

Horseshoe Crabs and Marine Decapod Crustaceans

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Scientific Name:

Tachypleus gigas
(Müller, 1785)

Common Name:

Coastal horseshoe crab

Order/Family:

Xiphosurida/Limulidae

National Status: Vulnerable (VU)

Habitat and Ecology: Typically encountered in sandy to muddy shores near reefs, seagrass beds, and mangroves, when they come up from deeper water to breed; in Singapore they are usually seen singly or in mating pairs (amplexus) on the edge of the shore. Relatively more dispersive (not localised) and adapted to open-sea conditions, compared to the other species of horseshoe crab found in Singapore (viz. Tang et al., 2021). They feed on bottom-dwelling invertebrates, also scavenge on organic debris. They produce large numbers of eggs in the spawning season, which can be a valuable food source for shore birds and other animals.

Distribution: Throughout Indo-West Pacific region.

Threats: Loss of suitable sandy/muddy shore habitats from coastal reclamation, development, and pollution; also, mortality from accidental entanglement in abandoned fishing gear (ghost fishing).

Scientific Interest and Potential Value: Horseshoe crabs represent an ancient lineage of arthropods with high phylogenetic uniqueness. Studies also suggest

Photo: CMBS



that they are essential elements of the coastal and benthic food webs. They are of biomedical importance as their blood (hemolymph) is harvested and used to detect bacterial contamination in drugs and other pharmaceutical products and equipment. Elsewhere in Asia, they are sometimes consumed as food (gravid females) or may be dry-preserved and sold as curios or decorative items.

Conservation Measures: This species was previously listed as Endangered (EN) in RDB2 (Yeo et al., 2008). While still uncommon to rare in Singapore, there have been increased sightings in recent years since 2008. Recent population genetics studies suggest that local populations are panmictic and that Singapore has high potential for recolonisation from adjacent populations. Main conservation measures should include habitat protection and restoration as well as monitoring of populations.

Scientific Name:
Carcinoscorpius rotundicauda
(Latreille, 1802)

Common Name:
Mangrove horseshoe crab

Order/Family:
Xiphosurida/Limulidae

National Status: Vulnerable (VU)

Habitat and Ecology: Found only in mudflats and mangroves, where it feeds on benthic invertebrates, such as molluscs and polychaete worms. Significant numbers of juveniles have been observed seasonally, and studies have shown that there are patterns of high and low periods in breeding activity despite the horseshoe crabs breeding year-round.

Distribution: Throughout Indo-West Pacific region.

Threats: Loss of suitable mangrove and muddy shore habitats from coastal reclamation, development, and pollution; also, mortality from accidental entanglement in abandoned fishing gear (ghost fishing).

Scientific Interest and Potential Value: Horseshoe crabs represent an ancient lineage of arthropods with high phylogenetic uniqueness. Studies also suggest that they are essential elements of the coastal and benthic food webs. They are of biomedical importance as their blood (hemolymph) is harvested and used to

Photo: CMBS



detect bacterial contamination in drugs and other pharmaceutical products and equipment. Elsewhere in Asia, they are sometimes consumed as food (gravid females) or may be dry-preserved and sold as curios or decorative items.

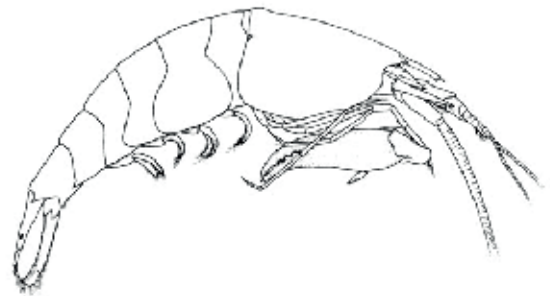
Conservation Measures: Although usually more commonly observed in Singapore than *Tachypleus gigas*, one study (Tang et al., 2021) has shown that local populations of *C. rotundicauda* are less dispersed in the region and have a lower genetic diversity, probably making them more vulnerable to extinction. Main conservation measures should include protection and restoration of mangrove and mudflat habitats, as well as monitoring of populations.

Scientific Name:
Salmonus singaporensis Anker, 2003

Common Name:
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Order/Family:
Decapoda/Alpheidae

Line Drawing: From Anker (2003), RBZ



National Status: Critically Endangered (CR)

Habitat and Ecology: Occurs in mudflats, usually with soft and soggy mud, and possibly associated with burrows of other alpheid shrimps, such as *Alpheus rapacida* De Man, 1908; infaunal, occurring in the intertidal and also possibly subtidal.

Distribution: Presently known only from Singapore, and possibly also from Indonesia (Anker & De Grave, 2016).

Threats: Loss of suitable mudflat habitats, particularly soft and soggy mud substrates due to coastal reclamation and modification.

Scientific Interest and Potential Value: A rare and poorly known species, only known from the holotype

specimen, collected from intertidal mudflats of Tanjong Penjuru (now a reclaimed area in the Jurong district). It has not been found in Singapore since it was first collected in 1959, despite several surveys in similar localities. It was considered likely to be locally extinct by Anker & De Grave (2016) in their checklist of Singapore Caridea.

Conservation Measures: Protection and restoration of substantial mudflat areas, particularly those that can harbour burrowing or infaunal crustaceans and other animals, should be undertaken. Targeted surveys must also be undertaken to confirm the presence of this species in Singapore or elsewhere. Likewise, more research must be done to understand its biology, which would help guide conservation efforts.

Scientific Name:
Synalpheus stimpsoni
(De Man, 1888)

Common Name:
Crinoid snapping shrimp

Order/Family:
Decapoda/Alpheidae

Photo: CMBS/A. Anker



National Status: Endangered (EN)

Habitat and Ecology: In coral reefs and similar rocky habitats with many crevices and attachments for crinoids; found always associated with crinoid feather stars, mainly of the family Comatulidae. Occurring in shallow subtidal depths to as deep as 155 m. The shrimp feeds on trapped food particles and mucus on the arms of its host. It avoids detection by predators through camouflage, matching the host's colouration; with an enlarged claw capable of producing powerful shockwaves for added protection.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable reef habitats for comatulid crinoids due to reclamation or habitat modification; also, sedimentation and declining water quality due to pollution.

Scientific Interest and Potential Value: The shrimp is an obligate symbiont of feather stars, and this pairing is of interest for research in evolution and behavioural biology. It may also likely be a species-complex, further taxonomic studies will be required to elucidate this matter. The presence of complex symbiotic relationships in reef ecosystems is usually an indicator of reef health, their absence usually indicating stress in these ecosystems.

Conservation Measures: Conservation of these shrimps is dependent on the continued survival of its host feather star, which in turn depends on maintaining healthy reef habitats. Main conservation efforts should involve protection and restoration of coral reefs, and the maintenance of good water quality crucial for filter-feeding feather stars.

Scientific Name:
Cristimenes cristimanus
(Bruce, 1965)

Common Name:
Black urchin shrimp

Order/Family:
Decapoda/Palaemonidae

Photo: CMBS/A. Anker



National Status: Vulnerable (VU)

Habitat and Ecology: Occurs in coral reefs as an obligate symbiont of diadematid sea urchins, particularly *Diadema setosum* (Leske, 1778), and also, sometimes, *Echinothrix calamaris* (Pallas, 1774). It is usually observed clinging to the sea urchin's spines, and its colouration tends to match and blend in with these spines making it hard to detect. The biology of this shrimp is poorly known.

Distribution: Western Pacific region.

Threats: Loss of suitable reef habitats for the host sea urchins due to habitat destruction or modification; also sedimentation and deteriorating water quality due to pollution.

Scientific Interest and Potential Value: The shrimp is an obligate symbiont of diadematid sea urchins, which makes it an interesting subject for evolutionary and behavioural studies. The presence of complex symbiotic relationships in reef ecosystems is usually an indicator of reef health, their absence usually indicating stress in these ecosystems.

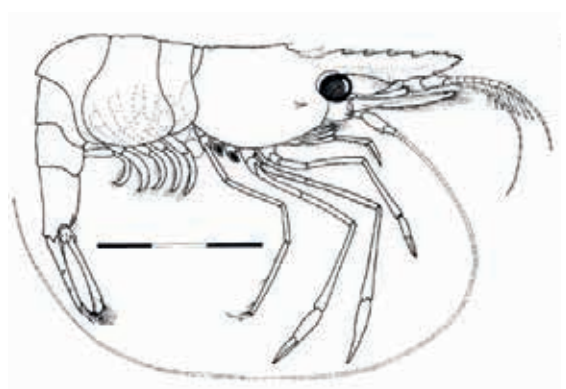
Conservation Measures: Conservation of these shrimps is dependent on the continued survival of its host sea urchins, which in turn depends on maintaining healthy reef habitats. Main conservation efforts should involve protection and restoration of coral reefs, and the maintenance of good water quality.

Scientific Name:
Cuapetes johnsoni (Bruce, 1987)

Common Name:
Seagrass shrimp

Order/Family:
Decapoda/Palaemonidae

Line Drawing: From Bruce (1987),
Indo-Malayan Zoology



National Status: Critically Endangered (CR)

Habitat and Ecology: Found in mangrove channels and seagrass beds. Very little else is known about this species.

Distribution: Singapore only

Threats: Loss of suitable habitat, such as mangrove channels and seagrass (*Enhalus*) beds, due to coastal reclamation and development.

Scientific Interest and Potential Value: Reportedly abundant in the 1960's in Jurong and in Jurong Strait, but these sites have been extensively modified via reclamation or construction of the Tuas Link since then. This species is now rare and poorly known as it has not been seen nor collected from the wild since 1966; this despite intensive collection efforts in or near the type locality and similar habitats around Singapore by the CMBS (2010–2015). It was considered likely to be locally extinct by Anker & De Grave (2016) in their checklist of Singapore Caridea.

Conservation Measures: Protection and restoration of mangroves, especially in a manner that promotes formation of channels; and seagrass beds, especially containing *Enhalus* species. This species may also likely occur in similar habitats in adjacent areas outside of Singapore. Restoration of such habitats may encourage re-colonisation.

Scientific Name:
Thalassina anomala (Herbst,
1804) *sensu lato*

Common Name:
Mud lobster

Order/Family:
Decapoda/Thalassinidae

National Status: Endangered (EN)

Habitat and Ecology: Found in mangroves where it builds large mounds. Adults highly tolerant of the anoxic/hypoxic conditions in the mud; extensive and deep burrowers, extracting organic matter from ingested mud. Burrowing activity and mound building brings organic matter to the surface contributing to nutrient cycling, and mounds also provide habitats for other mangrove species.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable mangrove habitats from coastal reclamation, development, and pollution.

Scientific Interest and Potential Value: *Thalassina anomala* is a mangrove keystone species due to its important ecological roles. The genus *Thalassina* was revised by Ngoc-Ho & de Saint Laurent (2009), and five species were recorded from Singapore, i.e., *Thalassina anomala* (Herbst, 1804), *T. gracilis* Dana, 1852, *T. krempfi* Ngoc-Ho & de Saint Laurent, 2009, *T. spinirostris* Ngoc-Ho & de Saint Laurent, 2009 and *T. squamifera* De Man, 1915. A sixth species *T. kelanang* Moh & Chong, 2009, has also been reported. Many of

these species are not well studied and, with the possible exception of *T. gracilis*, may have been confused with *T. anomala* in museum and historical records.

Conservation Measures: The survival of the mud lobsters is important for a healthy mangrove, as many other mangrove species are closely associated with and dependent on them. Main conservation methods should include protection and restoration of mangrove habitats.



Scientific Name:
Porcellanella triloba
White, 1851

Common Name:
Painted porcelain crab

Order/Family:
Decapoda/Porcellanidae

National Status: Vulnerable (VU)

Habitat and Ecology: Found in lower intertidal to subtidal depths in open estuaries, on sandy to muddy substrates. This porcelain crab is always found associated with pennatulid sea pens such as *Pteroeides* Herklots, 1858. One sea pen can harbour one to several individuals at once, with the porcelain crabs nestled among the wide branches, probably feeding on trapped food particles and mucus. Not much else is known about the biology of this species.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable deep intertidal to sublittoral sandy-muddy habitats suitable for the host sea pens; also deteriorating water quality due to sedimentation and pollution.

Photo: A. Anker



Scientific Interest and Potential Value: This species has also been referred to in the scientific literature as *Porcellanella picta* Stimpson, 1858 (junior synonym). The biology of this species is poorly known and needs more detailed study. As an obligate symbiont of sea pens, it would make an interesting subject for evolutionary, behavioural, and ecological studies.

Conservation Measures: Protection and restoration of sandy-muddy sublittoral habitats suitable for the cnidarian hosts will be necessary for the survival of this uncommon porcelain crab. Also important would be the maintenance of good water quality necessary for the survival of the filter-feeding hosts.

Scientific Name:
Pseudoporcellanella
manoliensis Sankarankutty,
1961

Common Name:
False porcelain crab

Order/Family:
Decapoda/Porcellanidae

Photo: Yeo et al. (2008) RDB2



National Status: Endangered (EN)

Habitat and Ecology: Found in lower intertidal to subtidal waters of open estuaries, on soft muddy substrates. The first record from Singapore (Johnson, 1967) indicated that it was an obligate symbiont of the virgulid sea pen, *Scytalium* sp., although it has subsequently been observed on soft corals and sea whips. Little else is known about the biology of this species.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable deep intertidal to subtidal habitats harbouring the cnidarian hosts of this porcelain crab due to coastal reclamation and development, and also, degradation of water quality due to pollution.

Scientific Interest and Potential Value: This is a rare species of porcelain crab and very little is known of its biology, and this warrants further study of thriving populations in Singapore. As an obligate symbiont of certain octocorallian cnidarians such as sea whips, it will be an interesting subject for evolutionary, behavioral, and ecological studies.

Photo: Johnson (1967) J. Zool.



Conservation Measures: Previously listed as Vulnerable (VU) in RDB2 (Yeo et al., 2008), it is uplisted here to Endangered (EN) due to its rarity in museum collections. Protection and restoration of muddy benthic habitats suitable for the cnidarian hosts will be necessary for the survival of this rare porcelain crab. Also important would be the maintenance of good water quality necessary for the survival of the filter-feeding hosts.

Scientific Name:
Coenobita lila Rahayu,
Shih & Ng, 2016

Common Name:
Land hermit crab

Order/Family:
Decapoda/Coenobitidae

National Status: Near Threatened (NT)

Habitat and Ecology: This hermit crab can be found mostly on the upper intertidal zone of sandy beaches and rocky shores, extending up to 100 m inland, where it forages for food consisting of plant and animal matter. It sometimes forms large groups in supralittoral grassy patches or under rocks during the day. It is typically found near reef habitats but may also occur at the edge of mangroves and estuaries. Unlike its aquatic relatives,

Photo: CMBS



it is well suited for terrestrial life, foremost among its adaptations being its modified gill chambers that allow it to breathe air.

Distribution: Singapore, Malaysia, and Indonesia.

Threats: Loss of suitable supralittoral habitats due to reclamation and coastal development and deforestation. Also, excessive beach clean-ups for aesthetic purposes may deprive this hermit crab of organic debris which it can use as food or shelter. Land hermit crabs have become popular as pets, and this species may be targeted for the pet trade as well.

Scientific Interest and Potential Value: This species was recently described by Rahayu et al. (2016) from Singapore and adjacent areas in Malaysia and Indonesia, and distinguished from the similar *C. cavipes* Stimpson, 1858 and *C. violascens* Heller, 1862 using morphological and DNA characters. They also clarified that *C. lila* is the only species of land hermit crab known from Singapore currently, so previous records of other *Coenobita* spp. should be referred to this species. The biology of this hermit crab is not well known.

Photo: CMBS



Conservation Measures: Protection of suitable stretches of coastal habitat (beaches and rocky shores) and keeping them in a natural state. Practice selective beach clean-ups targeting plastics and other anthropogenic debris only.

Scientific Name:
Elamena globosa
Chuang & Ng, 1991

Common Name:
False spider crab

Order/Family:
Decapoda/Hymenosomatidae

National Status: Critically Endangered (CR)

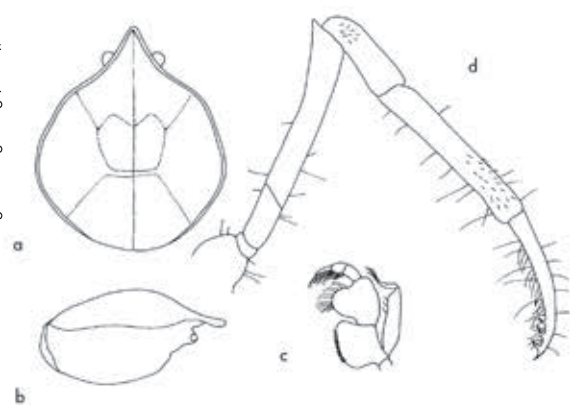
Habitat and Ecology: Occurs in gravelly to sandy habitats in shallow subtidal depths, on or near reefs.

Distribution: Singapore only.

Threats: Loss of suitable subtidal habitats due to coastal reclamation, development, and pollution.

Scientific Interest and Potential Value: *Elamena globosa* was described in 1991 based on one male specimen, which was collected from southern Singapore in 1986. It has not been recorded since. Little else is known about this species.

Line Drawing: Chuang & Ng (1991), RBZ



Conservation Measures: This species was previously listed as Vulnerable (VU) in RDB2 (Yeo et al., 2008). It is, however, quite rare and currently known only from Singapore. The type locality, Pulau Ayer Chawan, has undergone extensive reclamation works and has been incorporated into the larger Jurong Island. The crab may still occur in other similar habitats in Singapore and adjacent areas. Conservation measures should include protection and restoration of suitable subtidal habitats.

Scientific Name:
Neorhynchoplax venusta
Ng, 2015

Common Name:
False spider crab

Order/Family:
Decapoda/Hymenosomatidae

National Status: Endangered (EN)

Habitat and Ecology: This species occurs in the intertidal zone, in seagrass beds with sandy-muddy substrate and some stones, inside burrows. Two other hymenosomatid crab species found in similar habitat types are, *Crustaenia palawanensis* (Serène, 1971) and *Halicarcinus coralicola* (Rathbun, 1909). *Neorhynchoplax venusta* is morphologically closely related to *N. mangalis* (Ng, 1988), but the latter is only known from mangroves.

Distribution: Singapore only.

Threats: Loss of suitable habitats (intertidal seagrass

Photo: JCE Mendoza



beds) from coastal reclamation, development, and pollution.

Scientific Interest and Potential Value: This species was described in 2015 based on one female specimen, collected from Pulau Sekudu, off Pulau Ubin, northern Singapore. Little else is known of this species.

Conservation Measures: This species has not been previously evaluated. Although known from only one female specimen, its cryptic infaunal habits suggest that it is just under-collected. Main conservation measures should include protection and restoration of suitable seagrass habitats.

Scientific Name:
Favus granulatus Lanchester, 1900

Common Name:
Rubble crab/Singapore rubble crab

Order/Family:
Decapoda/Leucosiidae

National Status: Endangered (EN)

Habitat and Ecology: Found in intertidal and sublittoral coral rubble and gravel; its appearance mimics the abundant coral rubble in its habitat, serving as protective camouflage.

Distribution: Singapore only.

Photo: PKL Ng



Threats: Loss of intertidal coral reefs and rubble zones and associated sublittoral habitats due to coastal development, sedimentation, and pollution.

Scientific Interest and Potential Value: This species was discovered in 1900 and described as a new genus and new species, and it is, thus far, only known from Singapore. As such, it has high heritage value. This species is a coral rubble mimic, where its morphology resembles pieces of dead and eroded coral, similar to two other leucosiids species that had been previously reported from Singapore, *Alox somphos* Tan & Ng,

1995, and *Nursia tohae* Ng & Komatsu, 2016. Both species face similar conservation problems as *Favus granulatus*.

Conservation Measures: Protection and restoration of sufficient tracts of coral reef and associated rubble zones.

Scientific Name:

Paranursia abbreviata (Bell, 1855)

Common Name:

Pebble crab

Order/Family:

Decapoda/Leucosiidae

National Status: Near Threatened (NT)

Habitat and Ecology: Found in mangrove habitats, typically buried in mud.

Distribution: Indo-West Pacific region.

Threats: Loss of mangrove habitats from coastal reclamation, development, and pollution.

Scientific Interest and Potential Value: *Paranursia abbreviata* was recorded for the first time in Singapore only in 2014, despite intensive collecting efforts in

Photo: BY Lee



mangroves since the late 1980s. This suggests that collecting methods must include techniques that target species with cryptic behaviours and unusual microhabitats. Little else is known about this species.

Conservation Measures: Previously listed as Not Evaluated (NE) in RDB2 (Yeo et al., 2008). Main conservation measures should include protection and restoration of mangroves and adjacent mudflats.

Scientific Name:

Daldofia horrida (Linnaeus, 1758)

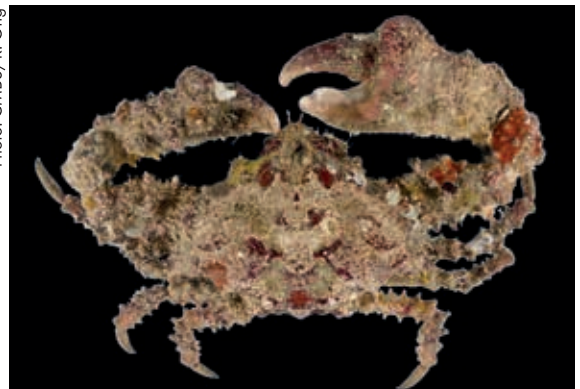
Common Name:

Horrid elbow crab

Order/Family:

Decapoda/Parthenopidae

Photo: CMBS/R. Ong



National Status: Critically Endangered (CR)

Habitat and Ecology: This species occurs subtidally in reefs, among large rocks and boulders, where there is an abundance of hard substrate and crevices in which to hide; it will also venture out onto the sandy or silty seabed in search for food. The morphology of its large asymmetric chelipeds suggests a diet of gastropod molluscs. It has a cryptic form and colouration, helping it blend better into its rocky environment. Reports indicate that it may be mildly toxic probably as a result of its diet.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable reef habitat due to reclamation and coastal development.

Scientific Interest and Potential Value: This species was first reported from Singapore in 1912, and would not be recorded in the following century, so much so that it was listed as Presumed Nationally Extinct (NEx) in the RDB2 (Yeo et al., 2008). The subsequent rediscovery of a large, mature female from Kusu Island in 2013 confirms its survival in Singapore, although it is quite rare. The presence of such large crabs indicates that local reef habitats are healthy enough to support them.

Conservation Measures: Protection and restoration of large areas of suitable reef habitat, especially those with a mixture of large rocks and sandy-silty substrate.

Scientific Name:
Harrovia longipes Lanchester, 1900

Common Name:
Feather star crab

Order/Family:
Decapoda/Pilumnidae

National Status: Vulnerable (VU)

Habitat and Ecology: This crab is found in coral reefs and is an obligate symbiont of crinoid feather stars, and in Singapore particularly on commatulids such as *Phanogenia gracilis* (Hartlaub, 1890) and *Comaster multifidus* (Müller, 1841). The crab is typically found on the oral disc of these filter-feeding echinoderms, where it probably feeds on trapped food particles and mucus. Sometimes, a breeding pair may be found on one feather star. Little else is known about the biology of this crab.

Distribution: Southeast Asia, Australia, New Caledonia, and Papua New Guinea.

Threats: Loss of suitable reef habitat for the host feather stars, due to coastal development, sedimentation, and pollution.

Photo: CMBS/R. Ong



Scientific Interest and Potential Value: *Harrovia longipes* was first discovered and described from Singapore in 1900. Its biology is still poorly known, and its being in a symbiotic relationship with comatulid feather stars (as with the shrimp, *Synalpheus stimpsoni*) makes it an interesting subject for evolutionary, behavioural, and ecological studies.

Conservation Measures: This species was previously listed as Critically Endangered (CR) in RDB2 (Yeo et al., 2008). Recent surveys and museum holdings, however, show that they are more abundant than previously thought, although still quite uncommon. Nonetheless, effort must be put in ensuring the long-term viability of coral reef habitats and the quality of the surrounding waters that will be capable of supporting healthy populations of the host feather stars.

Scientific Name:
Lupocyclus rotundatus Adams
& White, 1849

Common Name:
Swimming crab

Order/Family:
Decapoda/Portunidae

National Status: Endangered (EN)

Habitat and Ecology: Subtidal, more saline waters, on sand or rubble substrate with some mud. Active swimmer and predator of invertebrates and small fishes. May sometimes be seen associated with sea anemones. Little else is known about the biology of this crab.

Distribution: Indo-West Pacific region.

Threats: Loss of suitable sublittoral habitats with sandy to silty substrate due to coastal development and sedimentation.

Scientific Interest and Potential Value: The biology of this swimming crab is poorly known and warrants further study. The genus is in need of a taxonomic revision, and more species may be recognised.

Conservation Measures: This species was listed as Presumed Nationally Extinct (NEx) in RDB2 (Yeo et al., 2008). Recent surveys (CMBS), however, have found



a few specimens in the southern islands of Singapore, although this species is still considered rare. Conservation measures should include the protection and restoration of sublittoral habitats in southern Singapore with sandy to muddy substrate.

Scientific Name:
Palapedia valentini Ng, 1993

Common Name:
Rock crab

Order/Family:
Decapoda/Xanthidae



National Status: Endangered (EN)

Habitat and Ecology: Intertidal to subtidal, on coral reef habitats with rubble, rocks and sand. Often found underneath large rocks. They have been observed to rapidly burrow backwards at an angle into the sand using the upcurved tips of their legs to push the sand forward and over the narrow carapace. Very little is known about the biology of this crab.

Distribution: Singapore only.

Threats: Loss of suitable coral reef habitats, with coral rubble and sand, due to coastal development, sedimentation, and pollution.

Scientific Interest and Potential Value: *Palapedia valentini* was first described from Singapore in 1993 and is also the type species of its genus. It is rare in Singapore and has not yet been reported elsewhere. It has only been found in three southern localities so far. Its cryptic habits may be partly responsible for its rarity.

Conservation Measures: This species was listed as Vulnerable (VU) in RDB2 (Yeo et al., 2008). It was first collected in 1933 and last seen in the wild in 1992, since then it has not been observed even during intensive surveys. Conservation measures should include protection and restoration of coral reef habitats and their rubble zones.

Scientific Name:
Tuerkayana hirtipes (Dana,
1852)

Common Name:
Hairy-legged land crab

Order/Family:
Decapoda/Gecarcinidae



Photo: HH Tan

National Status: Critically Endangered (CR)

Habitat and Ecology: Terrestrial crab, frequenting forested coastal areas with limestone karst formations. It digs burrows for shelter in the soft ground around or between the harder limestone outcrops, and forages for food usually at night. It is herbivorous, feeding on fallen leaves and other plant matter. Its gill chambers have been modified for air-breathing. Females return to sea to spawn.

Distribution: Western Pacific region

Threats: Habitat loss due to coastal development.

Scientific Interest and Potential Value: This species of land crab was first recorded in Singapore in 1938 (from Paya Lebar), and again only recently (from St. John's Island), there have been no other records. Ng & Ng (2021) opine that the presence of scattered limestone areas on the coast of St. John's Island may enable this species to become established there and in nearby similar areas.

Conservation Measures: This land crab is quite rare in Singapore, with only two specimens recorded since 1938. The absence of extensive karst areas in Singapore may explain their rarity. Nevertheless, conservation measures should include protection of coastal limestone areas that can serve as suitable habitat for these crabs.

Scientific Name:
Sesarmoides borneensis
(Tweedie, 1950)

Common Name:
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Order/Family:
Decapoda/Sesarmidae

National Status: Endangered (EN)

Habitat and Ecology: Usually found in mangroves and estuaries. This crab's long legs are adapted to climbing and scampering over tree trunks and branches. Not much else is known about the biology of this crab.

Distribution: Southeast Asia and northern Australia.

Threats: Habitat loss from destruction and deforestation of mangroves.

Photo: CMBS



Scientific Interest and Potential Value: This crab was first described in 1950 using specimens from Labuan and Singapore. As the biology of this crab is still not well understood, it will be a good subject for various studies, particularly those concerning mangrove-dependent species.

Conservation Measures: This species is rare in Singapore, having been recorded in only two localities thus far. Conservation measures should involve protection and restoration of mangroves, to provide suitable habitats for this crab.

The contributors for the Horseshoe Crabs and Marine Decapod Crustaceans chapter wish to thank the following for their assistance: Martyn E.Y. Low, Muhammad Dzaki bin Safaruan & Tashfia Raquib.

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Arthropoda – Marine Insects

MARC CHANG JIA JIN, LANNA CHENG, TRAN ANH DUC, HWANG WEI SONG

Scientific Name:

Pontomyia pacifica Tokunaga,
1932

Common Name:

Marine midge

Order/Family:

Diptera: Chironomidae

National Status: Least Concern (LC)

Habitat and Ecology: This suspension feeder is one of the most common tanaisids in shallow subtidal soft bottom habitats (12–54 m depths) along the Singapore Strait (pers. obs.). Sites of occurrence include southeast of Pulau Tekong, Eastern Bunkering, southwest of Bedok Jetty, east of Lazarus Island Beach and southwest of Jurong Island. The biology of this local species is unknown but other species of kalliapseudids were found to feed on diatoms and crustaceans in Florida, U.S.A. (Drumm, 2005) and were prey for many benthic fishes in Brazil (Contente et al., 2009a, 2009b, 2012).

Distribution: Only known from Singapore, including the unknown shallow subtidal type locality where it was first collected in 1905–1907 (Drumm & Heard, 2011).

Threats: Unknown but possibly marine trash.

Scientific Interest and Potential Value: N.A.

Photo: Danwei Huang



Conservation Measures: Unpublished long-term quantitative data (2009 to 2020) showed that this species is quite common in at least two localities along the Singapore Strait with no obvious decline in numbers. Main conservation measures should include enforcing laws against illegal dumping of trash into the sea.

Scientific Name:

Hermatobates singaporensis
Cheng, 1976

Common Name:

Coral treader

Order/Family:

Hemiptera: Hermatobatidae

National Status: Endangered (EN)

Habitat and Ecology: These wingless insects live in air-filled crevices in boulders or rocks around coral reefs or stony seawalls. They emerge to feed during low tides and return to hide in the crevices as the tide rises. If trapped and unable to return to their crevices, they can survive at the sea surface. They are rarely sighted. The adults measure about 4 mm in body length with short legs but are fast moving.

Distribution: Described originally from the Siglap Coast of Singapore, this species was recently caught from St. John's Island and also from Malaysia.

Photo: Lanna Cheng
(Cheng et al., 2001, fig. 97)



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Threats: Coastal reclamation of the Siglap Coast has led to loss of their original habitat. Water pollution might threaten its last remaining known habitat.

Scientific Interest and Potential Value: The family Hermatobatidae is the oldest living lineage of marine insects and are thus one of the first insect groups to have evolved adaptations to live in coastal waters.

Conservation Measures: Continued habitat protection of St. John's Island as part of the Sisters' Islands Marine Park. As the last known collection was made in 2010, it is timely to determine if the species is still present at the locality and to update the population status of this species.

Scientific Name:

Halobates hayanus White,
1883

Common Name:

Sea skater

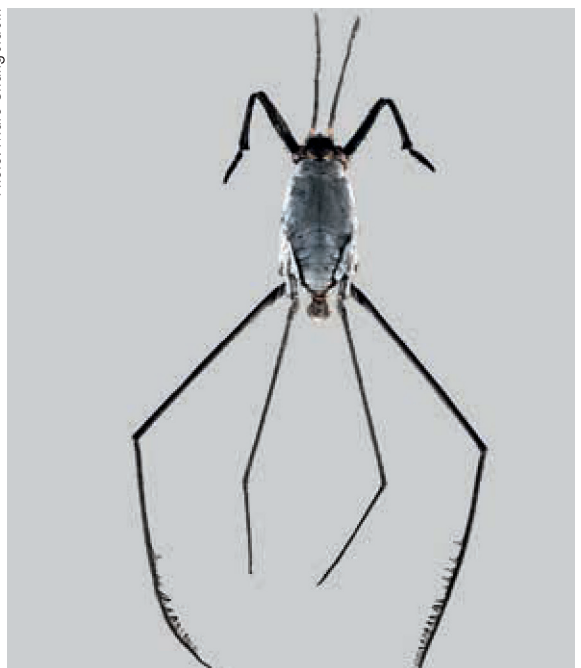
Order/Family:

Hemiptera: Gerridae

National Status: Least Concern (LC)

Habitat and Ecology: The species occurs in coastal habitats including coral reef flats with marine algae, seagrass meadows, or overhanging mangroves. Adults measure ~5 mm in length, with long legs. They are carnivorous and known to prey on their own young.

Photo: Marc Chang Jia Jin



Distribution: This species is found at Berlayer Creek, Changi Beach, Chek Jawa Wetlands, Pulau Semakau and Pulau Subar Laut. It has a transoceanic distribution stretching from the Red Sea, across the Indian Ocean to Southeast Asia and all the way to Australia and Papua New Guinea in the Pacific Ocean.

Threats: Potential land reclamation at Changi and Pulau Ubin poses great threats that will reduce their habitable area in Singapore.

Scientific Interest and Potential Value: This species belongs to the only insect genus with five species that has conquered and survived completely on the open

ocean surface, thousands of kilometres away from land. There is great scientific interest in how they evolved to adapt to life on the sea surface (water-proofing, heat and ultraviolet resistance), and how these might be applied to benefit society.

Conservation Measures: Continued habitat protection of Pulau Subar Laut as part of Sisters' Islands Marine Park will ensure this species' persistence. Efforts are needed however, to preserve the Changi and Pulau Ubin habitats, as genetic data suggests that the insects found there could be of a different species, and they have insofar been only recorded at those two sites.

Scientific Name:
Xenobates singaporensis
Andersen, 2000

Common Name:
Mangrove bug

Order/Family:
Hemiptera: Veliidae

National Status: Least Concern (LC)

Habitat and Ecology: Mangrove tidal streams and pools, often in concert with other marine skaters. They are some of the smallest marine bugs, with adults measuring ~1.5 mm in length. They may be seen at low tide but are easily overlooked due to their small size. Very little is known about their ecology.

Distribution: This species has been found at Mandai mangrove, Pulau Ubin and Sungei Buloh Wetland Reserve in Singapore. It has been recorded recently in Thailand.

Threats: Mangrove degradation and habitat loss from potential land reclamation works in the Pulau Ubin area.

Scientific Interest and Potential Value: Amongst the numerous insect families that have evolved to living on the sea surface, *Xenobates* remains one of the more poorly studied groups. This is likely due to their small



size (~1 mm) and cryptic nature making them easy to miss if one was not out consciously searching for them.

Conservation Measures: Continued protection and expansion of the Mandai Mangrove and Sungei Buloh Wetland Reserve will ensure persistence of the insect's habitat. Sustained effort into protecting the mangroves from habitat degradation will also be helpful.

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