offshore Southern Islands sites within Singapore's Marine Protected Area network.

Scientific Name:
Protoreaster nodosus (Linnaeus, 1758)

Common Name:
Giant knobbly seastar

Order/Family:
Asteroidea: Oreasteridae

National Status: Endangered (EN)

Habitat and Ecology: This massive, variably-coloured sea star typically occurs on intertidal shores and seagrass habitats around Singapore. An extra-oral feeder, but little is known of its biology.

Photo: David J.W. Lane



Distribution: On reef flat sea-grass beds and other intertidal areas in the Southern Islands and the Johore Straits. In recent years (2000-2020) naturalists have reported it on post-reclamation shorelines, e.g. East Coast Park. Juveniles are regularly seen in sea-grass habitats, notably on Cyrene Reef adjacent to the Pasir Panjang container terminal.

Threats: Extirpation due to reclamation of coastal shorelines and patch reefs remains a threat to the viability of populations. Illegal collection of these conspicuous, attractive sea stars for aquaria or as curio— a trade which occurs at scale in some other countries— is a potential threat locally.

Scientific Interest and Potential Value: Little is known of its biology but large size and a potential long-

life span indicates that this species may be an important part of the reef ecosystem and a useful bioindicator species for monitoring reef health.

Conservation Measures: Persistence in Singapore is unlikely unless its refuge habitats are protected (e.g. as MPAs) and remain free from degradation, inappropriate development or curio collection.

Scientific Name:

Pentaceraster mammillatus
(Audouin, 1826)

Common Name:

Mammillated pentaceraster

Order/Family:

Asteroidea: Oreasteridae

National Status: Endangered (EN)

Habitat and Ecology: A recent addition (2008) to the Singapore fauna this massive, spectacular sea star occurs on sea-grass beds and feeds by everting its stomach over epibenthic biota, micro-organisms and surface organic matter.

Distribution: An Indian Ocean species now known in Singapore waters on sandy sea-grass beds, principally on Cyrene Reef, a large patch reef close to the Pasir Panjang container terminal within the Port of Singapore. Small individuals of this species have also been found there in recent years.

Threats: Rare in Singapore and at severe risk of local extirpation in the event of further land reclamation and expansion of the Port of Singapore. Potentially at risk from collection as a curio.

Photo: David J.W. Lane



Scientific Interest and Potential Value: This large sea star appears to be a recent recruit to the Singapore marine fauna, having never been recorded historically even during intensive Echinoderm surveys in the 1990s, and testifies to the present quality of the marine environment close to port infrastructure.

Conservation Measures: Inclusion of patch reef/ sea-grass habitats of this sea star within the Marine Protected Area network of Singapore. Protection from casual or trade curio collectors.

Scientific Name:

Anthenea aspera Döderlein, 1915

Common Name:

Cake star

Order/Family:

Asteroidea: Oreasteridae

National Status: Vulnerable (VU)

Habitat and Ecology: Little is known of its biology or ecology but small individuals tend to be found on seagrass beds which may serve as an important recruiting ground and nursery for this species.

Distribution: First found by dredging off Pulau Ubin and the Southern Islands in the 1990s, this large sea star has subsequently been found intertidally on coral rubble or seagrass meadows around Singapore but it is never abundant.

Threats: Potentially threatened by land reclamation of intertidal areas.

Photo: David J.W. Lane



Scientific Interest and Potential Value: A massive but rare species known only from North Australia, southern Japan, China, Indonesia and Singapore. In Singapore individuals are very varied in colour and patterning.

Conservation Measures: Temporary protection of the designated Chek Jawa wetlands area at the eastern end of Pulau Ubin may need to be established more permanently for conservation of this sea star to be effective.

Scientific Name:

Cryptasterina pentagona (Müller & Troschel, 1840)

Common Name:

Cryptic seastar

Order/Family:

Asteroidea: Asterinidae

National Status: Vulnerable (VU)

Habitat and Ecology: These small, blunt-armed, almost pentagonal sea stars live limpet-like on the underside of undisturbed rocks and stones on the upper to mid-shore level. Reported to feed on epilithic growth and biofilms.

Distribution: West Pacific. First identified in Singapore in the 1990s. Found in small numbers under rocks and

Photo: David J.W. Lane



stones intertidally on natural shores of the Southern Islands and recently at a remnant mainland site (Berlayer Creek) on southern Singapore. Whether or not this species has managed to colonise the hidden sides of (immovable) boulders that form extensive rock bund sea defenses around much of Singapore remains undetermined.

Threats: The few remaining habitats of mid to upper intertidal, natural rocky/ stony shores are potentially under threat from reclamation, coastal development and/ or human disturbance.

Scientific Interest and Potential Value: Unlike many egg-brooding asterinids in this kind of habitat, this species is a broadcast spawner with larvae developing in the plankton.

Conservation Measures: The few remaining natural, rocky, intertidal localities where these sea stars occur need to be protected from development (by inclusion within Marine Protected Areas) if this locally rare species is to survive in Singapore.

Scientific Name:

Echinaster callosus Marenzeller,
1895

Common Name:

Warty seastar

Order/Family:

Asteroidea: Echinasteridae

National Status: Endangered (EN)

Habitat and Ecology: Found on shallow coral reefs or soft substrata and presumed to feed on epibiota or biofilms. The aboral surface sometimes has epi-symbiotic associates, including the comb jelly, *Coeloplana astericola*.

Distribution: A shallow tropical West Indo-Pacific species of coral reefs. Locally it has been found only once, in the 1990s, subtidally on coral rubble substrata between the Southern Islands of Pulau Hantu and Pulau Semakau.

Threats: A locally rare subtidal species that may be threatened with local extinction by SCUBA diver

collection. The location where this species has been recorded is used intensively for open water dive training. Further seabed reclamation in the Southern Islands area is an additional threat.

Scientific Interest and Potential Value: The specimen in the Museum (LKCNHM) collection has single dorsal callosities, unlike the transverse fused callosities more typical of Indo-Pacific forms. This may point to the Singapore form being a separate sub-species.

Conservation Measures: This species may not survive in Singapore waters unless its habitat is given Marine Protected Area status.

Photo: David J.W. Lane



Scientific Name:
Luidia maculata (Müller & Troschel, 1842)

Common Name:
Eight-armed seastar

Order/Family:
Asteroidea: Luidiidae

National Status: Endangered (EN)

Habitat and Ecology: Arm number, usually 8 in Singapore specimens, can vary from 6 to 9. A large predatory sea star living in and on soft intertidal and subtidal sediments. Also found on seagrass beds. Nocturnally active. Feeds on molluscs, other echinoderms and a variety of other infaunal invertebrates by engulfing them whole.

Distribution: Indo-west Pacific. Found intertidally all-around Singapore, particularly on northern shores, some of the Southern Islands and on the man-made reclaimed shorelines of East Coast Park.

Threats: Loss of habitat due to further land reclamation. Low salinity mortalities due to high rainfall episodes sometimes affect these and other echinoderms at the

Photo: David J.W. Lane



eastern end of the Johore Straits. Such events may become more frequent if there are climate-change-driven increases in monsoonal rainfall intensities.

Scientific Interest and Potential Value: This very large sea star is important as a component of Singapore's marine invertebrate 'megafaunal' biodiversity.

Conservation Measures: Dredging and coastal land reclamation in the latter part of the 20th century obliterated much of the habitat for this sea star but shorelines newly created by reclamation (e.g. East Coast Park and adjacent area) have, in time, become colonized by *Luidia* sea stars. Protection of both remnant natural habitats and newly created ones is desirable.

Scientific Name:
Himerometra robustipinna (Carpenter, 1881)

Common Name:
Red feather star

Order/Family:
Crinoidea: Himerometridae

National Status: Vulnerable (VU)

Habitat and Ecology: This species lives in both intertidal and subtidal habitats. It is often found fully exposed, perched on corals, rocks or sponges, with its arms curled inwards.

Photo: Comprehensive Marine Biodiversity Survey (CMBS)



Himerometra robustipinna from waters of Lazarus Island.

Distribution: This species is found throughout Indo-Pacific region and is one of the more commonly seen species in Singapore.

Threats: Changes in habitat due to human activities.

Scientific Interest and Potential Value: Changes in habitat due to human activities.

Conservation Measures: Designating more marine protected areas can help in the conservation of this species and feather stars in general.

Photo: Teresa Tay



Himerometra robustipinna from waters of Lazarus Island.

Scientific Name:
Pontometra andersoni
(Carpenter, 1889)

Common Name:
Feather star

Order/Family:
Crinoidea: Colobometridae

National Status: Vulnerable (VU)

Habitat and Ecology: This species is easily recognisable by its large size and many arms arranged in a parabolic fan. It has a tendency to shed its arms when stressed.

Distribution: This species is found throughout Indo-Pacific region, but despite being easily identified, there are few official records of this species in Singapore.

Threats: Environmental changes and human disturbances.

Photo: Comprehensive Marine Biodiversity Survey (CMBS)



Scientific Interest and Potential Value: Has the potential to be a bio-indicator due to its reaction to stress and disturbance.

Conservation Measures: Designating more marine protected areas can help in the conservation of this species and feather stars in general.

Scientific Name:
Prionocidaris baculosa
(Lamarck, 1816)

Common Name:
Thorny sea urchin

Order/Family:
Echinoidea: Cidaridae

National Status: Vulnerable (VU)

Habitat and Ecology: Feeds by grazing like all regular sea urchins but members of the Cidaridae family are also reported to be scavengers, feeding on dead animal material. Thorny primary spines are often covered with attached organisms and other fouling debris.

Distribution: Tropical Indo-west Pacific. In Singapore found intertidally at the eastern end of the Johore Straits as well as subtidally there and in the Southern Islands area.

Photo: David J.W. Lane



Threats: Further land reclamation off eastern Singapore and in the Southern Islands area.

Scientific Interest and Potential Value: The biology of this species is little known, but it is of intrinsic value as a component of Singapore's echinoid biodiversity.

Conservation Measures: Continued inclusion of intertidal Pulau Ubin areas within a designated marine wetland protection zone.

Scientific Name:
Chaetodiadema granulatum
Mortensen, 1903

Common Name:
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Order/Family:
Echinoidea: Diadematidae

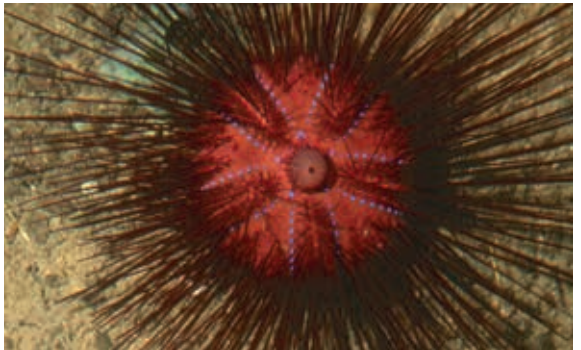
National Status: Endangered (EN)

Habitat and Ecology: A rare sea urchin found on soft sediments below the reef slope.

Distribution: Tropical Indo-west Pacific. In Singapore found thus far only in the Southern Islands area.

Threats: Status not evaluated globally but considered endangered locally as further land reclamation extending into deeper water in the Southern Islands area would lead to habitat loss.

Photo: David J.W. Lane



Scientific Interest and Potential Value: Throughout its Indo-west Pacific range this sea urchin is generally found at depths greater than 45 m but in Singapore it has been found at 15 m.

Conservation Measures: Encountered just once in waters off Pulau Semakau in the 1990s and again in the Southern Islands during the 2013 Comprehensive Marine Biological Survey, this species is rare in Singapore and its conservation probably requires inclusion of its localities within Singapore's Marine Protected Area network.

Scientific Name:

Asthenosoma varium Grube,
1868

Common Name:

Fire urchin

Order/Family:

Echinoidea: Echinothuriidae

National Status: Endangered (EN)

Habitat and Ecology: This large sea urchin occurs on coarse soft sediments near reefs. Co-occurrence with gorgonian sea fans in Singapore indicates preference for an environment with good water flow. Several kinds of organisms, including commensal shrimps, live in association and presumably benefit from the protection of the urchin's venomous spines. Feeds on biofilms, detritus, and encrusting organisms.

Distribution: From the eastern Indian Ocean to New Caledonia. In Singapore this sea urchin is found only in the Southern Islands.

Threats: Reclamation of seabed habitat. The only known location for this sea urchin, off Sultan Shoal, is now partially enclosed by southward extending arms of land reclamation from Tuas and Jurong Island. This



Photo: David J.W. Lane

has likely altered the tidal flow and water quality regime; thus, the threat level is raised from Vulnerable to Endangered. Further sea floor reclamation in the area could render it locally extinct.

Scientific Interest and Potential Value: As a venomous marine organism *A. varium* is of particular interest to anyone likely to encounter it, as well as to scientists interested in the biochemical nature of the venom. This colourful urchin harbors equally colourful shrimp associates.

Conservation Measures: Potentially on the verge of local extinction as its only known location in Singapore, Sultan Shoal, has been radically impacted by nearby reclamation and port expansion. This species is in urgent need of re-assessment and protection measures need to be put in place for any remaining populations.

Scientific Name:

Mespilia globulus (Linnaeus,
1758)

Common Name:

Globe urchin

Order/Family:

Echinoidea: Temnopleuridae

National Status: Vulnerable (VU)

Habitat and Ecology: Occurs on shallow reefs and coral rubble and tends to cover itself with debris.



Photo: Jeffrey K.Y. Low

Mespilia globulus at Pulau Satumu, Singapore.

Distribution: A tropical Indo-west Pacific urchin and a relatively new discovery for Singapore. Found on the fringing reef of the southernmost of the Southern Islands, Pulau Satumu, in 2015.

Threats: A rare sea urchin in Singapore and thus vulnerable to illegal collection as an attractive aquarium trade species. Also threatened by further land reclamation in the Southern Islands.

Scientific Interest and Potential Value: The exceptional size of the Singapore specimen (about 8 cm diameter) indicates that this is a long-lived individual.

Conservation Measures: Found only on the furthest offshore reef. Inclusion of this fringing reef and nearby submerged ones in Singapore's Marine Protected Area network would be highly desirable.

Photo: David J.W. Lane



Mespilia globulus at Pulau Manukan, Sabah, Malaysia.

Scientific Name:

Toxopneustes pileosus (Lamarck, 1816)

Common Name:

Flower urchin

Order/Family:

Echinoidea: Toxopneustidae

Photo: Wayne Thean Kang Wei



Toxopneustes pileosus from Pulau Hantu, Singapore.

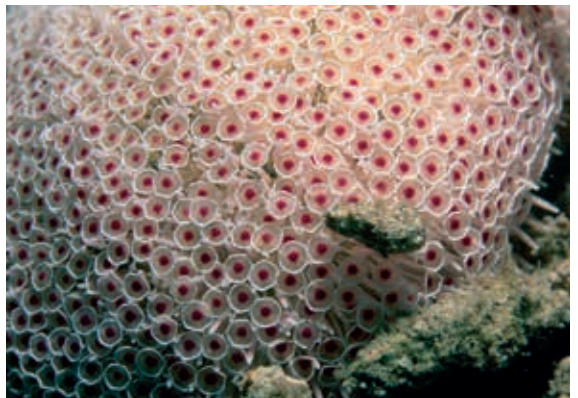
National Status: Near Threatened (NT)

Habitat and Ecology: Reef associated, generally found on coral rubble, often covering itself with sea floor debris, possibly as camouflage and/or protection against UV radiation. Reported to feed by grazing on epilithic organisms and detritus.

Distribution: Commonly encountered on Indo-west Pacific coral reefs and seagrass beds but rare in Singapore waters. An aggregation of 3 of these venomous urchins, found on coral rubble at Pulau Hantu in the Southern Islands in 2016, was a new record for Singapore.

Threats: Habitat loss due to further land reclamation in the Southern Islands region.

Photo: David J.W. Lane



Toxopneustes pileosus from Pulau Rawa, Malaysia.

Scientific Interest and Potential Value: Stings from the tiny fang-like jaws of the flower-like globiferous pedicellariae are highly dangerous; the venom interferes with nerve signal transmission and causes haemagglutination. Fatalities have been recorded thus gloves are essential when handling live specimens.

Conservation Measures: Inclusion of Pulau Hantu - and/or other sites where this sea urchin may be discovered - within the Marine Protected Area network.

Scientific Name:
Echinodiscus truncatus
(L. Agassiz, 1841)

Common Name:
Key-hole sand dollar

Order/Family:
Echinoidea: Atricleidae

National Status: Vulnerable (VU)

Habitat and Ecology: Intertidal sandy/silty shores and seagrass beds. Using its velvet-like covering of small, short spines it burrows just beneath the sediment surface.

Distribution: Indo-west Pacific from East Africa to New Caledonia. In Singapore known from a few sites in the Pulau Ubin / Pulau Tekong / Changi area.

Threats: An uncommon species it is under threat from coastal development in the Changi / Pulau Ubin / Pulau Tekong area.

Photo: David J.W. Lane



Scientific Interest and Potential Value: Various explanations for the adaptive value of the lunules have been put forward. One theory is that the lunule spines assist in burrowing while another idea is that the holes have a hydrodynamic function in reducing lift in strong currents, thus preventing dislodgment.

Conservation Measures: Currently protected, temporarily, at the Chek Jawa wetlands area at the eastern end of Pulau Ubin. Long-term conservation hinges on inclusion of this and/or neighbouring habitats within Singapore's Marine Protected Area network.

Scientific Name:
Holothuria (Metriatyla) scabra
Jaeger, 1833

Common Name:
Sandfish sea cucumber

Order/Family:
Holothuroidea: Holothuriidae

Photo: David J.W. Lane



National Status: Endangered (EN)

Habitat and Ecology: Found at the low tide mark on sandy beaches, reef flats and seagrass beds, often partially or completely buried. Feeds on the organic matter ingested with sediments. Known to harbour symbiotic crabs within the ventilatory cloacal chamber.

Distribution: A widespread tropical Indo-west pacific sea cucumber. Locally it is found near the low tide mark at Chek Jawa (Pulau Ubin), the mainland shores of Changi, the West coast, and on some of the Southern Islands' patch reefs and seagrass beds.

Threats: Harvesting of this valuable bêche de mer species is widespread in the Indo-west Pacific. The numbers in Singapore are too low to support a viable fishery but casual collection for food would threaten populations. The main potential threat would be further land reclamation in the Changi area and of the Southern Islands' fringing and patch reefs.

Scientific Interest and Potential Value: *H. scabra* is a high-value commercial bêche de mer species and is one of the few that have been successfully reared for aquaculture. Singapore, one of the major trading centres for imported bêche de mer product, could profitably focus efforts towards intensive mariculture of this and other sea cucumber species, with local populations providing spawning broodstock.

Conservation Measures: The major factor affecting the continued survival of this species in Singapore waters is, apparently, not collection for food but the threat of further land reclamation, particularly in the Changi and Southern Islands regions. Effective local conservation would require inclusion of intertidal sand and seagrass habitats of this species within an expanded Marine Protected Area network.

Scientific Name:
Stichopus herrmanni Semper,
1868

Common Name:
Curryfish sea cucumber

Order/Family:
Holothuroidea: Stichopodidae

National Status: Endangered (EN)

Habitat and Ecology: Found infrequently on shallow reef slopes of the Southern Islands. Feeds on organic material ingested with sediments.

Distribution: An Indo-west Pacific tropical species found locally only in the Southern Islands area.

Threats: Overexploited by the bêche de mer trade throughout its world distribution range and consequently listed by IUCN as Vulnerable. For Singapore the threat category is raised to Endangered because of the small numbers and restricted distribution range here.



Photo: David J.W. Lane

Scientific Interest and Potential Value: A medium-value Indo-west Pacific species in the bêche de mer sea food trade.

Conservation Measures: Effective local conservation would require inclusion of Southern Islands subtidal and seagrass habitats of this species within an expanded Marine Protected Area network.

Scientific Name:*Stichopus vastus* Sluiter, 1887**Common Name:**

Zebrafish sea cucumber

Order/Family:

Holothuroidea: Stichopodidae

National Status: Endangered (EN)**Habitat and Ecology:** Found on coral rubble of reef slopes and soft sediments. Feeds on sediment and derives nutrition from the associated organic matter.**Distribution:** A central Indo-west Pacific tropical species that is found in small numbers on reef slopes and seagrass beds of the Southern Islands.**Threats:** Exploited by the bêche de mer trade throughout its world distribution range but the IUCN threat level is listed as Least Concern globally. For Singapore the threat category is raised to Endangered because of the small numbers and restricted distribution range here.

Photo: David J.W. Lane

*Stichopus vastus* in the waters of Pulau Semakau, Singapore.**Scientific Interest and Potential Value:** A bêche de mer fishery species that is exploited throughout its range.**Conservation Measures:** Effective local conservation would require inclusion of Southern Islands subtidal and seagrass habitats of this species within an expanded Marine Protected Area network.**Scientific Name:***Stichopus ocellatus* Massin, Zulfigar, Hwai & Boss, 2002**Common Name:**

Ocellated sea cucumber

Order/Family:

Holothuroidea: Stichopodidae

National Status: Endangered (EN)**Habitat and Ecology:** Found on coral rubble of reef slopes and soft sediments. Feeds on sediment and derives nutrition from the associated organic matter.**Distribution:** South China Sea, South-west Sulawesi, Papua New Guinea in addition to Singapore. First

Photo: David J.W. Lane



described and named from Malaysian waters in 2002 but known on Singapore's Southern Islands' reef slopes since the mid 1980s.

Threats: Continued land reclamation around the Southern Islands threatens to obliterate the remaining habitat of this uncommon species.

Scientific Interest and Potential Value: This species is undoubtedly exploited by the sea cucumber trade in the West Pacific but, until recently at least, it was not recognised as a distinct species and had been grouped with other similar stichopodid sea cucumbers in fishery trade data.

Conservation Measures: Inclusion of habitat localities within an expanded Southern Islands Marine Protected Area network would help to conserve this species.

Scientific Name:
Pseudocolochirus violaceus
(Théel, 1886)

Common Name:
Sea-apple sea cucumber

Order/Family:
Holothuroidea: Cucumariidae

National Status: Vulnerable (VU)

Habitat and Ecology: Found intertidally in the Changi/ Pulau Ubin area and in greater numbers in offshore dredge hauls in the same region. Also seen, infrequently, on reef slopes around the Southern Islands (where this photo was taken). Expanded branching tentacles, coated in mucus and held in the water column, are retracted one at time and stuffed into the central mouth to ingest trapped suspended organic particulates and plankton.

Distribution: A tropical sea cucumber with a central Indo-west Pacific distribution. In Singapore it is found in the Changi/ Ubin/ Tekong area and around the Southern Islands.

Threats: This multicoloured sea cucumber is harvested in the Pacific region as an aquarium trade species and

Photo: David J.W. Lane



it is possible that casual collection by beachcombers could present a threat to local populations. Further land reclamation, particularly in the Changi/ Pulau Ubin/ Pulau Tekong area would be a threat to local populations.

Scientific Interest and Potential Value: The bright colouration of the Sea-apple sea cucumber is attractive to the aquarist but in nature, it probably serves as a warning colouration, signaling the presence of toxic chemicals that deter potential predators.

Conservation Measures: Prevention of habitat loss and major population losses of this species requires long-term protection of intertidal sites at the Chek Jawa Wetland Reserve as well as adjacent subtidal habitats between Changi, Pulau Ubin and Pulau Tekong.

Scientific Name:*Euryale aspera*

Lamarck, 1816

Common Name:

Basket star

Order/Family:

Euryalida: Euryalidae

National Status: Data Deficient (DD)

Habitat and Ecology: This species stays hidden within crevices on the reef during the day. At night, it emerges to seek for its food in the form of plankton by extending its arms in a basket-like posture. Juveniles have been found on Sea fans.

Distribution: Indo-west Pacific, typically at depths from 2 to 60m. In Singapore, its presence was first based on a single record from the 19th century when it was collected at a depth of 40m off St John's Island in the Southern Islands. Subsequently, over the past fifteen years, it has been recorded in the east Johore Straits, off Changi and at Pulau Hantu in the Southern Islands.

Threats: In the past, the dumping of dredge spoils in the Singapore Deepes off St John's Island may have adversely

Photo: David J.W. Lane



impacted this species. The true status of this nocturnal species is still relatively unknown since night diving surveys are not often carried out on Singapore reefs.

Scientific Interest and Potential Value: In the second edition Singapore Red Data Book, it was not known whether this species had already been extirpated. It has since been confirmed to be present at a number of sites including off the coast of Changi and in the waters around the Southern Islands.

Conservation Measures: More night dives are needed to better understand the distribution as well as ecology of this species.

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FAUNA : VERTEBRATES

Freshwater Fishes

LOW BI WEI, TAN HEOK HUI, JEFFREY T.B. KWIK, ZENG YIWEN, DARREN C.J. YEO

The ten species highlighted in this chapter exemplify an assortment of the challenges facing native freshwater fish conservation in Singapore. In total, 45 species of native freshwater fishes have been recorded from Singapore, of which 36 are currently extant and nine presumably Nationally Extinct. Owing to threats such as habitat degradation and invasive species, about half of the extant native freshwater fishes (19 species or 53%) fall within a threatened category.

The majority of the fishes (24 species) occur only in natural streams or freshwater swamp within forests or along forest edges, which are characterized by cool, acidic waters. A few species, such as the saddle barb *Barbodes sellifer* or the harlequin rasbora *Trigonostigma heteromorpha*, may be sighted more frequently in nature areas by those with a keen eye, but are nonetheless considered nationally threatened due to their narrow habitat requirements and restricted distributions. Their small numbers and fragmented populations make them highly vulnerable to anthropogenic and natural stressors such as habitat modification, poaching and extreme weather events. This highlights the importance of preserving and monitoring protected forested areas, such as the nature reserves, for their long-term survival.

The remaining 12 species are generally found in exposed habitats in rural to urban areas, such as open-canopy streams, freshwater marshes, ponds, and reservoirs. While these species are adapted to exposed habitat conditions, their close proximity to anthropogenic activities and disturbances poses a different set of challenges. For instance, the threat posed by non-native species introductions is greater in disturbed habitats. Examples of invasives negatively impacting native counterparts include the introduced barcheek goby *Rhinogobius similis*, believed to have caused extirpations of native gobies *Eugnathogobius siamensis* and *Pseudogobiopsis oligactis*, as well as the African sharptooth catfish *Clarias gariepinus* displacing the once-common native walking catfish *Clarias batrachus* from urban water bodies.

Despite Singapore's small size and numerous anthropogenic pressures on freshwater ecosystems, there have been numerous significant scientific discoveries. For example, the spotted eel-loach *Pangio muraeniformis*, harlequin rasbora *Trigonostigma heteromorpha*, longnose little warty catfish *Parakysis longirostris* and saddle barb *Barbodes sellifer* were all formally described from Singapore, the latter of which as recently as 2021. In 2022, a population of the bladefin catfish *Encheloclarias kelioides*, an extremely rare species not seen since its original description from Malaysia in the early 1990s and once thought to be globally extinct, was discovered from a few streams in the Central Catchment Nature Reserve.

Scientific Name:
Barbodes sellifer Kottelat
& Lim, 2021

Common Name:
Saddle barb

Order/Family:
Cypriniformes: Cyprinidae

National Status: Vulnerable (VU)

Habitat and Ecology: Gregarious, omnivorous species that frequents the middle and lower parts of the water column, usually occurring in large, loose shoals. Typically inhabits forest streams and freshwater swamps.

Distribution: In Singapore, known from the Central Catchment Nature Reserve, Bukit Timah Nature Reserve, Western Catchment forests and Pulau Tekong. Distributed in the Malay Peninsula, Sumatra, Riau islands, Natuna islands and Anambas islands.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. An introduced congener, *B. rhombeus*, is present in Singapore although it generally occupies a different habitat niche, occurring in disturbed, open-canopy streams at forest



Photo: Tan Heok Hui

edges and open country habitats. Nonetheless, it is unknown if competition had occurred between both species in the past.

Scientific Interest and Potential Value: This species was described recently in 2021 based on specimens collected from Singapore. Previously identified as *Puntius binotatus* (Valenciennes, in Cuvier & Valenciennes, 1842) and later (1996 onwards) as *Puntius*, *Systemus* or *Barbodes banksi* (Herre, 1940). However recent studies have shown that *B. banksi* is restricted to western Borneo, whereas other populations represent a distinct species and should be referred to as *B. sellifer*.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts.

Scientific Name:
Boraras maculatus
(Duncker, 1904)

Common Name:
Pygmy rasbora

Order/Family:
Cypriniformes: Cyprinidae

National Status: Endangered (EN)

Habitat and Ecology: Gregarious species that appears to be restricted to shallow forest streams and freshwater swamps with slow-flowing, acidic waters.



Photo: Tan Heok Hui

Distribution: In Singapore, known only from a small number of locations in the Central Catchment Nature Reserve. Distributed in the Malay Peninsula, Sumatra and Riau islands.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. Appears to be relatively sensitive to anthropogenic impacts; a sharp population decline was observed at one location between 2013 and 2015 following stream modification (that led to increased sedimentation and altered flow patterns). Does not appear to be collected in any substantial numbers for the aquarium trade locally, although its occurrence in only a few locations (and in

small numbers) means that any illegal collection may still pose a threat.

Scientific Interest and Potential Value: This brightly-coloured species is a popular aquarium fish.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts.

Scientific Name:

Trigonostigma heteromorpha
(Duncker, 1904)

Common Name:

Harlequin rasbora

Order/Family:

Cypriniformes: Cyprinidae

National Status: Endangered (EN)

Habitat and Ecology: Gregarious species that frequents the upper and middle parts of the water column, mainly feeding on insects. Restricted to forest streams and freshwater swamps with acidic waters.

Distribution: In Singapore, known from the Central Catchment Nature Reserve, Bukit Timah Nature Reserve, Western Catchment forests and Pulau Tekong. Distributed in the Malay Peninsula, Sumatra, Riau islands, Natuna islands and Anambas islands.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. Does not

Photo: Tan Heek Hui



appear to be collected in any substantial numbers for the aquarium trade locally, although sporadic illegal collection may still pose a threat.

Scientific Interest and Potential Value: This popular aquarium fish was described in 1904 based on specimens collected from Kuala Lumpur and the Singapore Botanic Gardens. This species was one of seven native fishes featured on an iconic Singapore stamp series issued in 1962 (as *Rasbora heteromorpha*).

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts, as well as policing against illegal collection.

Scientific Name:
Pangio muraeniformis
(de Beaufort, 1933)

Common Name:
Spotted eel-loach

Order/Family:
Cypriniformes: Cobitidae

Photo: Tan Heok Hui



National Status: Critically Endangered (CR)

Habitat and Ecology: Bottom-dwelling omnivorous species that is restricted to forest streams and freshwater swamps with acidic waters. Typically hidden amongst dense submerged vegetation and leaf litter.

Distribution: In Singapore, known only from one small area of the Central Catchment Nature Reserve. Distributed in the Malay Peninsula and Riau islands.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. It occurs only in a single patch of forest, where it is uncommon.

Scientific Interest and Potential Value: This species was described in 1933 based on specimens collected from Singapore.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts.

Scientific Name:
Parakysis longirostris
Ng & Lim, 1995

Common Name:
Longnose little warty catfish

Order/Family:
Siluriformes: Akysidae

Photo: Tan Heok Hui



National Status: Critically Endangered (CR)

Habitat and Ecology: Bottom-dwelling species that inhabits fast-flowing sections of swamp-forest streams with acidic waters and dense growths of submerged vegetation and/or leaf litter. A highly secretive species that feeds on small invertebrates and uses its paired fins to move about on the stream bed.

Distribution: In Singapore, known only from one small area of the Central Catchment Nature Reserve. Distributed in the southern Malay Peninsula and Riau islands.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. It occurs only in a single patch of forest, where it is rare. Occurs mostly in faster-flowing stream sections, which suggests it may be vulnerable to hydrological perturbations.

Scientific Interest and Potential Value: This species was described in 1995 based on specimens collected from Singapore.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts.

Scientific Name:
Encheloclarias kelioides
Ng & Lim, 1993

Common Name:
Bladefin catfish

Order/Family:
Siluriformes: Clariidae



Photo: Tan Heok Hui

National Status: Critically Endangered (CR)

Habitat and Ecology: Highly secretive bottom-dwelling species that is restricted to acidic swamps, where it hides amongst submerged vegetation or burrows into the substratum.

Distribution: In Singapore, known so far from only a single location within the Central Catchment Nature Reserve. Distributed in the southern Malay Peninsula.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. It has an extremely restricted local distribution, occurring only in the upper reaches of a few streams, and in very small numbers, within a single patch of forest.

Scientific Interest and Potential Value: Recently discovered in Singapore in 2022. Prior to this, the species was only known from two individuals collected from Johor and Pahang in the early 1990s, with no other specimens known to have been collected since. In 2019, the IUCN Red List noted that the species may already be extinct, given that the only previous known locations (in Johor and Pahang) have become highly degraded, and extensive surveys in Peninsular Malaysia failed to detect the species. The discovery of a population from Singapore is therefore of potential global significance as it could provide assurances for the long-term survival of the species, given its possible extirpation elsewhere.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts.

Scientific Name:
Eugnathogobius siamensis
(Fowler, 1934)

Common Name:
Roundhead stream goby

Order/Family:
Gobiiformes: Gobiinellidae



Photo: Tan Heok Hui

National Status: Critically Endangered (CR)

Habitat and Ecology: Bottom-dwelling, diurnal carnivore that inhabits rural open-canopy streams with flowing water and sandy/clay bottoms.

Distribution: In Singapore, known only from one semi-urban stream in the Thomson area. Widely distributed from southern China to Indonesia.

Threats: Displacement by invasive species and habitat degradation. The species was recorded from multiple locations in central, northeastern and western Singapore in the 1930s to 1960s, although since 2005, it is only known from a single location within the Kallang river basin. Observed declines have been largely attributed to competition and displacement by the introduced *Rhinogobius similis* (previously identified as *R. giurinus*). Its last remaining location lies within a semi-urban residential area and is unprotected, which further increases the risk of extirpation from anthropogenic factors (e.g., pollution, channelization). It is also unknown if the completion of the Marina Barrage in 2008 has impacted the species, given that it requires

access to the sea to complete its life cycle (the larvae have an obligate phase in saline waters).

Scientific Interest and Potential Value: This species is very occasionally seen in the aquarium trade.

Conservation Measures: The local status of this species requires urgent verification; it was last recorded in 2005, and there are concerns it may already be extirpated. If still extant, it requires immediate protection of its remaining habitat(s) from human impacts, and, if numbers allow, a potential translocation to waterways that continue to have connection with the sea.

Scientific Name:

Nandus nebulosus (Gray, 1835)

Common Name:

Sunda leaf fish

Order/Family:

Perciformes: Nandidae

National Status: Endangered (EN)

Habitat and Ecology: Solitary, cryptic carnivore that is restricted to slow-flowing forest streams. Resembles a dead leaf and uses its camouflage to avoid predation as well as to sneak up to or ambush small fishes and crustaceans.

Distribution: In Singapore, known only from a small number of locations in the Central Catchment Nature Reserve and Bukit Timah Nature Reserve. Distributed in the Malay Peninsula, Sumatra and Borneo.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. It is generally

Photo: Tan Heok Hui



rare at known locations. Does not appear to be collected in any substantial numbers for the aquarium trade locally, though its occurrences in only a few locations (and in small numbers) means that any illegal collection may still pose a threat.

Scientific Interest and Potential Value: This species is sometimes sold as an aquarium fish.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts, as well as policing against illegal collection.

Scientific Name:

Betta imbellis Ladiges, 1975

Common Name:

Crescent betta

Order/Family:

Perciformes: Osphronemidae

Photo: Tan Heek Hui



National Status: Endangered (EN)

Habitat and Ecology: Air-breathing species that frequents the upper parts of the water column, mainly feeding on small arthropods. Typically inhabits slow-flowing, rural open-canopy streams, ponds, and swamps with dense aquatic vegetation. Males are highly territorial and usually solitary. Exhibits paternal care; the male builds a bubble nest amongst floating or emergent vegetation, where eggs and fry will be tended to until free-swimming.

Distribution: In Singapore, known from a few small areas in the Central Catchment Nature Reserve and rural parts of northwestern Singapore. Distributed in the Malay Peninsula and northern Sumatra.

Threats: Mainly habitat degradation. While the species is relatively common at one location, it is extremely rare

at other areas where (presumably small) populations may be highly vulnerable to disturbances. Does not appear to be collected in any substantial numbers for the aquarium trade locally, though its occurrences in only a few locations (and in small numbers) means that any illegal collection may still pose a threat.

Scientific Interest and Potential Value: A popular aquarium fish. In southern Thailand, this species is selectively bred for aggression and used for fish-fighting (similar to its close relative the Siamese fighting fish, *B. splendens*).

Conservation Measures: Continued protection of its natural habitat (typically rural open-canopy streams and ponds) from human impacts, as well as policing against illegal collection.

Scientific Name:

Channa limbata (Cuvier, in Cuvier & Valenciennes, 1831)

Common Name:

Dwarf snakehead

Order/Family:

Perciformes: Channidae

Photo: Tan Heek Hui



National Status: Endangered (EN)

Habitat and Ecology: Solitary, air-breathing carnivore that is restricted to shallow forest streams

and acidic swamps, feeding on small fish, insects, and crustaceans. Exhibits intensive parental care; the male broods the eggs and fry in his mouth, and both parents guard the free-swimming fry aggressively.

Distribution: In Singapore, known only from a small number of locations in the Central Catchment Nature Reserve and Bukit Timah Nature Reserve. Widely distributed from southern China to Indonesia.

Threats: Mainly habitat degradation, given that this species is restricted to forested habitats. It is generally uncommon in known locations. Reported as extinct in 1966 but was later rediscovered in 1989. Does not appear to be collected in any substantial numbers for the aquarium trade locally, though its occurrences in only a few locations (and in small numbers) means that any illegal collection may still pose a threat.

Scientific Interest and Potential Value: This species is sometimes sold as an aquarium fish. Previously identified as *C. gachua* (Hamilton, 1822), but recent genetic studies have shown that *C. gachua* is restricted to the Indian subcontinent, whereas populations east of the Indo-Burman ranges (Southern China, most of Indochina, Sundaic Southeast Asia) including those in Singapore represent a distinct species that should be referred to as *C. limbata*.

Conservation Measures: Continued protection of its natural habitat (forest streams and freshwater swamps) from human impacts, as well as policing against illegal collection.

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Marine Fishes

ZEEHAN JAAFAR, JEFFREY K.Y. LOW, KELVIN K.P. LIM

Scientific Name:

Aetobatus ocellatus (Kuhl, 1823)

Common Name:

Ocellated eagle-ray

Family:

Aetobatidae

National Status: Critically Endangered (CR)

Habitat and Ecology: The Ocellated eagle-ray occurs in shallow coastal areas to depths of up to 60m. In Singapore, this species has been observed in areas with fringing coral reefs, as well as lagoons and embayments. This species feeds on fishes as well as small invertebrates such as molluscs and crustaceans. Fecundity in this species is low; females do not bear young annually, and gestation for each litter has been reported to be about twelve months.

Distribution: The Ocellated eagle-ray can be found in the tropical and warmer temperate coastal reefs of the Indo-West and Central Pacific regions. This species was first reported from Singapore in 1849 and is extant at both Singapore and Johor Straits.

Threats: Habitat loss, habitat modification, recreational angling, extraction for consumption.

Scientific Interest and Potential Value: Global populations of this species are classified as Vulnerable to Extinction by IUCN's Red List of Threatened Species. The meat of this species is consumed, and skin is used for leather goods. Throughout its distribution, most population sizes are on the decline given its susceptibility to anthropogenic activities coupled with its low fecundity. In Singapore, this species is considered highly desirable, and targeted by recreational anglers.

Conservation Measures: Presently, there are no conservation measures specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Photo: Khalid El Ouazghi



Aetobatus ocellatus off Sentosa, Singapore.

Scientific Name:
Rhynchobatus australiae
(Whitley, 1939)

Common Name:
White-spotted wedgefish

Family:
Rhinidae



Rhynchobatus australiae in the waters of Thailand.

National Status: Critically Endangered (CR)

Habitat and Ecology: One of the largest wedgefish species, the White-spotted wedgefish can grow to 3m in total length. This species can be found throughout the Indo-Pacific region, from shallow coastal waters to 60m deep. The White-spotted wedgefish feeds on small invertebrates such as molluscs and crustaceans. This species is viviparous, and females bear litter sizes of up to 19 pups.

Distribution: The White-spotted wedgefish can be found in the tropical and warmer temperate coastal reefs of the Indo-West Pacific regions. In Singapore, this species was first reported in 1999; and has since been primarily encountered when caught by recreational anglers at nearshore areas with sandy-silt substrate.

Threats: Habitat loss, habitat modification, recreational angling.

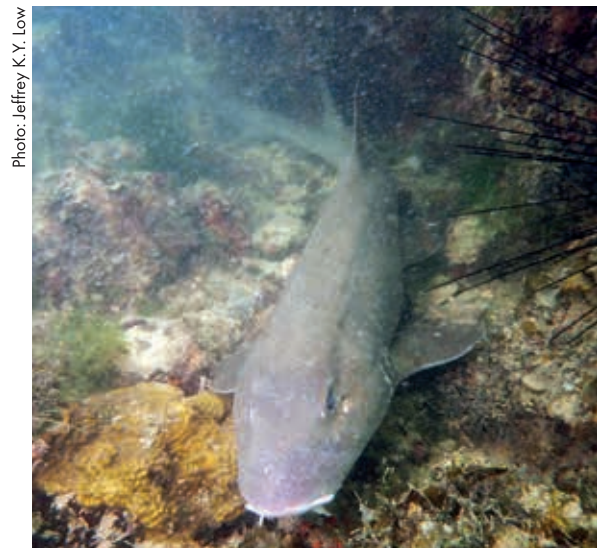
Scientific Interest and Potential Value: Global populations of this species are classified as Critically Endangered by IUCN's Red List of Threatened Species due to targeted and intense fishing pressure in areas where they occur. The fins of this species are prized, as are the snout. The meat is also consumed although often sold at a fraction of the price of the fins and snout. In Singapore, this species is considered highly desirable, and targeted by recreational anglers.

Conservation Measures: Presently, there are no conservation measures specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Scientific Name:
Nebrius ferrugineus
(Lesson, 1831)

Common Name:
Tawny nurse shark

Family:
Ginglymostomatidae



Nebrius ferrugineus in waters off Pulau Biola, Singapore.

National Status: Critically Endangered (CR)

Habitat and Ecology: The Tawny nurse shark is a docile, nocturnal species that is naturally distributed throughout the Indo-Pacific region. This viviparous species is most commonly observed over continental shelf areas shallower than 70m. The Tawny nurse shark feeds on cephalopods, crustaceans, corals, echinoderms, and small fishes.

Distribution: The Tawny nurse shark is widely distributed in the tropical and warmer temperate coastal reefs of the Indo-West Pacific regions. In Singapore, this species was first reported in 1852; and is at present occasionally observed in the coral reef areas within the Singapore Strait.

Threats: Habitat loss, habitat modification.

Scientific Interest and Potential Value: Global populations of this species are classified as Vulnerable by IUCN's Red List of Threatened Species due to targeted and intense fishing pressure in areas where they occur. The meat of this species is consumed fresh, dried, or salted, and the skin is used for leather goods. In Singapore, this species is considered highly desirable by recreational anglers.

Conservation Measures: At present, there are no conservation measures specific for this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Scientific Name:

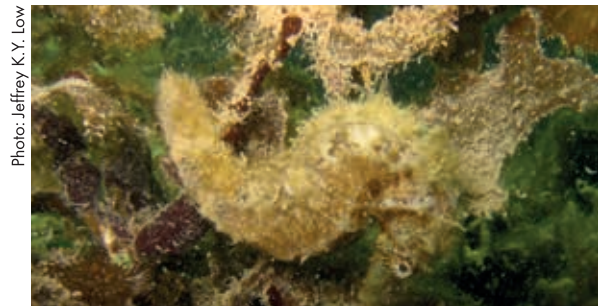
Hippocampus comes Cantor
1849

Common Name:

Tiger tail seahorse

Family:

Syngnathidae



Hippocampus comes at 3m water depth off Pulau Hantu, Singapore.

National Status: Critically Endangered (CR)

Habitat and Ecology: The Tiger tail seahorse is a cryptic species typically observed in shallow coastal areas. In Singapore, this species is closely associated with coral reefs and coral-associated seagrass meadows. The upper and lower jaws of seahorses are fused and tubular resulting in a highly specialised feeding mechanism. The prey items of seahorses constitute mostly of small zooplankton organisms. Similar to males of other seahorse species, the males of the Tiger tail seahorse possess a brood pouch into which females deposit eggs. Males tend to the clutch of eggs until they hatch.

Distribution: First described from Penang Island, Peninsular Malaysia, this species is now reported to be distributed along coastal areas of Eastern Indian and Western Pacific Oceans. In Singapore, this species was

first reported in 1861; and has been reported at sites within Singapore and Johor Straits.

Threats: Habitat loss, habitat modification, declining water quality, targeted extraction.

Scientific Interest and Potential Value: Global populations of the Tiger tail seahorse are assessed as Vulnerable by IUCN's Red List of Threatened Species. The primary drivers of threat include targeted extraction of this species, along with other seahorses and pipefishes as these are sought after for the curio trade and traditional remedies market. Live seahorses are also captured for the aquaria trade.

Conservation Measures: There are no conservation measures in place specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Scientific Name:

Lutjanus sebae
(Cuvier, 1816)

Common Name:

Red emperor snapper

Family:

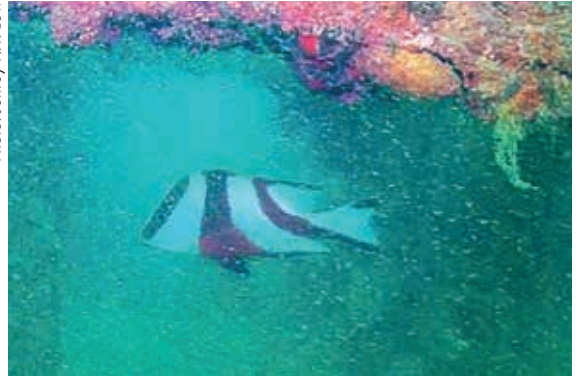
Lutjanidae

National Status: Critically Endangered (CR)

Habitat and Ecology: The Red emperor snapper is a reef-associated species although adults can occur in deeper areas with sandy-silt substrate. This species feeds on small fishes, crustaceans, and cephalopods. Sub-adults possess characteristic dark red bands that are lost in adult individuals; the latter are uniformly red or pink.

Distribution: This species is widely distributed at tropical nearshore areas across the Indo-west Pacific, from the southern Red Sea and East Africa, east to Australia and southern Japan. First reported from Singapore in 1865, this species is encountered—by divers or recreational anglers—within the Straits of Singapore.

Photo: Jeffrey K.Y. Low



Lutjanus sebae at 12m water depth at Terumbu Pempang Laut, Singapore.

Threats: Habitat loss, habitat modification, declining water quality, targeted extraction.

Scientific Interest and Potential Value: Global populations of the Red emperor snapper are assessed as Least Concern by IUCN's Red List of Threatened Species. This is a commercially important species and is prized by recreational anglers in Singapore.

Conservation Measures: There are no conservation measures in place specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Scientific Name:

Pomacentrus alexanderae
Evermann & Seale 1907

Common Name:

Alexander's damselfish

Family:

Pomacentridae

National Status: Endangered (EN)

Habitat and Ecology: Alexander's damselfish is a reef-obligate species that is solitary or occur in pairs. This species feeds on algae and small invertebrate organisms such as crustaceans and gastropods. This oviparous species practices parental care—males guard and aerate eggs, that are laid on hard substrate, until they hatch.

Photo: Jeffrey K.Y. Low



Pomacentrus alexanderae at Sisters' Islands, Singapore.

Distribution: This species is widely distributed at tropical coral reef areas across the Western Pacific. First reported from Singapore in 1990, this species is encountered at only a few sites within the Straits of Singapore where live coral cover is higher.

Threats: Habitat loss, habitat modification, declining water quality.

Scientific Interest and Potential Value: Global populations of Alexander's damselfish have not yet been evaluated by IUCN's Red List of Threatened Species. This species is occasionally observed in the aquaria trade.

Conservation Measures: There are no conservation measures in place specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Scientific Name:
Halichoeres melanochir
Fowler & Bean 1928

Common Name:
Orangefin wrasse

Family:
Labridae

National Status: Endangered (EN)

Habitat and Ecology: The Orangefin wrasse occurs in coral reefs and shallow rocky areas either singly or in small groups. This species feeds on small invertebrate organisms and form distinct pairs during mating. Little else is known of their ecology.

Distribution: This species is widely distributed across the Western Pacific. First reported from Singapore in 1990, this species is now encountered at only a few sites within the Straits of Singapore.

Threats: Habitat loss, habitat modification, declining water quality.

Scientific Interest and Potential Value: : Global populations of Orangefin wrasse are evaluated as Least Concern by IUCN's Red List of Threatened Species. This species is occasionally observed in the aquaria trade.

Conservation Measures: There are no conservation measures in place specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.

Photo: Jeffrey K.Y. Low



Halichoeres melanochir in waters off Pulau Satumu, Singapore.

Scientific Name:
Thalassoma lunare
(Linnaeus 1758)

Common Name:
Moon wrasse

Family:
Labridae

National Status: Endangered (EN)

Habitat and Ecology: The Moon wrasse inhabits coral reefs and shallow rocky areas either singly or in small groups. This species feeds on small invertebrate organisms and occasionally, small fishes. The Moon wrasse has been reported to engage in cleaning behaviour, where they pick on ectoparasites off other fishes that they then consume.

Distribution: This species is widely distributed across the Western Pacific. First reported from Singapore in 1860, this species is now only rarely observed at a few sites within the Straits of Singapore.

Photo: Jeffrey K.Y. Low



Thalassoma lunare in waters of Boracay, Philippines.

Threats: Habitat loss, habitat modification, declining water quality.

Scientific Interest and Potential Value: Global populations of Moon wrasse are evaluated as Least Concern by IUCN's Red List of Threatened Species. This species is occasionally observed in the aquarium trade.

Conservation Measures: There are no conservation measures in place specific to this species. Existing measures are in the form of area protection and maritime regulation within the Sisters' Islands Marine Park.