Invasive species lists

1. Priority species lis

Here I list species from previous surveys in Australia and other harbours in the Pacific Islands. It will be important in addition to these species, to estimate if there are Australian native species that could become a problem in Fiji, as well as from other areas in the Indo-Pacific.

**Table 1.** Priority species from the Australian Priority Marine Pest list (2019) and Queensland invasive species watch list.

|  |  |  |  |
| --- | --- | --- | --- |
| **Scientific Name** | **Common Name** | **Description** | **Risk Level** |
| Undaria pinnatifida | Japanese kelp | U. pinnatifida is highly invasive, growing rapidly. Large distribution ranges, also Queensland mentioned as a possible area for invasion. However, currently distributed mainly in temperate waters, and colder temperatures may be needed at some point of the year for it to survive. | Priority (also for Queensland biosecurity) |
| Eriocheir sinensis | Chinese mitten crab | E. sinensis has had significant impacts in freshwater and brackish environments. Also impacts infrastructure and industry including blocking of cooling systems of power plants as well as damage to local fisheries. Has the potential to harm human health, as it is an intermediate host for lung fluke and can bioaccumulate toxins and heavy metals Has wide temperature tolerances (reproductive temperature range is 9 to 30 °C). | Priority (also for Queensland biosecurity) |
| Rhithropanopeus harrisii ’ | Harris’ mud crab | It is known to affect prey species richness and diversity negatively, altering prey population size structure. Rhithropanopeus harrisii is native to the Atlantic coast of the Americas from New Brunswick to northeast Brazil. It is a highly successful invader, having established in 20 countries across 45 degrees of latitude. Has wide temperature tolerances (optimum temperature range 15 to 25 °C) | Priority (also for Queensland biosecurity) |
| Mytilopsis sallei | black-striped false mussel | M. sallei has serious impacts on biodiversity, by outcompeting and excluding native species and by modifying habitat through its dense settlement. Native to the tropical central Atlantic Ocean—the Caribbean Sea—and has become **established in Fiji (!?)** | Already established in Fiji? |
| Perna Perna | Brown mussel | P. perna forms dense aggregations, where densities of 27,200 individuals per square metre have been recorded. Native to tropical and subtropical waters of Africa. | Priority (also for Queensland biosecurity) |
| Perna viridis | Asian green mussel | The impacts of P. viridis include altered biodiversity by outcompeting or overgrowing native species, changes in community structure and trophic relationships and habitat modification. It Perna viridis is an invasive mussel, native to the Arabian Sea, China, India, Thailand, Malaysia and the Philippines. | Priority (also for Queensland biosecurity) |
| Arcuatula senhousia | Asian bag mussel | Prefers intertidal to subtidal soft substrates (e.g. sediments).Tolerates wide variety of temperatures and salinities. Native to the waters of tropical and temperate Asia. | Priority (for Queensland biosecurity) |
| Magallana bilineata | Black Scar Oyster | The black scar oyster grows attached to hard objects in brackish shallow intertidal or subtidal waters at depths of 0 to 300 metres. Black scar oysters are found abundantly in the western Pacific Ocean, from the Philippines to Tonga and **Fiji,** and is an economically important species cultured extensively in the Philippines. | Native/cultivated in Fiji? |
| Didemnum perlucidum | White colonial sea squirt | Potential to be highly invasive due to its rapid reproductive output. Fast growing and can occupy disturbed habitats. Can overgrow native species. Subtropical to tropical. | Priority (for Queensland biosecurity) |

**Table 2.** Species that needed further review as not enough information was available

|  |  |  |  |
| --- | --- | --- | --- |
| **Scientific Name** | **Common Name** | **Description** | **Risk Level** |
| Sargassum horneri | Brown macroalga |  |  |
| Charybdis japonica | Asian paddle crab |  |  |
| Hemigrapsus takanoi | Takano’s shore crab |  |  |
| Petrolisthes elongatus | New Zealand porcelain crab | NZ + South AUS, not tropical |  |

**Table 3.** Priority species from the Australian Priority Marine Pest list (2019) that most likely would not survive in tropical waters

|  |  |  |  |
| --- | --- | --- | --- |
| **Scientific Name** | **Common Name** | **Description** | **Risk Level** |
| Asterias amurensis | northern Pacific Seastar | An invasive starfish, native to China, North Korea, South Korea, Russia and Japan. A. amurensis is a generalist predator impacting soft sediment communities, particularly bivalve populations. The species has had significant impacts on aquaculture and recreational activities due to predation on native and commercially farmed shellfish | Prefers colder environments, possibly not a risk for tropical waters. |
| Carcinus maenas | European green shore crab | C. maenas impacts a range of benthic bivalves. Native to Europe and North Africa | Mostly temperate distribution, possibly not a risk for tropical waters. |
| Perna canaliculus | New Zealand green-lipped mussel | native to New Zealand | Temperature tolerance of this species is between 10 °C and 19 °C, not a risk for Fiji |

**Table 4.** Most impactful marine non-native species established or considered as a risk for in Hawaii

|  |  |  |  |
| --- | --- | --- | --- |
| **Scientific Name** | **Common Name** | **Description** | **Risk Level** |
| Amathia verticillata | Spaghetti bryozoan | First described from the Mediterranean Sea and now widespread in tropical, subtropical, and warm-temperate waters. Established in Hawaii. | Colonies of A. verticillata have had negative impacts by clogging shrimp fishing gear, fouling cultured pearl oysters, and overgrowing and killing eelgrass. |
| Gracilaria salicornia | Gorilla Ogo | Widespread in west Pacific, but invasive in Hawaii. Gracilaria salicornia is one of the most successful invasive algae on reef flats. Possibly native to Fiji? |  |
| Hypnea musciformis | Hookweed | Hypnea musciformis is a highly opportunistic invader well known for its large floating blooms in coastal Maui. Large biomass washes up on the beaches of O‘ahu and Maui. Already present in Fiji. | Inshore coastlines and reefs in the tropical and subtropical eastern, central and western Pacific are potentially susceptible to invasion by *H. musciformis.* |
| Cassiopea sp. | Upside-down jellyfish | Globally distributed in the tropics, introduced to Hawaii, already present in Fiji |  |
| Osteomugil engeli | Kanda mullet | Taking over native mullets in Hawaii |  |
| Batis Maritima | Pickleweed | Native to the Americas, invasive in Hawaii with mangroves, where they can destroy habitats of local species. |  |
| Avrainvillea amadelpha | Leather mudweed | In the sandy, shallow habitats of Mamala Bay in O‘ahu, Avrainvillea amadelpha has formed thick communities that cover the substrate, invading the reef environment and out competing other algae and our native seagrass. Already present in Fiji. |  |
| Mnemiopsis leidyi | American comb jelly |  | Threat priority |
| Hydrozoa spp | Any new species to HI |  | Threat priority |
| Scyphozoa | Jellyfish, Sea Jelly |  | Threat priority |
| Limnoperna fortunei | Golden mussel |  | Threat priority |
| Musculista senhousia | Asian mussel |  | Threat priority |

**Table 5.** Potential marine invasive species (Guam Marine Security Action Plan, 2014).

The following species are considered biofouling high risk species in general based on observations throughout the Pacific, largely from what has been seen in Hawaii. This list was compiled by Steve McKagen (NOAA) and Scott Goodwin (NOAA). These are tropical marine non-native species which have established in Hawaii and are at high risk for biofouling transport.

|  |  |  |  |
| --- | --- | --- | --- |
| **Phyla** | **Species name** | **Description** | **Risk level** |
| **Porifera** | Callyspongia sp. |  |  |
|  | Chelonaplysilla violacea |  |  |
|  | Cladocroce burrapha |  |  |
|  | Crella spinulata |  |  |
|  | Darwinella australiensis |  |  |
|  | Dictyodendrilla dendyi |  |  |
|  | Dysidea sp. |  |  |
|  | Dysidea arenaria |  |  |
|  | Echinodictyum asperum |  |  |
|  | Gelloides fibrosa |  |  |
|  | Halichondria sp. |  |  |
|  | Heteropia glomerosa |  |  |
|  | Lissodendoryx similis |  |  |
|  | Monanchora sp. |  |  |
|  | Monanchora quadrangulata |  |  |
|  | Mycale grandis |  |  |
|  | Phorbas arborescens |  |  |
|  | Sigmadocia cf. caerulae |  |  |
|  | Strongylamma wilsoni |  |  |
|  | Suberites zeteki |  |  |
|  | Tedania strongylostyla |  |  |
|  | Tethya deformis |  |  |
| **Cnidaria** | Bouganvillia ramosa |  |  |
|  | Carijoa riisei |  |  |
|  | Diadumene leucolena |  |  |
|  | Diadumene lineata |  |  |
|  | Dynamena crisioides |  |  |
| **Annelida** | Branchiomma nigromaculata |  |  |
|  | Circeus cf. amoricana |  |  |
|  | Eulaeospira orientalis |  |  |
|  | Hydroides crucigerus |  |  |
|  | Hydroides dirampha |  |  |
|  | Hydroides elegans |  |  |
|  | Neodexiospira foraminosa |  |  |
|  | Neodexiospira preacuta |  |  |
|  | Rhamphostomella argentea |  |  |
|  | Scrupocellaria cf. sinuosa |  |  |
|  | Watersipora edmondsii |  |  |
|  | Pileolaria militaris |  |  |
|  | Pomatoceros cf. minutus |  |  |
|  | Pomatoleios kraussii |  |  |
|  | Sabellastarte spectabilis |  |  |
|  | Salmacina tribranchiata |  |  |
|  | Serpula cf. watsoni |  |  |
|  | Serpula verimcularis |  |  |
|  | Simplicaria pseudomilitaris |  |  |
| **Mollusca** | Chama fibula |  |  |
|  | Chama macerophylla |  |  |
|  | Crucibulum spinosum |  |  |
|  | Hipponix australis |  |  |
|  | Vermetus alii |  |  |
| **Crustacea** | Balanus amphitrite |  |  |
|  | Balanus eburneus |  |  |
|  | Balanus trigonus |  |  |
|  | Caprella acutifrons |  |  |
|  | Ericthonius brasiliensis |  |  |
|  | Glabropilmnus seminudus |  |  |
|  | Gonodactylaceusus mutatus |  |  |
|  | Jassa falcata |  |  |
|  | Megabalanus californicus |  |  |
|  | Megabalanus peninsularis |  |  |
|  | Megabalanus tanagrae |  |  |
| **Pycnogonida** | Anoplodactylus sp. |  |  |
|  | Echinodermata |  |  |
|  | Ophiactis savignyi |  |  |
| **Bryozoa** | Bugula neritina |  |  |
|  | Bugula robusta |  |  |
|  | Hippoppdina feegeensis |  |  |
|  | Holoporella pilaefera |  |  |
|  | Rhamphostomella argentea |  |  |
|  | Scrupocellaria cf. sinuosa |  |  |
|  | Watersipora edmondsii |  |  |
| **Urochordata** | Ascidia archaia |  |  |
|  | Ascidia sydneiensis |  |  |
|  | Botrylloides simodensis |  |  |
|  | Botrylloides sp. |  |  |
|  | Cnemidocarpa irene |  |  |
|  | Didemnum cf. perlucidu |  |  |
|  | Diplosoma listerianum |  |  |
|  | Eusynstyela hartmeyeri |  |  |
|  | Herdmania momus |  |  |
|  | Herdmania pallida |  |  |
|  | Lissoclinum fragile |  |  |
|  | Microcosmus exasperatus |  |  |
|  | Phallusia nigra |  |  |
|  | Polyandrocarpa sagamiensis |  |  |
|  | Polycarpa aurita |  |  |
|  | Polyclinum constellatum |  |  |
|  | Styela canopus |  |  |
|  | Styela clava |  |  |
|  | Styela plicata |  |  |
|  | Symplegma brakenhielmi |  |  |
|  | Symplegma sp. |  |  |

1. Identified introduced species in Pacific Islands

A previous survey of identified introduced species from the tropical west Pacific has been made by Campbell et al. (2016), in connection with a preliminary port survey in Palau. This included species from Palau, Guam, Western and American Samoa as well as tropical Australia. In addition I have added species from a Hawaiian harbour settlement plate analysis that were marked as invasive (<https://dlnr.hawaii.gov/ais/files/2014/01/Species-found-at-harbors-around-O%E2%80%98ahu-during-DAR-2015-settlement-panel-study.pdf>). Many of these species have been identified but have not had significant impacts on their new environment, therefore expert knowledge is needed to evaluate the level of risk posed by these introductions. Species which were analysed by the Australian risk assessment to not be of high risk are mentioned.

**Table 5.** Pre-existing knowledge of introduced and cryptogenic species (modified from Campell et al. 2016) in **P**: Palau (Lambert 2002; P Colin, pers comm.), **G**: Guam (Lambert 2002; Paulay et al. 2002), **S**: Western and American Samoa (P Skelton, pers comm.), **H**: Hawaii and **tA**: tropical Australia (Hewitt 2002, unpub data). I – Introduced, C – cryptogenic, N – Native. Please note that species are listed alphabetically within taxon group.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Phyla** | **Species** | **P** | **G** | **S** | **H** | **tA** | **Description** | **Risk Level** |
| Algae | *Caulerpa serruleta* |  |  | **C** |  |  |  |  |
|  | *Codium ovale* Zanardini, 1878  “Spongy ball alga” |  |  | **I** |  |  | Have been observed to be rapidly colonising disturbed areas with their tendency to form large clumps that potentially smother other native benthos. |  |
|  | *Codium arenicola* M.E.Chacana & P.C.Silva, 2014  “Dead man’s fingers” |  |  | **I** |  |  | Very little is known of this species or its impact on the marine environment. Similar species of Codium have been proven highly invasive, specifically Codium tomentosoides in New Zealand and South Australia. This alga is of concern, and effort should be made to monitor its spread. |  |
|  | *Halymenia durvillei* |  |  | **C** |  |  |  |  |
|  | *Spatoglossum macrodontum* J Agardh 1882 |  |  | **I** |  |  | Probably a recent introduction to Samoa, with invasive tendency. This Australian native has recently been collected from Samoa. It is found in Hawaii and French Polynesia, and could very well be recent introductions there. The degraded area where this alga is growing is a text-book habitat for invasive species. |  |
|  | *Valonia fastigiata* Harvey ex J Agardh 1887 |  |  | **I** |  |  | Coral reefs have been damaged by outbreaks of this species |  |
| Porifera | *Callyspongia aff. Fibrosa* (Ridley and Dendy 1886) |  | **C** |  |  |  |  |  |
|  | *Ianthella basta* (Pallas 1766) |  | **C** |  |  |  |  |  |
|  | *Mycale sp.*  *“orange sponge”* | **C** |  | **C** |  |  | Identified as a potential threat to coral reefs of Hawaii <http://hbs.bishopmuseum.org/invasives/reports/mycale.html> |  |
|  | *Mycale (Crambia) sp. 1* |  | **C** |  |  |  |  |  |
|  | *Niphates sp. 1* |  | **C** |  |  |  | One species currently spreading on the coast of Turkey:  <http://blackmeditjournal.org/volumes-archive/vol-26-2020/vol-26-2020-no-3-2/niphates-toxifera-porifera-demospongiae-a-possible-lessepsian-species-now-colonizing-the-coast-of-turkey/> |  |
|  | *Tedania cf. ignis* (Duchassaing and Michelotti 1864) |  | **I** |  |  |  | Native to eastern caribbean |  |
|  | Haliclona caerulea? Hechtel 1965 | **C** | ? |  |  |  | Native to the Caribbean introduced in the central pacific [10.7717/peerj.1170](https://dx.doi.org/10.7717%2Fpeerj.1170) |  |
| Cnidaria Anthozoa | *Actiniaria sp. (1,2,3)* |  | **C** |  |  |  |  |  |
|  | *Aiptasia sp.* | **I** |  |  |  |  |  |  |
|  | *Carijoa riisei* (Duchassaing and Michelotti 1860) |  |  | **I** |  |  | According to the Australian risk assessment, not considered high risk |  |
|  | *Litophyton sp.* |  | **I** |  |  |  |  |  |
| Cnidaria - Hydroid | *Antennella secundaria* (Gmelin 1791) |  |  |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Bouganvillea sp.* |  |  |  |  | **C** |  |  |
|  | *Bouganvillia muscus* |  |  |  | **I** |  |  |  |
|  | *Clytia hemisphaerica* (Linnaeus 1767) |  | **C** |  |  | **C** |  |  |
|  | *Clytia latitheca* Millard and Bouillon 1973 |  | **C** |  |  |  |  |  |
|  | *Clytia linearis* (Thorneley 1900) |  | **C** |  |  | **C** |  |  |
|  | *Clytia noliformis* (McCrady 1859) *sensu* Calder 1991 |  | **I** |  |  |  |  |  |
|  | *Corydendrium parasiticum* (Linnaeus 1767) |  | **C** |  |  |  |  |  |
|  | *Coryne eximia* (Allman 1859) |  |  |  |  | **C** |  |  |
|  | *Dynamena crisioides* |  |  | **C** |  |  |  |  |
|  | *Ectopleura viridis* Thorneley 1900 |  | **I** |  |  |  |  |  |
|  | *Eudendrium carneum* Clarke 1882 | **I** |  |  |  |  |  |  |
|  | Halopteris plagiocampa |  |  |  | **I** |  |  |  |
|  | Nemalecium lighti |  |  |  | **I** |  |  |  |
|  | Obelia bidentata |  |  |  | **I** |  |  |  |
|  | *Obelia dichotoma* (Linnaeus 1758) | **C** | **I** |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Pennaria disticha* Goldfuss 1820 |  | **C** | **I** | **I** | **C** | Very common as a fouling organism on wharf pilings. Widespread throughout the Indo-Pacific. Its abundance and remarkable range is probably a result of historical movement of vessels, especially wooden vessels in the early days of sea-exploration. |  |
|  | *Plumularia strictocarpa* |  |  | **C** |  |  |  |  |
|  | *Sertularella diaphena* |  |  | **C** |  |  |  |  |
|  | *Turritopsis nutricula* McCrady 1857 |  | **C** | **I** | **I** |  | Widespread, originates from Caribbean? But probably no danger of invasiveness |  |
|  | *Thyroscyphus fruticosus* (Esper 1793) | **I** | **C** | **I** |  |  | Already in Fiji (most likely local?) |  |
| Polychaeta - Annelida | Chaetopterus variopedatus |  |  |  | **I** |  |  |  |
|  | Eulalia sanguinea |  |  |  | **I** |  |  |  |
|  | *Ficopomatus enigmaticus* (Fauvel 1923) |  |  |  |  | **I** |  |  |
|  | *Hydroides elegans* (Haswell 1883) |  |  |  | **I** | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Hydroides sanctaecrucis* Krøyer 1863 |  |  |  |  | **I** |  |  |
|  | Pileolaria militaris |  |  |  | **I** |  |  |  |
|  | *Oenone fulgida* (Savigny in Lamarck 1818) |  | **I** |  |  |  |  |  |
|  | *Sabella spallanzanii* (Gmelin 1791) |  |  |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Sabellastarte spectabilis* (Grube 1878) | **C** | **I** | **C** |  |  | Widespread throughout the Indo-Pacific, although considered an introduced species to the Hawaiian Islands. |  |
|  | *Salmacina dysteri* (Huxley 1855) |  | **C** | **I** |  |  | It is not clear where this species originated, but it is now found in warm waters globally. It was first seen in Hawaii in 1939, and it occurs there from the eulittoral zone down to around 600 m (2,000 ft).[2] It grows on solid structures such as on rocks, on seaweed on reef flats, on reef slopes and docks, especially in harbours and bays; it also grows on the hulls of ships and on top of other fouling organisms. In WriMS |  |
|  | *Thelepus setosus* (Quatrefages 1866) |  | **I** |  |  |  |  |  |
|  | *Timarete caribous* (Grube 1859) |  | **I** |  |  |  |  |  |
|  | Serpulididae |  |  |  | **I** |  |  |  |
|  | Serpula vermicularis |  |  |  | **I** |  |  |  |
|  | Spirobranchus kraussii |  |  |  | **I** |  |  |  |
| Mollusca - Gastropoda | *Bostrycapulus aculeatus* (Gmelin 1791) |  | **I** |  |  |  |  |  |
|  | *Cellana mazatlandica* (GB Sowerby I 1839) |  | **I** |  |  |  |  |  |
|  | *Crepidula aculeata* |  | **I** |  |  |  |  |  |
|  | *Crucibulum spinosum* (GB Sowerby I 1824) |  | **I** |  |  |  |  |  |
|  | *Tathrella iredalei* Laseron 1959 |  | **I** |  |  |  |  |  |
|  | *Tectus niloticus* (Linnaeus 1767) |  | **I** | **I** | **I** |  | Commercially important species, native in Fiji? |  |
| Mollusca – Bivalvia | *Anomia nobilis* |  | **I** | **I** |  |  |  |  |
|  | *Arcuatula senhousia* (Benson in Cantor 1842) |  |  |  |  | **I** |  |  |
|  | *Chama asperella* Lamarck 1819 |  | **I** |  |  |  |  |  |
|  | *Chama macerophylla* Gmelin 1791 |  | **I** |  |  |  |  |  |
|  | *Chama pacifica* |  |  | **I** |  |  |  |  |
|  | *Crassostrea echinata* |  | **I** |  |  |  | Have established larger populations. (*comm*. Hewivatharane) |  |
|  | *Crassostrea gigas* (Thunberg 1793) |  | **I** |  |  | **I** | Have established larger populations. More meaty and perform same ecological functions as native species which is why they are not viewed as invasives. (comm. Hewivatharane) |  |
|  | Hiatella arctica |  |  |  | **I** |  |  |  |
|  | *Isognomon ephippium* (Linnaeus 1758) |  | **C** |  |  |  |  |  |
|  | *Monia nobilis* (Reeve 1859) |  | **I** |  |  |  |  |  |
|  | *Mytilopsis sallei* (Récluz 1849) |  |  |  |  | **I** |  |  |
|  | *Neotrapezium sublaevigatum* (Lamarck 1819) |  | **C** |  |  |  |  |  |
|  | *Perna viridis* (Linnaeus 1758) |  |  |  |  | **I** |  |  |
|  | *Saccostrea echinata* (Quoy and Gaimard 1835) |  | **I** |  |  |  |  |  |
|  | *Trapezium sublaevigatum* |  | **C** |  |  |  |  |  |
|  | *Tridacna derasa* (Röding 1798) |  | **I** |  |  |  |  |  |
|  | *Tridacna gigas* (Linnaeus 1758) |  | **I** |  |  |  |  |  |
| Arthropoda - Cirripedia | *Amphibalanus eburneus* (Gould 1841) |  | **I** |  | **I** | **I** |  |  |
|  | *Amphibalanus reticulatus* |  |  | **I** | **I** |  | Native to indo-pacific, introduced widely around the world. |  |
|  | *Chthamalus proteus* Dando and Southward 1980 |  | **I** |  |  |  |  |  |
|  | *Amphibalanus Amphitrite (Darwin 1854)* | **C** |  | **I** |  |  | This barnacle is considered an introduced and invasive in the Hawaiian Islands. Its native distribution is the Indo-Pacific. It is a serious fouling organism and its current widespread nature may have been aided by shipping activities dating back to early explorers. |  |
|  | *Chthalamus Proteus Dando and Southward 1980* | **I** |  |  |  |  | According to the Australian risk assessment, not considered high risk |  |
|  | *Tetraclita japonica Pilsbury 1916* |  |  | **I** |  |  | Common in the Western Pacific Ocean |  |
| Arthropoda - Isopoda | *Ligia exotica* Roux 1828 |  |  | **I** |  | **I** | Native to the Indo-Pacific. Although it is widely introduced, no economic or ecological impacts have been reported. |  |
|  | *Paracerceis sculpta* (Holmes 1904) |  |  |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
| Arthropoda - Malocostraca | *Bemlos virgus* |  |  | **C** |  |  |  |  |
|  | *Charybdis helleri* (Milne Edwards 1867) |  | **C** |  |  |  |  |  |
|  | *Corophium insidiosum* |  |  | **I** |  |  |  |  |
|  | Elasmopus rapax |  |  |  | **I** |  |  |  |
|  | Erichthonius punctatus |  |  |  | **I** |  |  |  |
|  | Erichthonius brasiliensis |  |  | **I** |  |  |  |  |
|  | Laticorophium baconi |  |  |  | **I** |  | According to the Australian risk assessment not considered a high risk |  |
|  | Leucothoe micronesiae |  |  | **I** |  |  |  |  |
|  | *Metopograpsus oceanicus* (Hombron and Jacquinot 1846) |  | **C** |  | **I** |  |  |  |
|  | Monocorophium acherusicum |  |  |  | **I** |  | According to the Australian risk assessment, not considered high risk |  |
|  | Panopeus pacificus |  |  | **I** |  |  |  |  |
|  | *Penaeus monodon* Fabricius 1798 |  | **I** |  |  |  |  |  |
|  | *Penaeus stylirostris* Stimpson 1871 |  | **I** |  |  |  | Found to have natural breeding populations with little known negative effects (*comm*. Hewivatharane) |  |
|  | *Percnon guinotae Crosnier 1965* |  |  | **I** |  |  | Although the distribution of this species appears to be sporadic throughout the tropical seas (e.g. China, Indonesia, Australia, French Polynesia and Samoa), its presence in the Pacific Islands may be more recent. |  |
|  | *Penaeus vannamei* Boone 1931 |  | **I** |  |  |  | Found to have natural breeding populations with little known negative effects (*comm*. Hewivatharane) |  |
|  | *Caprella scaura* |  |  |  | **I** |  |  |  |
|  | Stenothoe gallensis |  |  |  | **I** |  |  |  |
|  | Stenothoe valida |  |  | **C** |  |  |  |  |
| Arthropoda- Pantopoda | Anoplodactylus callifornicus |  |  |  | **I** |  |  |  |
|  | Endeis nodosa |  |  |  | **I** |  |  |  |
| Bryozoa | *Aetea anguina* (Linnaeus 1758) |  |  |  |  | **I** |  |  |
|  | *Amathia distans* Busk 1886 | **I** | **I** |  | **I** |  | According to the Australian risk assessment, not considered high risk |  |
|  | *Amathia verticellatum* (delle Chiaje 1822) |  |  |  | **I** | **I** |  |  |
|  | *Bowerbankia sp* |  |  |  |  | **C** |  |  |
|  | *Bowerbankia cf. imbricata* |  |  |  | **I** |  |  |  |
|  | *Bryozoan sp. 1 (metallic)* |  | **C** |  |  |  |  |  |
|  | *Bugula neritina* (Linnaeus 1758) | **I** | **I** | **I** | **I** | **I** | According to the Australian risk assessment, not considered high risk.  Native to the Caribbean, believed to have been introduced to many areas, especially in Australia, Southeast Asia and the Red Sea, Indian Ocean and the Mediterranean. |  |
|  | *Bugula Dentata* |  |  | **I** |  |  |  |  |
|  | *Bugulina stolonifera* (Ryland 1960) |  |  |  | **I** | **I** |  |  |
|  | Caulibugula dendrograpta |  |  |  | **I** |  |  |  |
|  | Celleporaria brunnea |  |  |  | **I** |  |  |  |
|  | Celleporaria pilaefera |  |  |  | **I** |  |  |  |
|  | *Conopeum seurati* (Canu 1928) |  |  |  |  | **I** |  |  |
|  | Hippopodina tahitiensis |  |  |  | **I** |  |  |  |
|  | Poricella robusta |  |  | **C** |  |  |  |  |
|  | *Savignyella lafontii* (Audouin 1826) |  |  | **I** | **I** | **I** |  |  |
|  | *Schizoporella errata* (Waters 1878) |  |  | **I** | **I** | **I** |  |  |
|  | *Schizoporella pseudoerrata* |  |  |  | **I** |  |  |  |
|  | *Schizoporella pungens* |  |  |  | **I** |  |  |  |
|  | *Schizoporella serialis* (Heller 1867) |  | **I** |  |  |  |  |  |
|  | *Tricellaria inopinata* d’Hondt and Occhipinti Ambrogi 1985 | **I** |  |  |  | **I** |  |  |
|  | *Tricellaria occidentalis* (Trask 1857) | **I** |  |  |  | **I** |  |  |
|  | *Watersipora subtorquata* (d’Orbigny 1852) | **I** |  | **I** | **I** | **I** |  |  |
|  | *Virididentula dentata (Lamouroux, 1816)* | **I** |  |  |  |  |  |  |
| Echinodermata - Ophiuroid | *Ophiactis savignyi* (Müller and Troschel 1842) |  | **C** |  |  |  |  |  |
| Chordata - Ascidia | *Ascidia archaia* Sluiter 1890 | **C** |  |  | **I** |  |  |  |
|  | *Ascidia sp. B* |  | **C** |  |  |  |  |  |
|  | *Ascidia sydneiensis* Stimpson 1855 | **C** | **I** |  | **I** |  |  |  |
|  | *Ascidiacea sp. A* |  | **C** |  |  |  |  |  |
|  | *Botrylloides leachi* (Savigny 1816) |  |  |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Botrylloides cf. simodensis* Saito and Watanabe 1981 |  | **C** |  |  |  |  |  |
|  | *Botrylloides niger* Herdman 1886 |  | **C** |  |  |  |  |  |
|  | *Botrylloides tyreus* (Herdman 1886) | **C** |  |  |  |  |  |  |
|  | *Botryllus sp. B* |  | **C** |  |  |  |  |  |
|  | *Botryllus sp. A* | **C** | **C** |  |  |  |  |  |
|  | *Cnemidocarpa irene* (Hartmeyer 1906) |  | **C** |  | **I** |  |  |  |
|  | *Didemnum perlucidum* Monniot F 1983 | **I** | **I** | **C** |  |  | On Australian pest priority list |  |
|  | *Didemnum psammatodes* (Sluiter 1895) |  | **C** |  |  |  |  |  |
|  | *Didemnum cf. spongioides Sluiter 1909* |  |  | **C** |  |  |  |  |
|  | *Diplosoma listerianum* (Milne Edwards 1841) | **I** | **I** |  | **I** |  |  |  |
|  | *Diplosoma sp. A* |  | **C** |  |  |  |  |  |
|  | *Ecteinascidia diaphanis* Sluiter 1886 | **C** |  |  |  |  |  |  |
|  | *Eusynstyela hartmeyeri* Michaelson 1904 | **C** |  |  | **I** |  |  |  |
|  | *Herdmania insolita* Monniot F and Monniot C 2001 |  | **C** |  |  |  |  |  |
|  | *Herdmania pallida* (Heller 1878) |  | **C** |  | **I** |  |  |  |
|  | *Herdmania mauritiana* (Drasche 1884) | **C** |  |  |  |  |  |  |
|  | *Herdmania momus* (Savigny 1816) | **C** |  |  |  |  |  |  |
|  | *Lissoclinum fragile* (Van Name 1902) | **I** | **I** |  |  |  |  |  |
|  | *Microcosmus exasperatus* Heller 1878 |  | **I** |  | **I** |  |  |  |
|  | *Microcosmus helleri* Herdman 1881 | **C** | **C** |  |  |  |  |  |
|  | *Microcosmus pupa* (Savigny 1816) | **C** | **C** |  |  |  |  |  |
|  | *Perophora multiclathrata* (Sluiter 1904) |  | **C** |  |  |  |  |  |
|  | *Perophora sagamiensis* Tokioka 1953 |  | **C** |  |  |  |  |  |
|  | *Phallusia nigra* Savigny 1816 | **I** | **I** | **I** |  |  |  |  |
|  | *Phallusia philippinensis* Millar 1975 | **C** |  |  | **I** |  |  |  |
|  | *Polyandrocarpa sagamiensis* Tokioka 1953 |  | **C** |  | **I** |  |  |  |
|  | *Polycarpa aurita* (Sluiter 1890) |  | **C** |  | **I** |  |  |  |
|  | *?Polycarpa nigricans Heller 1878* |  |  | **C** |  |  |  |  |
|  | *Polyclinum constellatum* Savigny 1816 |  | **I** |  | **I** |  |  |  |
|  | *Polyclinum nudum* Kott 1992 | **C** |  |  |  |  |  |  |
|  | *Pyura cf. robusta* Hartmeyer 1922 |  | **C** |  |  |  |  |  |
|  | *Pyura confragosa* Kott 1985 |  | **C** |  |  |  |  |  |
|  | *Pyura curvigona* Tokioka 1950 | **C** | **C** |  |  |  |  |  |
|  | *Pyura honu* Monniot C and Monniot F 1987 | **C** | **C** |  |  |  |  |  |
|  | *Pyura vittata* (Stimpson 1852) | **C** |  |  |  |  |  |  |
|  | *Rhodosoma turcicum* |  | **I** |  |  |  |  |  |
|  | *Styela canopus* (Savigny 1816) |  | **I** | **I** | **I** |  |  |  |
|  | *Styela plicata* (Lesueur 1823) | **N** | **N** |  |  | **I** | According to the Australian risk assessment, not considered high risk |  |
|  | *Symplegma brakenhielmi* (Michaelsen 1904) |  | **I** |  |  |  |  |  |
|  | *Symplegma oceania* |  |  |  | **I** |  |  |  |
|  | *Symplegma sp. A* |  | **C** |  |  |  |  |  |
| ChordataOsteichthyes | *Gambusia affinis* (Baird and Girard 1853) |  | **I** |  |  |  |  |  |
|  | *Mugil cephalus* Linnaeus 1758 |  | **I** |  |  |  |  |  |
|  | *Neopomacentrus violascens* (Bleeker 1848) |  | **I** |  |  |  |  |  |
|  | *Omobranchus elongates* (Peters 1855) |  | **I** |  |  |  |  |  |
|  | *Oreochromis mossambicus* (Peters 1852) |  | **I** |  |  |  |  |  |
|  | *Parioglossus philippinus* (Herre 1945) |  | **I** |  |  |  |  |  |
| Pisces | *Gobiidae sp.* | **C** |  |  |  |  |  |  |
|  | *Rhabdamia gracilis* |  | **I** |  |  |  |  |  |

1. References:

Campbell ML, Hewitt CL, Miles J (2016) Marine pests in paradise: capacity building, awareness raising and preliminary introduced species port survey results in the Republic of Palau. *Management of Biological Invasions* 7: 351-363, <http://dx.doi.org/10.3391/mbi.2016.7.4.05>

Australian Priority Marine Pest List: <https://www.marinepests.gov.au/what-we-do/apmpl>

Queensland list of prohibited invasive animals: <https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/pests/invasive-animals/prohibited/asian-green-mussel>

List of Species detected in Hawaiian harbours: <https://dlnr.hawaii.gov/ais/files/2014/01/Species-found-at-harbors-around-O%E2%80%98ahu-during-DAR-2015-settlement-panel-study.pdf>

Skelton, P., South, G. R., Seeto, J. (2008) Marine Invasive species survey of Apia Harbour, Samoa. National Marine Biodiversity conservation project, Final Report.

Coles, S.L., Reath, P.R., Skelton, P.A., Bonito, V., DeFelice, R.C., Basch, L. (2003) Introduced marine species in Pago Pago harbor, Fagatele bay and the national park coast, American Samoa, final report. Bishop Museum Technical Report No. 26

Miller, R. (2014) Guam Marine Security Action Plan. the University of Guam’s Center for Island Sustainability

South GR; Skelton PA, 2003. Catalogue of the marine benthic macroalgae of the Fiji Islands, South Pacific. Australian Systematic Botany, 16:699-758.

Fuller, K. (2017) Hawaiian priority list for established and pre-border invasive aquatic species survey list. Western Governors’ Association Invasive Species Data Management Initiative, West-wide Invasive Species Risk-Assessment Survey: Aquatic Species.