Final Report

Port Coogee Marina critter monitoring programme (non-fish marine fauna)

Dr Glen Whisson
Alexandra Hoschke

May 2024

AQUA RESEARCH & MONITORING SERVICES

EXECUTIVE SUMMARY

Commencing in 2018, Aqua Research & Monitoring Services (ARMS) has been conducting a long-term marine biodiversity monitoring project in Port Coogee Marina, focussing on the prevailing fish assemblage. During the 44 surveys conducted, marine species other than finfish have also been recorded, including crustaceans, molluscs, corals, seagrass, etc.

The current study classified all the non-fish records from the previous surveys (excluding corals), and combined them with records from three critter-specific surveys in 2023/24 to produce a detailed account of many of the "critters" within Port Coogee Marina.

A total of 281 photographs were used to verify 180 species from 10 phyla, namely Annelida, Arthropoda, Bryozoa, Chordata, Cnideria, Echinodermata, Mollusca, Nemertea, Platyhelminthes and Porifera. Two introduced species of molluscs were recorded, with neither currently a species of concern in WA.

ARMS recommends updating the Port Coogee Marina critter database established as part of this project every two or three years while simultaneously monitoring for introduced or invasive non-fish species.

Glen Whisson
Alexandra Hoschke

Aqua Research & Monitoring Services
10 May 2024

OVERVIEW

Since 2018, Aqua Research and Monitoring Services (ARMS) has been conducting a marine biodiversity monitoring program at Port Coogee Marina, Western Australia, for the City of Cockburn. The monitoring effort has been primarily focused on the fish assemblage prevailing in the Marina. During the 44 dive surveys completed during this time, the researchers have also taken additional photographic records of other interesting marine life inhabiting the Marina; for example, nudibranchs and other molluscs; echinoderms like sea stars and sea cucumbers; crustaceans like hermit crabs and shrimps; and other animal "critters" like marine worms and bryozoans.

The present report has been compiled in acknowledgement of the valuable contribution to the marine monitoring programme made by the non-fish fauna (excluding corals), grouped together and collectively referred to as "critters".

The following pages catalogue at least 180 species of critters, with over 280 photographic observations including species from ten phyla.

1.0 OBJECTIVES

- To identify non-fish fauna (excluding corals) encountered during the 2018-2023 Port Coogee Marina monitoring programme to the lowest taxonomic level possible (fish and corals have been reported separately—see Whisson & Hoschke 2023*).
- To enter all relevant records into the iNaturalist platform to increase the availability of the extensive database to stakeholders, including scientists, City of Cockburn staff and the general public.
- To summarise, collate and present all records collected within appropriate taxonomic groups.

1.1 Timeline

- February 2023—February 2024
  - Conduct additional SCUBA surveys of non-fish fauna in Port Coogee Marina
- June 2023—April 2024
  - Review results from all previous dive surveys in the Marina and collate into a photographic database of major taxonomic groups
- August 2023—April 2024
  - Upload all representative photographs onto the iNaturalist platform
  - Identify all critters to lowest practical taxonomic level
  - Seek expert assistance where required/possible
- May 2024
  - Summarise data and complete final report for City of Cockburn

**Final Report, Port Coogee Marina fish diversity monitoring programme*, March 2023. Aqua Research & Monitoring Services, 29p

2.0 BACKGROUND

2.1 Aqua Research & Monitoring Services

Aqua Research & Monitoring Services (ARMS) is a small consultancy established by Dr Glen Whisson and Alexandra Hoschke in 2012 following extensive careers in the aquatic sciences at Curtin University in Perth. ARMS is experienced in conducting marine surveys, and has published results in international journals, and three books: the *Ningaloo Marine Life Identification Guide (2024)*, *The Rottnest Island Fish Book* (2017, 2019) and *The Perth Coast Fish Book* (2021, 2023). In addition, ARMS has specialist skills and extensive professional experience in GIS mapping, and designed and operated an underwater camera at Ningaloo Reef as part of an initiative called "Piercam", which was developed as part of the Bachelor of Aquatic Science (Coastal Zone Management) at Curtin University. ARMS was contracted by the City of Cockburn to design and implement the initial Port Coogee Marina fish diversity monitoring program in 2018-19, with a repeat in 2022-23.

As part of the fish monitoring surveys, the team has also gathered a significant amount of photographic material relating to non-fish residing in the Marina. This report has entailed the review, collation and identification of these records for the period 2018-2024.

2.2 Personnel

- Dr Glen Whisson, Aqua Research and Monitoring Services
- Alexandra Hoschke, Aqua Research and Monitoring Services

3.0 METHODS

ARMS utilised an opportunistic survey approach, combined with standard transect analysis (established for the fish diversity project), as follows:

3.1 Diver surveys

• Opportunistic observations of non-fish fauna were made along six 100m transects that were surveyed as part of the monitoring effort between 2018 and 2023 (see: *Final Report, Port Coogee Marina fish diversity monitoring programme, March 2023* for additional details). Locations of transects are shown in Fig. 1.

• In addition, critter-specific dive surveys were undertaken on 21 March 2023, 22 March 2023 and 20 February 2024, using the following approach:

- completion of a pre-dive safety briefing and dive plan;
- prior contact made with Marina management and approval given;
- each diver made observations and took photographs of all sighted critters;
- each dive lasted approximately 90 minutes, resulting in approximately 9 hours of underwater observation effort (i.e. in total for two divers);

3.2 Weed sampling

A weed sampling exercise was also conducted on 14 April 2023. All target fauna were photographed during the surveys and logged with time and date.

Fig. 1 Survey and monitoring locations in Port Coogee Marina

3.3 Target invertebrate fauna

The following taxonomic groups were targeted during the critter survey:

- Ascidians (sea squirts)
- Cniderians (anemones, tube anemones, jellyfish), excluding corals
- Crustaceans (crabs, barnacles, shrimps, etc)
- Echinoderms (seastars, sea urchins, sea cucumbers, feather stars)
- Flatworms
- Molluscs (bivalves, cephalopods, chitons, gastropods)
- Segmented worms
- Sponges

The above target fauna, and other incidental critter observations, were broadly classified into the major phyla of Porifera, Annelida, Bryozoa, Chordata, Arthropoda, Cnidaria, Echinodermata, Mollusca, Nemertea, and Platyhelminthes.

3.4 Species identification / iNaturalist platform

All photographs taken during the marine monitoring programme (2018-2024) were screened for non-fish fauna, and subsequently uploaded to the iNaturalist (www.iNaturalist.org) platform if the image quality was of a high enough standard to allow meaningful identification. ARMS made initial identifications of organisms that fell within their areas of expertise. In all other cases, relevant data (location, ID suggestion, etc) were logged to enable the wider iNaturalist community to comment and suggest identifications, where possible. In several cases, experts from the WA Museum were approached directly for assistance with identifications.

Additional resources were also utilised, including identification guides, additional online resources (e.g. Atlas of Living Australia, Australian Museum, World Register of Marine Species, etc), and published journal articles.

3.5 An important note about classification and identification

It should be noted that it is virtually impossible to be 100% certain about the identification of some aquatic fauna to low taxonomic levels. The reason for this is that physical specimens are often required, owing to the nature of certain diagnostic characteristics. For example, two species might only be distinguished from one another by an anatomical structure in the jaw bone, or the number of vertebrae. Further, even if it is a morphological feature that confirms an identification, that particular structure may have been hidden from view, and not visible on the photograph in question. Other fluctuating factors like low visibility and flighty behaviour of a target individual can add to the uncertainty of an identification. This is one reason we use the iNaturalist platform, because it has a grading system that places identifications in increasing levels of certainty, from “Casual Grade” through to “Research Grade”, based on the input of the iNaturalist community, which includes many experts. In this report, when a specimen cannot be confirmed to Species level, it has been left at the “lowest taxonomic unit” possible, in most case this is Genus, but occasionally a higher level of classification, like Family or Order. With this note in mind, some identifications in this report may change as more input is received, or further evidence comes to light in the future (i.e. in further surveys, or if Museum staff obtain a physical specimen and provide updated identification advice with certainty). The classifications presented here are based on the author’s best knowledge at the date of this document.

3.6 Intellectual Property

Users of this report should note that the authors assert copyright ownership over all photographs contained; however, it is acknowledged that reasonable requests for non-commercial use will generally be allowed.

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4.0 RESULTS

4.1 Overall findings

Aquatic fauna from 10 phyla were observed within the Port Coogee Marina over the duration of the project (2018—2024). Following screening of unusable imagery, the total number of observations of target non-fish fauna was 281 (Appendix 1), representing 180 different species*. Molluscs represented both the highest number of unique observations at 93 (Table 1), and also the highest percentage of confirmed species at 59 (33%; Fig. 2), followed by Arthropods (36 species) and Chordates (23 species, Table 1, Fig. 2).

Table 1 Number of unique observations/species per phylum identified during the Port Coogee Marina Critter Monitoring programme, 2018-2024

Phylum	Observations	Species
Mollusca	93	59
Arthropoda	65	36
Chordata	34	23
Echinodermata	33	13
Annelida	26	23
Cnidaria	11	10
Porifera	11	6
Bryozoa	4	3
Platyhelminthes	3	3
Nemertea	1	1
	281	**180**

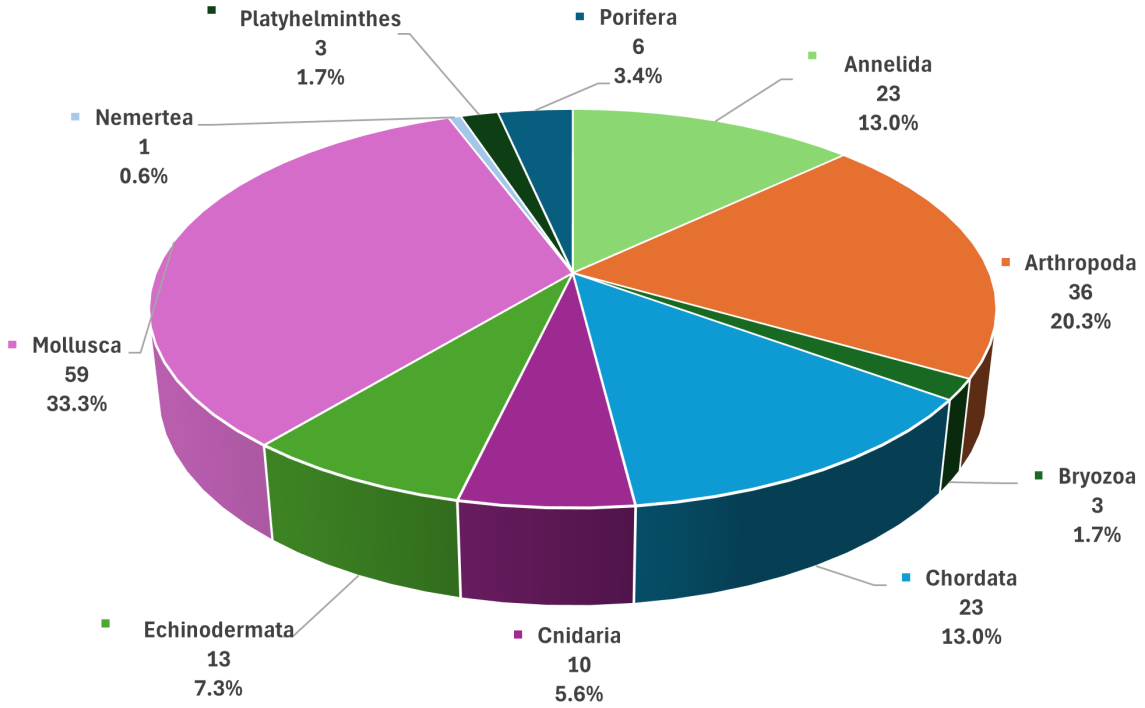

Fig. 2 Number of species per phylum identified during the Port Coogee Marina Critter Monitoring programme, 2018-2024

*to be read in conjunction with the special note on taxonomy and identification at section 3.5 (p. 6)

4.2 Molluscs (Phylum: MOLLUSCA)

Molluscs were the most diverse phylum of non-fish marine fauna recorded in the marina. Table 2 displays the number of different mollusc species photographed, and the lowest taxonomic level to which each could be identified (see Appendix 1 for detailed classification). Bivalves were the most diverse within the phylum with 20 species identified. Nudibranch species were also common, although many of the Western Australian species of *Goniobranchus* have not been described, and are therefore only included to genus. A selection of mollusc species photographed during this project is presented in Fig. 3, featuring Bivalves (Fig. 3.1), Cephalopods (Fig. 3.2), Sea hares and Nudibranchs (Fig. 3.3 & 3.4), Sap Sucking Slugs and Gastropods (Fig. 3.5), plus additional Gastropods and Chitons (Fig. 3.6).

Table 2. Molluscan taxa recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Class/Order
1	*Barbatia pistachia*	Banded Ark	Bivalves
2	Infraclass Pteriomorphia	Pteriomorphia Bivalve	Bivalves
3	Infraclass Pteriomorphia	Pteriomorphia Bivalve	Bivalves
4	*Chione* sp.	Venus Clam	Bivalves
5	*Malleus meridianus*	Southern Hammer Oyster	Bivalves
6	*Megacardita* sp.	False Cockle	Bivalves
7	*Mimachlamys* sp.	Mimachlamys Scallop	Bivalves
8	Family Mytilidae	Mussel	Bivalves
9	Family Mytilidae	Mussel	Bivalves
10	Family Mytilidae	Mussel	Bivalves
11	*Mytilus edulis*	Blue Mussel	Bivalves
12	*Mytilus* sp.	Black Mussel	Bivalves
13	*Pecten fumatus*	Commercial Scallop	Bivalves
14	Family Pectinidae	Pectinid Scallop	Bivalves
15	*Pinctada albina*	Pale Pearl Oyster	Bivalves
16	*Pinctada* sp.	Pearl Shell	Bivalves
17	*Pinna bicolor*	Common Razor Clam	Bivalves
18	*Pinna* sp.	Pinna Razor Clam	Bivalves
19	Family Pinnidae	Pen Shell	Bivalves
20	*Scaeochlamys livida*	Livid Fan Scallop	Bivalves
21	*Xipholeptos notoides*	Southern Pygmy Idiosepiid	Cephalopods
22	*Octopus djinda*	Star Octopus	Cephalopods
23	*Ascarosepion apama*	Australian Giant Cuttlefish	Cephalopods
24	Family Sepiidae	Cuttlefish	Cephalopods
25	*Aplysia reticulata*	Reticulated Sea Hare	Sea Hares
26	*Dolabella auricularia*	Blunt-end Seahare	Sea Hares

Table 2. (cont'd) Molluscan taxa recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Class/Order
27	*Ceratosoma brevicaudatum*	Short-tailed Ceratosoma	Nudibranchs
28	*Dendrodoris krusensternii*	Gem Doris	Nudibranchs
29	*Goniobranchus* sp. 1	Goniobranchus	Nudibranchs
30	*Goniobranchus* sp. 2	Goniobranchus	Nudibranchs
31	*Goniobranchus* sp. 3	Goniobranchus	Nudibranchs
32	*Goniobranchus* sp. 4	Goniobranchus	Nudibranchs
33	*Goniobranchus* sp. 5	Goniobranchus	Nudibranchs
34	*Hypselodoris saintvincentius*	Saint Vincent's Nudibranch	Nudibranchs
35	*Hypselodoris* sp.	Hypselodorid Nudibranch	Nudibranchs
36	*Phestilla* sp.	Phestilla Nudibranch	Nudibranchs
37	*Rostanga* sp.	Rostanga Egg Ribbon	Nudibranchs
38	*Scyllaea pelagica*	Sargassum Nudibranch	Nudibranchs
39	*Spinophallus falciphallus*	Headshield Slug	Headshied Slugs
40	*Elysia marginata*	Dark-margined Sapsucking Slug	Headshied Slugs
41	*Elysia* sp.	Elysia Sapsucking Slug	Headshied Slugs
42	Family Columbellidae	Dove Snail	Gastropods
43	*Cronia avellana*	Murex Snail	Gastropods
44	*Dicathais orbita*	Cart-Rut Shell	Gastropods
45	*Herpetopoma aspersum*	Speckled Top Shell	Gastropods
46	*Janthina janthina*	Violet Sea Snail	Gastropods
47	*Mitrella bicincta*	East Asian Dove Snail	Gastropods
48	*Nerita atramentosa*	Australian Black Nerite	Gastropods
49	*Patelloida alticostata*	Tall-ribbed Limpet	Gastropods
50	Family Rissoinidae	Spire Shell	Gastropods
51	*Stomatella impertusa*	Elongate False Ear Shell	Gastropods
52	*Thylacodes sipho*	Worm Snail	Gastropods
53	Super-family Trochoidea	Top Snail	Gastropods
54	*Acanthochitona bednalli*	Bednall's Spiny Chiton	Chitons
55	*Cryptoplax striata*	Striped Cryptoplax	Chitons
56	*Ischnochiton cariosus*	Corroded Ischnochiton	Chitons
57	*Ischnochiton contractus*	Contracted Chiton	Chitons
58	*Liolophura hirtosa*	Hairy Crested Chiton	Chitons
59	*Lorica volvox*	Loricid Chiton	Chitons

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Banded Arc (*Barbatia pistachia*)

Banded Arc (*Barbatia pistachia*)

False Cockle (*Megacardita* sp.)

True Mussels (Family Mytilidae)

Black Mussels (*Mytilus* sp.)

Black Mussels (*Mytilus* sp.)

Southern Hammer Oyster (*Malleus meridianus*)

Pale Pearl Oyster (*Pinctada albina*)

Fig. 3.1 Molluscs (Bivalves) identified during the Port Coogee Marina critter study, 2018-2024

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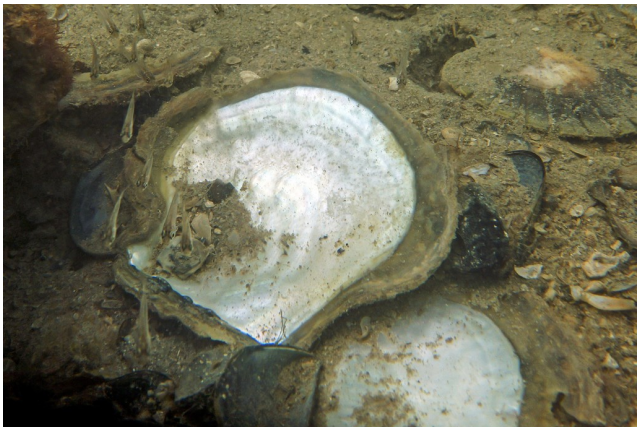
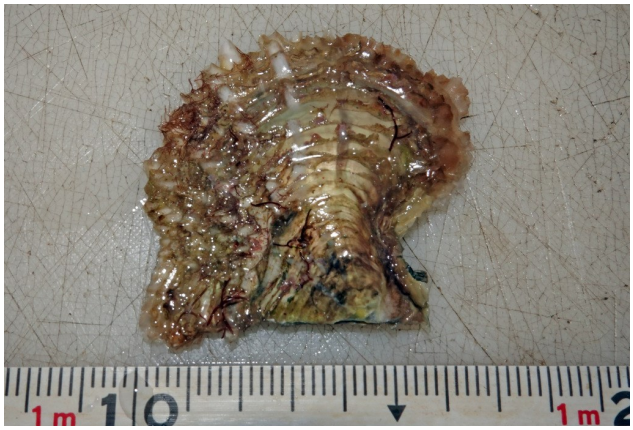


Pearl Oyster (*Pinctada* sp.)



Pearl Oyster (*Pinctada* sp.)

Common Razor Clam (*Pinna bicolor* cf.)

Common Razor Clam (*Pinna bicolor* cf.)

Commercial Scallop (*Pecten fumatus*)

Livid Fan Scallop (*Scaeochlamys livida*)

Scallops (Tribe Mimachlamydini)

Venus Clams (*Chione* sp.)

Fig. 3.1 (cont'd) Molluscs (Bivalves) identified during the Port Coogee Marina critter study, 2018-2024

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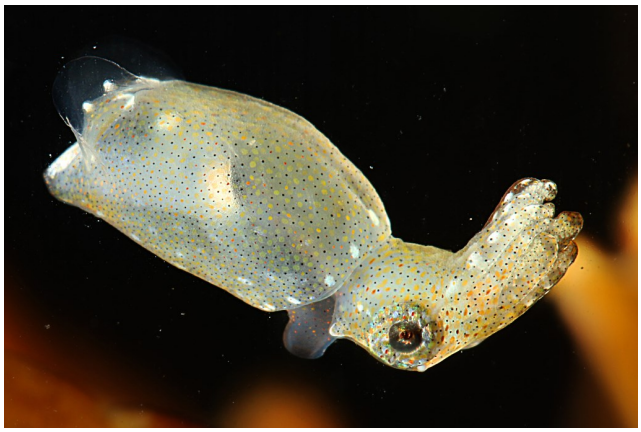

Southern Pygmy Idiosepiid (*Xipholeptos notoides*)

Southern Pygmy Idiosepiid (*Xipholeptos notoides*)

Star Octopus (*Octopus djinda)*

Star Octopus (*Octopus djinda)*

Australian Giant Cuttlefish (*Ascarosepion apama*)

Australian Giant Cuttlefish (*Ascarosepion apama*)

Australian Giant Cuttlefish (*Ascarosepion apama*)

Australian Giant Cuttlefish (*Ascarosepion apama*)

Fig. 3.2 Molluscs (Cephalopods) identified during the Port Coogee Marina critter study, 2018-2024

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Reticulated Sea Hare (*Aplysia reticulata*)

Blunt-end Seahare (*Dolabella auricularia*)

Short-tailed Ceratosoma (*Ceratosoma brevicaudatum*)

Goniobranchus (*Goniobranchus* sp. 1)

Goniobranchus (*Goniobranchus* sp. 2)

Goniobranchus (*Goniobranchus* sp. 3)

Saint Vincent's Nudi (*Hypselodoris saintvincentius*)

Undescribed Hypselodoris (*Hypselodoris* sp.)

Fig. 3.3 Molluscs (Sea Hares, Nudibranchs) identified during the Port Coogee Marina critter study, 2018-2024

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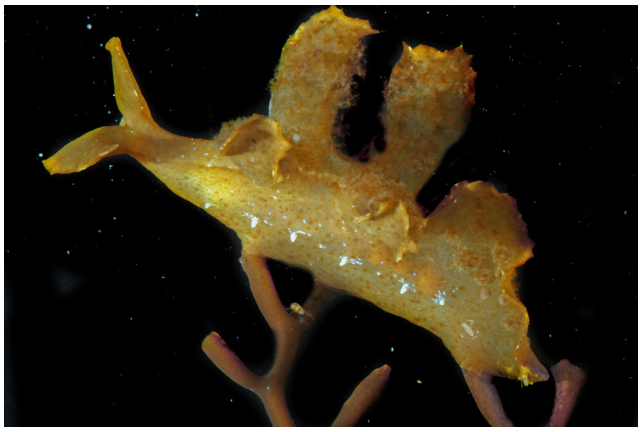
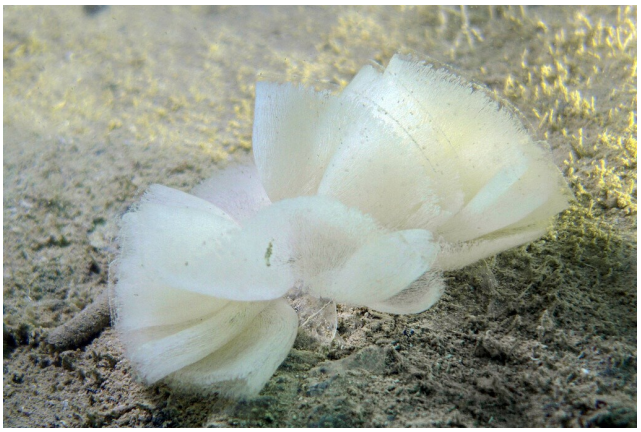
Two *Phestilla* sp. nudibranchs with white egg ribbons on *Turbinaria* coral



Sargassum Nudibranch (*Scyllaea pelagica*)

Gem Doris (*Dendrodoris krusensternii*)

Nudibranch Egg Ribbon (*Rostanga* sp.)



Nudibranch Egg Ribbon

Fig. 3.4 Molluscs (Nudibranchs) identified during the Port Coogee Marina critter study, 2018-2024

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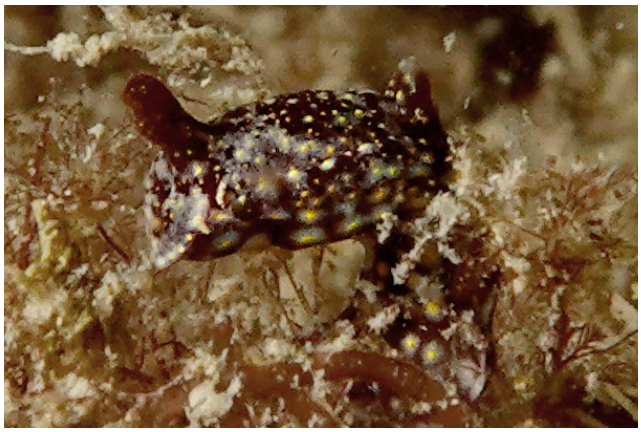
Sap-sucking Slug (*Elysia marginata*)

Sap-sucking Slug (*Elysia* sp.)



Bubble Snail (*Spinophallus falciphallus*)

Australian Black Nerite (*Nerita atramentosa*)

Violet Sea Snail (*Janthina janthina*)

Spire Shell (Family Rissoinidae)

Introduced species of Dove Snail (*Mitrella bicincta*)

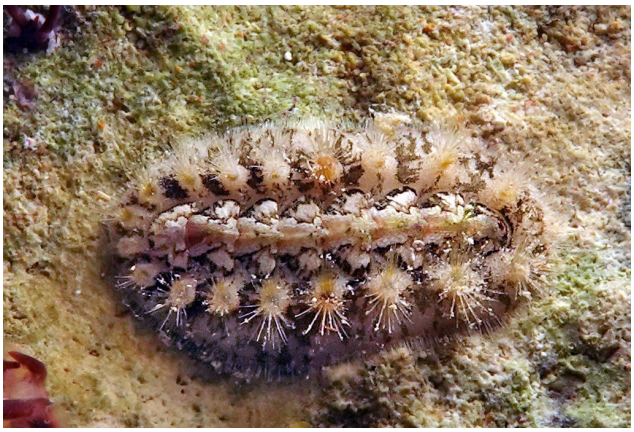
Murex Snail (*Cronia avellana*)

Fig. 3.5 Molluscs (Sap Sucking Slugs, Gastropods) identified during the Port Coogee Marina critter study, 2018-2024

Cart-rut Snail (*Dicathais orbita*)

False Ear Shell (*Stomatella impertusa*)

Tall-ribbed Limpet (*Patelloida alticostata*)

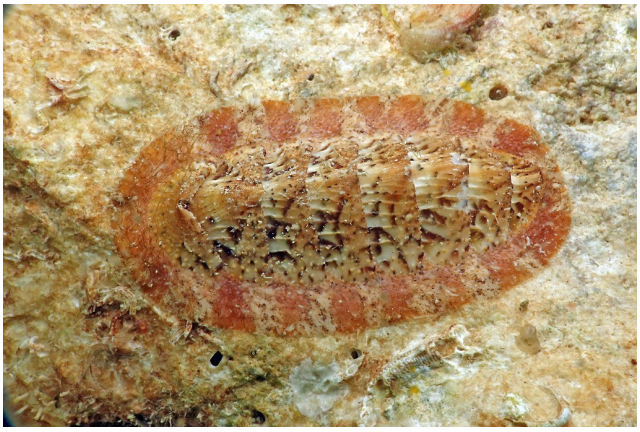


Chiton (*Acanthochitona bednalli*)

Chiton (*Liolophura hirtosa*)

Chiton (*Cryptoplax striata*)

Chiton (*Ischnochiton contractus*)



Chiton (*Lorica volvox*)

Fig. 3.6 Molluscs (Gastropods, Chitons) identified during the Port Coogee Marina critter study, 2018-2024

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4.3 Arthropods (Phylum: ARTHROPODA)

Arthropods were widespread in the Marina, with 36 species identified (Table 3; Appendix 1) and all specimens observed belonging to the Sub-phylum CRUSTACEA. Most species observed were crabs, including six species of Portunid crabs. Purple Rock Crabs (*Leptograpsus variegatus*) were seen in large numbers on the channel rock wall. A selection of Crustacean species from the project are presented in Fig. 4, featuring Barnacles and Shrimps (Fig. 4.1), Crabs (Figs. 4.2 & 4.3), plus Isopods (Fig. 4.3).

Table 3. Crustacean taxa recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Family
1	*Amphibalanus* sp.	Acorn Barnacle	Barnacles
2	*Balanus trigonus*	Triangle Barnacle	Barnacles
3	Family Alpheidae	Snapping Shrimp	Snapping Shrimps
4	Family Caprellidae	Skeleton Shrimp	Skeleton Shrimps
5	*Hippolyte* sp.	Broken-back Shrimp	Hump-backed Shrimps
6	*Latreutes* sp.	Sargassum Shrimp	Hump-backed Shrimps
7	*Palaemon serenus*	Rock-pool Shrimp	Glass Shrimps
8	*Palaemon* sp.	Glass Shrimp	Glass Shrimps
9	*Philocheras* sp.	Sand Shrimp	Crangonid Shrimps
10	Superfamily Caridea	Caridean Shrimp 1	Caridean Shrimps
11	Superfamily Caridea	Caridean Shrimp 2	Caridean Shrimps
12	*Penaeus latisulcatus*	Western King Prawn	Penaeid Prawns
13	*Calcinus dapsiles*	Hermit Crab	Hermit Crabs
14	Family Epialtidae	Kelp Crab	Kelp Crabs
15	*Paranaxia serpulifera*	Decorator Crab	Kelp Crabs
16	*Ozius truncatus*	Rock Crab	Oziid Crabs
17	*Pilumnus fissifrons*	Tasselled Crab	Pilumnid Crabs
18	*Pilumnus sp.*	Hairy Crab	Pilumnid Crabs
19	*Pisidia dispar*	Little Porcelain Crab	Porcelain Crabs
20	*Portunus armatus*	Australian Blue Swimmer Crab	Portunid Crabs
21	*Portunus sanguinolentus*	Three-spotted Swimmer Crab	Portunid Crabs
22	*Portunus* sp.	Portunid Swimming Crab	Portunid Crabs
23	*Thalamita sima*	Four-lobed Swimming Crab	Portunid Crabs
24	*Thalamita* sp.	Thalamita Crab	Portunid Crabs
25	*Trionectes rugosus*	Rough-backed Swimming Crab	Portunid Crabs
26	Subfamily Leucosiinae	Purse Crab	Purse Crabs
27	*Guinusia chabrus*	Red Rock Crab	Rafting Crabs
28	*Actaea* sp.	Round Crab	Round Crabs
29	Family Xanthidae	Round Crab	Round Crabs
30	*Megametope carinatus*	Carinated Round Crab	Round Crabs
31	*Leptograpsus variegatus*	Purple Rock Crab	Shore Crabs
32	*Planes minutus*	Gulfweed Crab	Shore Crabs
33	*Halicarcinus ovatus*	Three-pronged Spider Crab	Spider Crabs
34	*Helograpsus haswellianus*	Haswell's Crab	Varunid Crabs
35	*Cerceis* sp.	Seapill	Isopods
36	Family Euidotea	Isopod	Isopods

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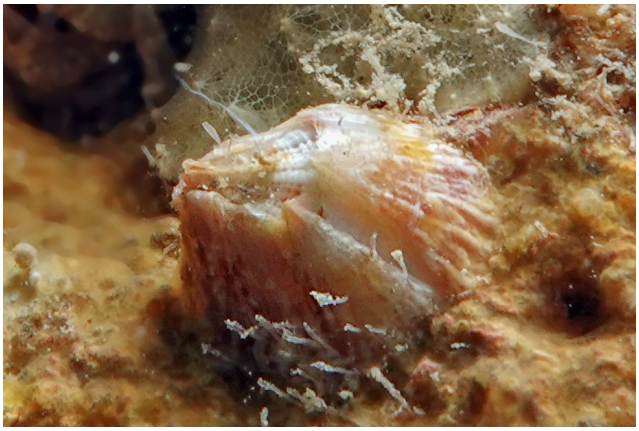
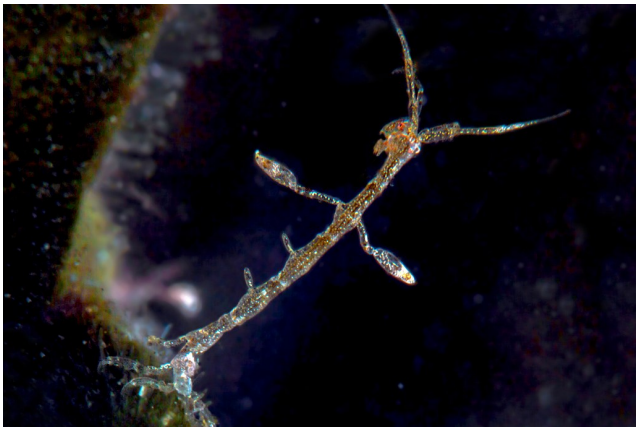


Triangular Barnacle (*Balanus trigonus*)

Barnacles (*Amphibalanus* sp.)



Skeleton Shrimp (Family Caprellidae)

Snapping Shrimp (Family Alpheidae)

Hump-backed Shrimp (*Latreutes* sp.)

Rock-pool Shrimp (*Palaemon serenus*)

Caridean Shrimp (Infraorder Caridea)

Western King Prawn (*Penaeus latisulcatus*)

Fig. 4.1 Arthropods (Crustaceans—Barnacles, Shrimps) identified during the Port Coogee Marina critter study, 2018-2024

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Hermit Crab (*Calcinus dapsiles*)

Gulfweed Crab (*Planes minutus*)

Three-pronged Spider Crab (*Halicarcinus ovatus*)

Spider / Decorator Crabs (Superfamily Majoidea)

Spider / Decorator Crabs (Superfamily Majoidea)

Fig. 4.2 Arthropods (Crustaceans—Crabs) identified during the Port Coogee Marina critter study, 2018-2024

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Leucosiid Crab (Family Leucosiidae)

Heterotrematan Crab (*Pilumnus fissifrons**)

Heterotrematan Crab (*Pilumnus* sp.)

Red Rock Crab (*Guinusia chabrus*)

Purple Rock Crabs (*Leptograpsus variegatus*)

Purple Rock Crab (*Leptograpsus variegatus*)

Rock Crab (*Ozius truncates*)

Little Porcelain Crab (*Pisidia dispar*)

Fig. 4.2 (cont'd) Arthropods (Crustaceans—Crabs) identified during the Port Coogee Marina critter study, 2018-2024

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Australian Blue Swimmer Crab (*Portunus armatus*)

3-spotted Swimmer Crab (*Portunus sanguinolentus*)

Four-lobed Swimming Crab (*Thalamita sima*)

Swimming Crab (*Thalamita* sp.)

Haswell's Crab (*Helograpsus haswellianus*)

Round Crab (*Actaea* sp.)

Common Valvetails (*Euidotea* sp.)

Seapill (Family Sphaeromatidae)

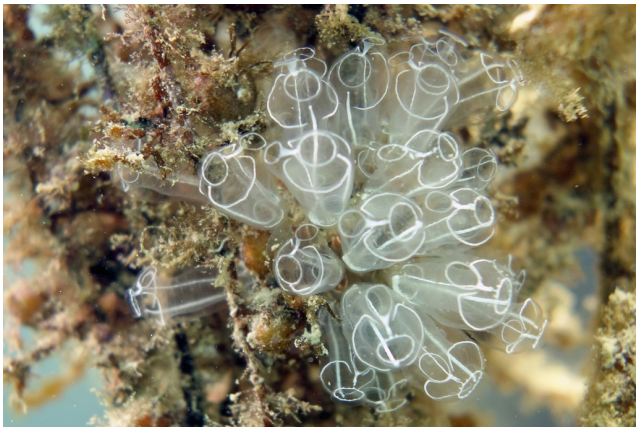
Fig. 4.3 Arthropods (Crustaceans—Crabs, Isopods) identified during the Port Coogee Marina critter study, 2018-2024

4.4 Chordates (Phylum: CHORDATA)

Excluding finfish, at least five families and 23 species from the Phylum CHORDATA were observed during the study, with all belonging to the Sub-phylum TUNICATA (Ascidians or Sea Squirts) (Table 4). A high number of Ascidians remained unclassified below Class (n = 12) owing to the difficulties associated with photographic identification of this taxon (Appendix 1). The Red-throated Ascidian (*Herdmania momus*) was common on the Marina walls, with *Botrylloides* sp. from the family Styelidae also featuring prominently. A selection of Ascidians classified as being separate species are presented in Fig. 5.

Table 4. Ascidian taxa recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Family
1	*Clavelina lepadiformis*	Lightbulb Sea Squirt	Clavelinid Ascidians
2	*Clavelina moluccensis*	Bluebell Tunicate	Clavelinid Ascidians
3	*Sycozoa sigillinoides*	Lollipop Ascidian	Holozoid Ascidians
4	*Aplidium* sp.	Sea Pork	Polyclinid Ascidians
5	*Herdmania* sp.	Herdmania Ascidian	Pyurid Ascidians
6	*Herdmania momus*	Red-throated Ascidian	Pyurid Ascidians
7	*Botrylloides* sp. 1	Colonial Ascidian	Styelid Ascidians
8	*Botrylloides* sp. 2	Colonial Ascidian	Styelid Ascidians
9	*Botrylloides* sp. 3	Colonial Ascidian	Styelid Ascidians
10	*Styela plicata*	Pleated Sea Squirt	Styelid Ascidians
11	*Symplegma* sp.	Colonial Ascidian	Styelid Ascidians
12	Class Ascidiacea sp. 1	Sea Squirt	Ascidians
13	Class Ascidiacea sp. 2	Sea Squirt	Ascidians
14	Class Ascidiacea sp. 3	Sea Squirt	Ascidians
15	Class Ascidiacea sp. 4	Sea Squirt	Ascidians
16	Class Ascidiacea sp. 5	Sea Squirt	Ascidians
17	Class Ascidiacea sp. 6	Sea Squirt	Ascidians
18	Class Ascidiacea sp. 7	Sea Squirt	Ascidians
19	Class Ascidiacea sp. 8	Sea Squirt	Ascidians
20	Class Ascidiacea sp. 9	Sea Squirt	Ascidians
21	Class Ascidiacea sp. 10	Sea Squirt	Ascidians
22	Class Ascidiacea sp. 11	Sea Squirt	Ascidians
23	Class Ascidiacea sp. 12	Sea Squirt	Ascidians



Lightbulb Sea Squirt (*Clavelina lepadiformis*)

Bluebell Tunicate (*Clavelina moluccensis*)

Fig. 5 Chordates (Ascidians) identified during the Port Coogee Marina critter study, 2018-2024

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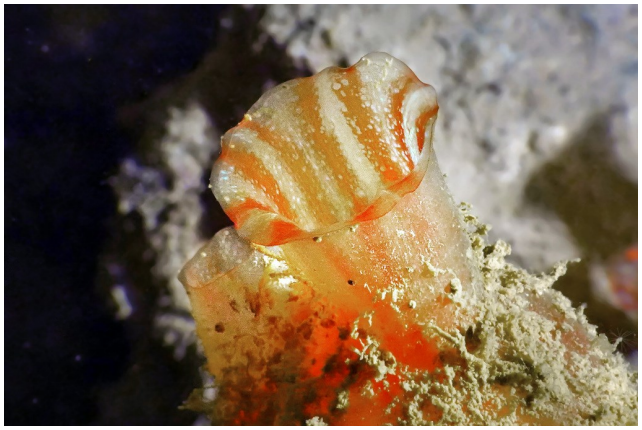
Sycozoa Sea Squirt (*Sycozoa sigillinoides*)

Sea Pork (*Aplidium* sp.)



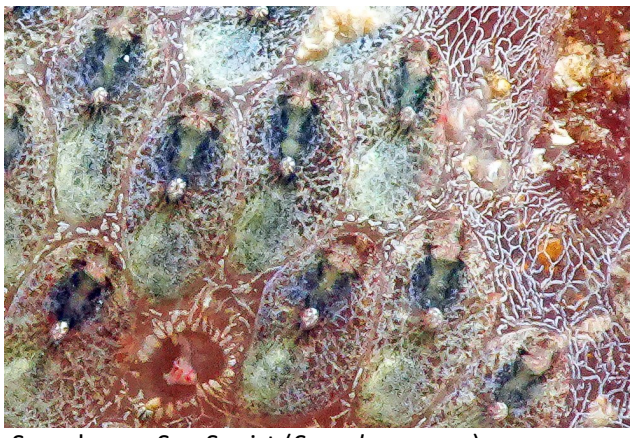
Red-throated Ascidian (*Herdmania momus*)

Red-throated Ascidian encrusted with Didemnid

Botrylloides Ascidian (*Botrylloides* sp.)

Botrylloides Ascidian (*Botrylloides* sp.)

Pleated Sea Squirt (*Styela plicata*)



Symplegma Sea Squirt (*Symplegma* sp.)

Fig. 5 (cont'd) Chordates (Ascidians) identified during the Port Coogee Marina critter study, 2018-2024

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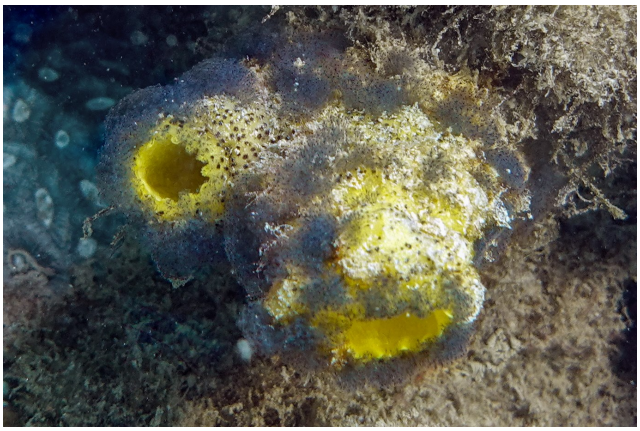
Solitary Ascidian

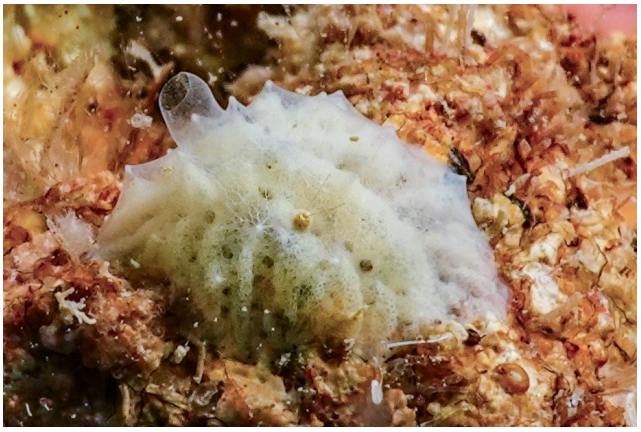
Solitary Ascidian



Solitary Ascidian

Colonial Ascidian

Colonial Ascidian



Colonial Ascidian

Fig. 5 (cont'd) Chordates (Ascidians) identified during the Port Coogee Marina critter study, 2018-2024

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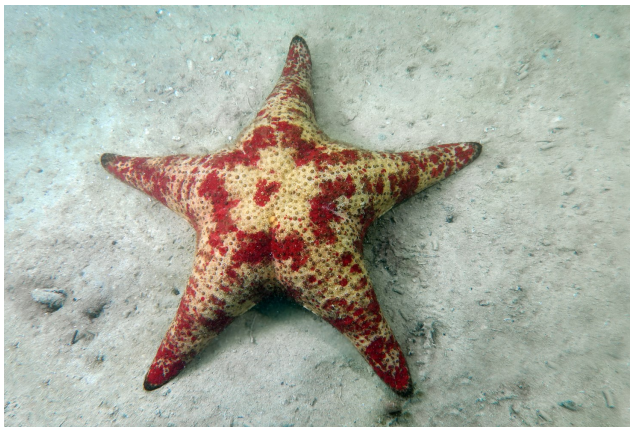
4.5 Echinoderms (Phylum: ECHINODERMATA)

Eleven families from the Phylum ECHINODERMATA were observed throughout the study, with Sea Stars from the Families Asteriidae, Oreasteridae, Asterinidae, Pterasteridae, Goniasteridae and Archasteridae being observed on 24 occasions (Appendix 1). Sea Cucumbers within the Families Cucumaridae and Stichopodidae were also observed, along with Brittle Stars (Ophiotrichidae, Clarkcomidae) and one species of Sea Urchin (Echinometridae) (Table 5). A selection of Echinoderms encountered throughout the study are presented in Fig. 6, featuring Sea Stars (Fig. 6.1), Sea Urchins, Sea Cucumbers and Brittle Stars (Fig. 6.2).

Table 5. Echinoderms recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Class
1	*Anthenea australiae*	Australian Cushion Star	Sea Stars
2	*Archaster angulatus*	Angular Sea Star	Sea Stars
3	*Coscinasterias muricata*	Eleven-armed Sea Star	Sea Stars
4	*Euretaster insignis*	Striking Sea Star	Sea Stars
5	*Nepanthia crassa*	Western Sea Star	Sea Stars
6	*Pentagonaster duebeni*	Biscuit Star	Sea Stars
7	*Heliocidaris erythrogramma*	Western Pacific Purple Sea Urchin	Sea Urchins
8	*Australostichopus mollis*	Australasian Brown Sea Cucumber	Sea Cucumbers
9	*Cercodemas anceps*	Pink Warty Sea Cucumber	Sea Cucumbers
10	Class Holothuroidea	Sea Cucumber	Sea Cucumbers
11	*Colochirus crassus*	Fat Sea Cucumber	Sea Cucumbers
12	*Clarkcoma canaliculata*	Brittle Star	Brittle Stars
13	Family Ophiotrichidae	Brittle Star	Brittle Stars

Australian Cushion Star (*Anthenea australiae*)



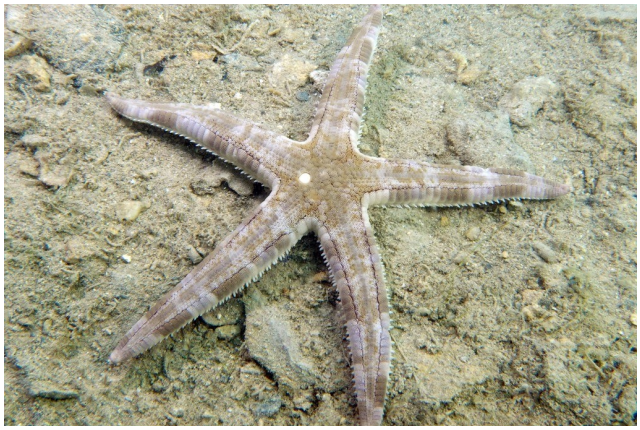
Australian Cushion Star (*Anthenea australiae*)

Fig. 6.1 Echinoderms (Sea Stars) identified during the Port Coogee Marina critter study, 2018-2024

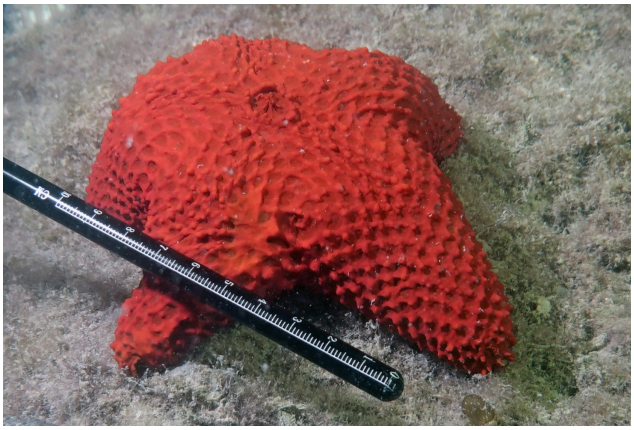
Eleven-armed Seastar (*Coscinasterias muricata*)

Eleven-armed Seastar (*Coscinasterias muricata*)

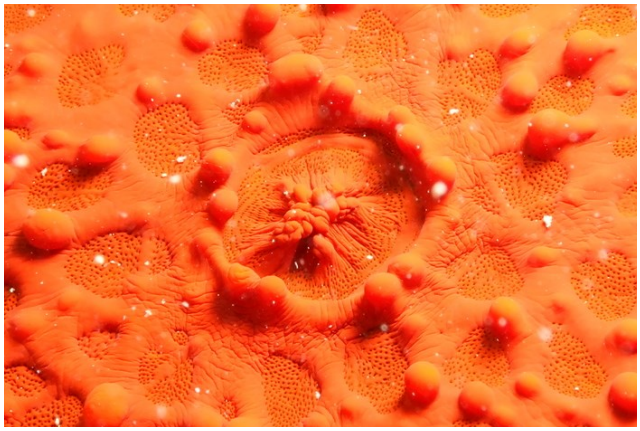
Eleven-armed Seastar (*Coscinasterias muricata*)



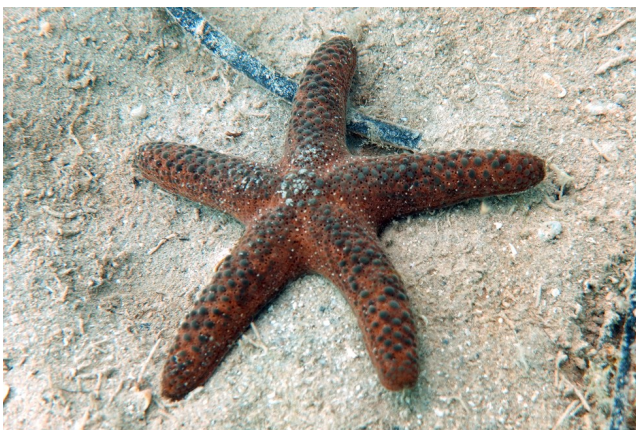
Angular Archaster Seastar (*Archaster angularis*)



Striking Seastar (*Euretaster insignis*)



Cllose-up of the aboral opening of *E. insignis*



Western Seastar *(Nepanthia crassa*)

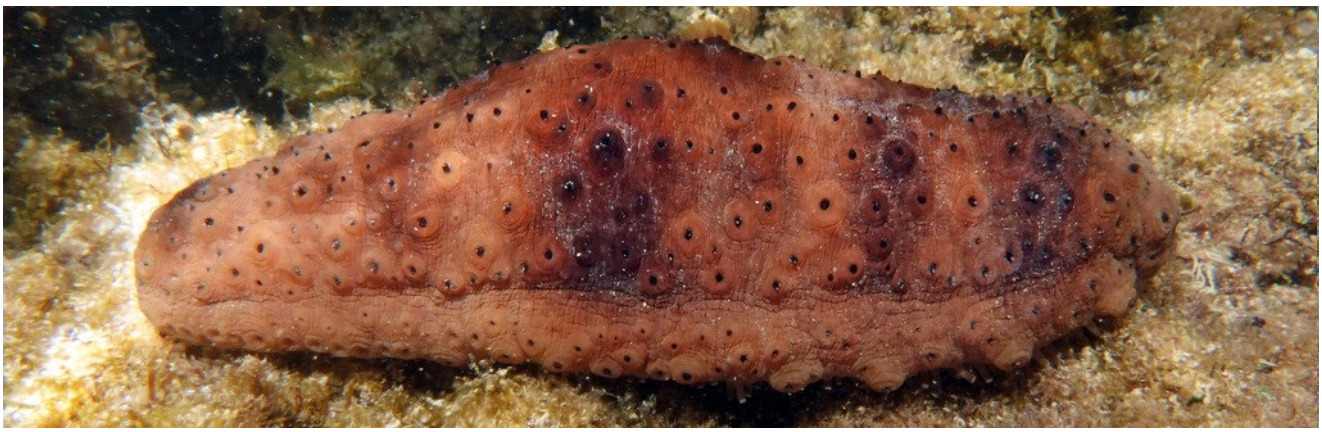
Biscuit Star (*Pentagonaster duebeni*)

Fig. 6.1 (cont'd) Echinoderms (Sea Stars) identified during the Port Coogee Marina critter study, 2018-2024

Western Pacific Purple Sea Urchin (*Heliocidaris erythrogramma*)

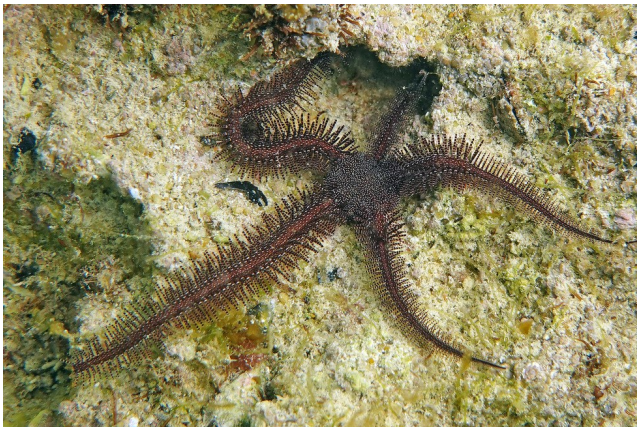
Pink Warty Sea Cucumber (*Cercodemas anceps*)

Fat Sea Cucumber (*Colochirus crassus*)



Australasian Brown Sea Cucumber (*Australostichopus mollis*)

Brittle Star *(Macrophiothrix spongicola*)



Brittle Star (*Clarkcoma canaliculata*)

Fig. 6.2 Echinoderms (Sea Urchins, Sea Cucumbers, Brittle Stars) identified during the Port Coogee Marina critter study, 2018-2024

4.6 Annelids (Phylum: ANNELIDA)

Nine families from the Phylum ANNELIDA were observed during the study period, with all specimens being Polychaete worms except for three records of *Phascolosoma scolops* (Peanut Worm) and one record of *Metabonellia haswelli* (Green Spoon Worm) (Table 6; Appendix 1). Scaleworms (Family Polynoidae) and Feather Duster Worms (Family Sabellidae) were the most abundant polychaetes being observed on 14 occasions collectively. Eunicid worms (Genera Eunice and Leodice) were commonly observed, along with Serpulid Tubeworms (Family Serpulidae). A selection of Annelids encountered throughout the study are presented in Fig. 7, featuring Spoon Worms, Bristleworms (Fig. 7.1), Tubeworms and Peanut Worms (Fig. 7.2).

Table 6. Annelids recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Order
1	*Metabonellia haswelli*	Green Spoon Worm	Spoonworms
2	*Eunice* sp.	Eunice Bristleworm	Bristleworms
3	Family Lumbrineridae	Lumbrinerid Bristleworm	Bristleworms
4	*Leodice* sp.	Leodice Bristleworm	Bristleworms
5	Family Syllidae	Necklace Worm	Bristleworms
6	*Odontosyllis* sp.	Fireworm	Bristleworms
7	Family Polynoidae sp. 1	Scaleworm	Scaleworms
8	Family Polynoidae sp. 2	Scaleworm	Scaleworms
9	Family Polynoidae sp. 3	Scaleworm	Scaleworms
10	Family Polynoidae sp. 4	Scaleworm	Scaleworms
11	Family Polynoidae sp. 5	Scaleworm	Scaleworms
12	Family Polynoidae sp. 6	Scaleworm	Scaleworms
13	*Thormora* sp.	Thormora Scaleworm	Scaleworms
14	Family Serpulidae	Serpulid Tubeworm	Serpulid Tubeworms
15	*Serpula* sp.	Red Tubeworm	Serpulid Tubeworms
16	*Branchiomma* sp.	Branchiomma Feather Duster	Feather Duster Worms
17	Family Sabellidae sp. 1	Feather Duster Worm	Feather Duster Worms
18	Family Sabellidae sp. 2	Feather Duster Worm	Feather Duster Worms
19	Family Sabellidae sp. 3	Feather Duster Worm	Feather Duster Worms
20	Family Sabellidae sp. 4	Feather Duster Worm	Feather Duster Worms
21	Family Sabellidae sp. 5	Feather Duster Worm	Feather Duster Worms
22	*Sabellastarte australiensis*	Southern Fanworm	Feather Duster Worms
23	*Phascolosoma scolops*	Peanut Worm	Peanut Worms

Green Spoon Worm (*Metabonellia haswelli*)

Bristleworm (*Eunice* sp.)

Bristleworm (*Leodice* sp.)

Bristleworm (Family Lumbrineridae)

Bristleworm (*Odontosyllis* sp.)

Bristleworm (Family Syllidae)

Scaleworm (*Thormora* sp.)

Scaleworm (Family Polynoidae)

Fig. 7.1 Annelids (Spoon Worms, Bristleworms) identified during the Port Coogee Marina critter study, 2018-2024

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Southern Fanworm (*Sabellastarte australiensis*)

Feather Duster Worms (*Branchiomma* sp.)

Feather Duster Worms (Family Sabellidae)

Serpulid Tubeworm (*Serpula* sp.)

Peanut Worm (*Phascolosoma* sp.)

Fig. 7.2 Annelids (Tubeworms, Peanut Worms) identified during the Port Coogee Marina critter study, 2018-2024

4.7 Cnidarians (Phylum: CNIDARIA)

At least eight families of Cnidarians (Phylum CNIDARIA) were observed during the project (Table 7; Appendix 1), despite excluding the sessile corals. Several species of sea anemones were observed on the rock walls; large tube-dwelling anemones were observed on the silty Marina floor at night; and true jellies and hydrozoans were observed on several occasions in the water column including a notable record of a Blue Button (*Porpita porpita*). A selection of Cnidarians observed throughout the study are presented in Fig. 8, featuring the *Isanemonia australis* Sea Anemone (Fig. 8.1), Tube Anemones, True Jellies and Hydrozoans (Fig. 8.2), and the Blue Button and Australian Spotted Jelly (Fig. 8.3).

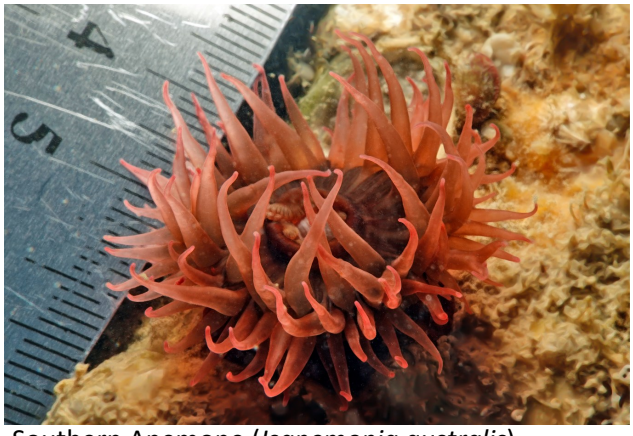
Table 7. Cnidarians recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Class
1	*Isanemonia australis*	Southern Anemone	Sea Anemones
2	Order Actiniaria	Sea Anemone	Sea Anemones
3	Order Actiniaria	Sea Anemone	Sea Anemones
4	Family Cerianthidae	Tube-dwelling Anemone	Tube-dwelling Anemones
5	*Porpita porpita*	Blue Button	Hydrozoans
6	Family Aequoreidae	Many-ribbed Jelly	Hydrozoans
7	*Liriope* sp.	Nymph Jelly	Hydrozoans
8	*Chrysaora* sp.	Sea Nettle	True Jellies
9	*Aurelia* sp.	Moon Jelly	True Jellies
10	*Phyllorhiza punctata*	Australian Spotted Jelly	True Jellies

Sea Anemone (Family Actiniidae)

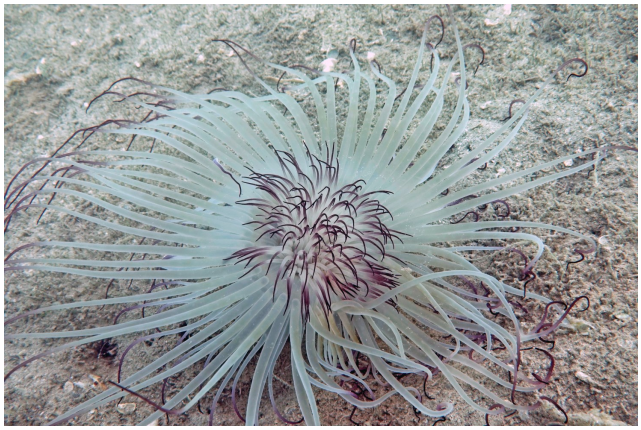
Sea Anemone (Family Actiniidae)

Southern Anemone (*Isanemonia australis*)



Southern Anemone (*Isanemonia australis*)

Fig. 8.1 Cnidarians (*Isanemonia australis*) observed during the Port Coogee Marina critter study, 2018-2024



Tube Anemone (Family Cerianthidae)

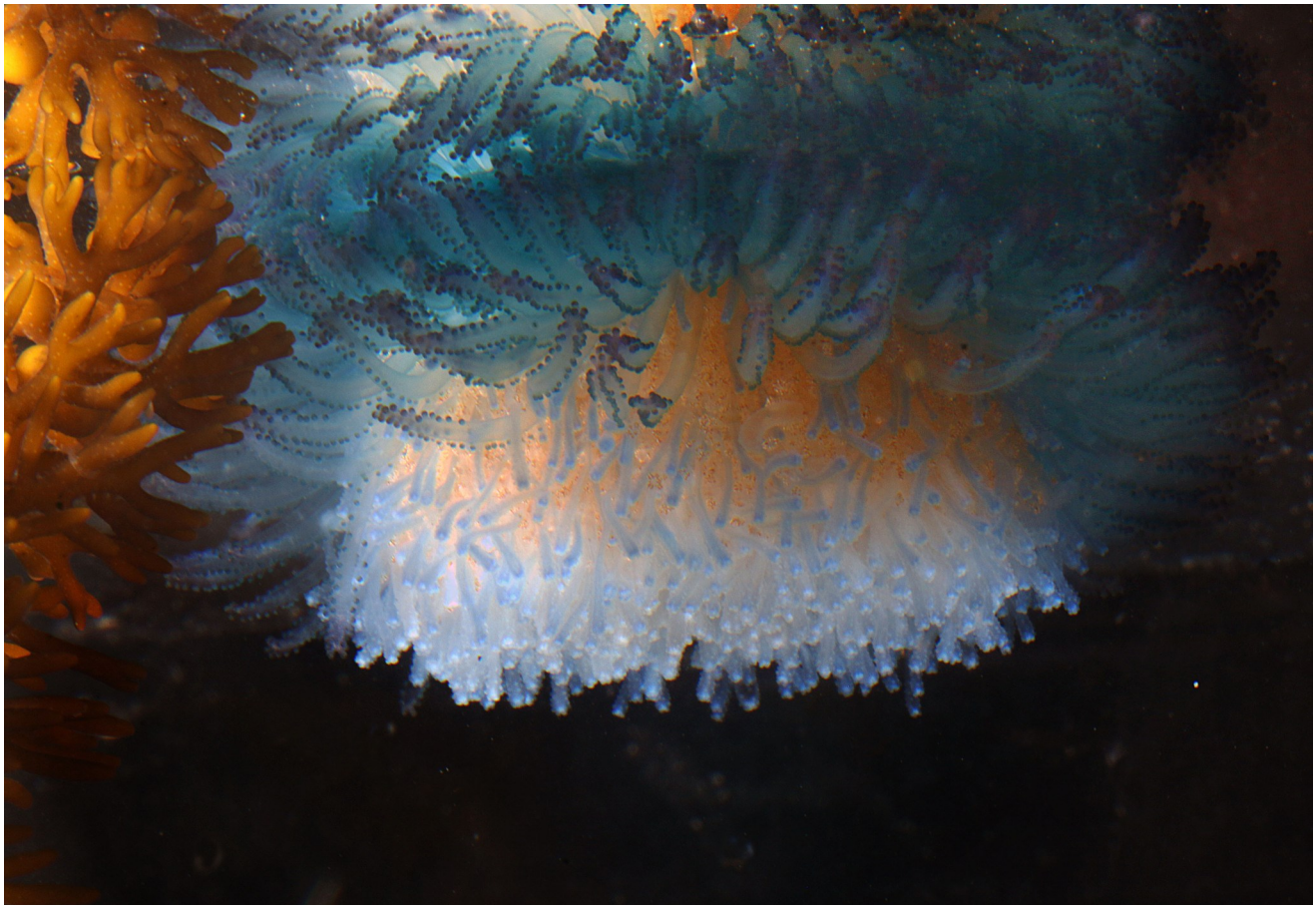
Moon Jellies (*Aurelia* sp.)

Tube Anemone (Family Cerianthidae)

Many-ribbed Jellies (Family Aequoreidae)

Nymph Jellyfishes (*Liriope* sp.)

Fig. 8.2 Cnidarians (Sea Anemones, True Jellies, Hydrozoans) identified during the Port Coogee Marina critter study, 2018-2024



Blue Button (*Porpita porpita*)

Australian Spotted Jelly (*Phyllorhiza punctata*)

Fig. 8.3 Cnidarians (*Porpita porpita, Phyllorhiza punctata*) identified during the Port Coogee Marina critter study, 2018-2024

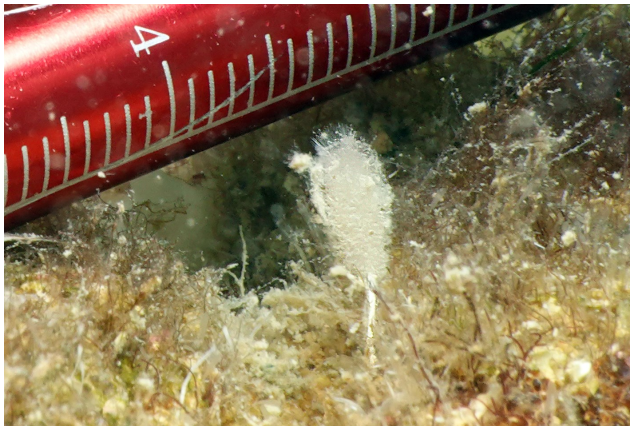
4.7 Poriferans (Phylum: PORIFERA)

Ten photographic observations of Sponges (Poriferans, Phylum PORIFERA) were recorded during the project, representing two classes (Calcareous Sponges and Demosponges, Table 8) and four separate families: Syconidae (Hairy Tube Sponges) and Tethyidae (Puffball Sponges) (Fig. 9.1); and Thorectidae (Cup Sponges) and Clionaidae (Boring Sponges) (Fig. 9.2). Sponges in Western Australia are poorly documented and often unable to be identified to species level without sampling. Taxonomic details are given in Appendix 1.

Table 8. Poriferans recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Class
1	*Sycon* sp.	Hairy Tube Sponge	Calcareous Sponges
2	*Tethya bergquistae*	Pink Golf Ball Sponge	Demosponges
3	*Tethya* sp.	Puffball Sponge	Demosponges
4	Order Haplosclerida	Haplosclerid Sponge	Demosponges
5	Family Thorectidae	Cup Sponge	Demosponges
6	Family Clionaidae	Boring Sponge	Demosponges

Hairy Tube Sponge (*Sycon* sp.)



Hairy Tube Sponge (*Sycon* sp.)

Pink Golf Ball Sponge (*Tethya bergquistae*)

Puffball Sponge (*Tethya* sp.)

Fig. 9.1 Poriferans (Hairy Tube Sponges) observed during the Port Coogee Marina critter study, 2018-2024

Haploscleridan Demosponge (Order Haplosclerida)

Cup Sponge (Family Thorectidae)

Cup Sponge (Family Thorectidae)

Boring Sponge (Family Clionaidae)

Fig. 9.2 Poriferans observed during the Port Coogee Marina critter study, 2018-2024

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4.8 Bryozoans, Platyhelminthes, Nemerteans (Phyla: BRYOZOA, PLATYHELMINTHES, NEMERTEA)

Seven species of Flatworms (Platyhelminthes), Ribbon Worms (Nemertea) and Bryozoans were photographed during the surveys, collectively (Appendix 1). Records included a *Baseodiscus delineates* Ribbon Worm, Cheilostomatid Bryozoans, and a Spotted Tiger Flatworm (*Maritigrella fuscopunctata*) (Table 9). A selection of these phyla are presented in Fig. 10.

Table 9. Bryozoans, Platyhelminthes and Nemerteans recorded during the Port Coogee Marina critter study, 2018-2024

	Lowest Taxonomic ID	Common/reference name	Phylum
1	*Maritigrella fuscopunctata*	Spotted Tiger Flatworm	Flatworms
2	*Notocomplana* sp.	Acotylean Flatworm	Flatworms
3	*Pseudoceros* sp.	Cotylean Flatworm	Flatworms
4	*Baseodiscus delineatus*	Ribbon Worm	Ribbon Worms
5	*Triphyllozoon* sp.	Cheilostomatid Bryozoans	Bryozoans
6	Order Cheilostomatida sp. 1	Cheilostomatid Bryozoans	Bryozoans
7	Order Cheilostomatida sp. 2	Cheilostomatid Bryozoans	Bryozoans

Fig. 10.1 Spotted Tiger Flatworm (*Maritigrella fuscopunctata*) observed during the Port Coogee Marina critter study, 2018-2024

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Acotylean Flatworm (*Notocomplana* sp.)

Ribbon Worm (*Baseodiscus delineates*)

Cheilostomatid Bryozoan (Order Cheilostomatida)

Lace Coral Bryozoan (*Triphyllozoon* sp.)

Lace Coral Bryozoan (*Triphyllozoon* sp.)

Fig. 10.2 Acotylean Flatworm, Ribbon Worm and Bryozoans identified during the Port Coogee Marina critter study, 2018-2024

5.0 POINTS OF INTEREST

5.1 *Phestilla* Nudibranch

During the survey a pair of *Phestilla* sp. nudibranchs were photographed in the Marina, on the inside of the south-western channel wall (Figs. 3.4 & 11). These nudibranchs are undescribed and rarely recorded in Western Australia, but feed on the tissue of the hard coral *Turbinaria* sp. as can be seen in the photo (exposed white coral skeleton devoid of tissue in the bottom left of the photo). In addition they have also been laying eggs on the coral—with the white egg ribbons clearly visible.

Fig. 11 *Phestilla* nudibranch pair on *Turbinaria* coral, Port Coogee Marina, March 2023

5.2 Nudibranch egg ribbons

In addition to the nudibranch eggs described above, two other larger egg ribbons were photographed during the survey (p14 Fig. 3.4 bottom two photos). One of these was identified as being from a *Rostanga* nudibranch, possibly *Rostanga calamus*. Although the nudibranchs themselves were not identified during the survey, they are less than 1cm long, red in colour and are thought to feed on reddish coloured sponges so can be very hard to see. The presence of their eggs confirms at least one species of *Rostanga* living in the Marina.

5.3 Blue Button

The Blue Button is a hydroid in the Phylum Cnideria. It looks superficially like a jellyfish (Fig. 8.3), but is actually made up of a large colony of zooids—some of which make up the float, and others the tentacles (Fig. 12). The tentacles have bundles of nematocysts at their tips which sting. They are a tropical to sub-tropical species but are occasionally seen further south.

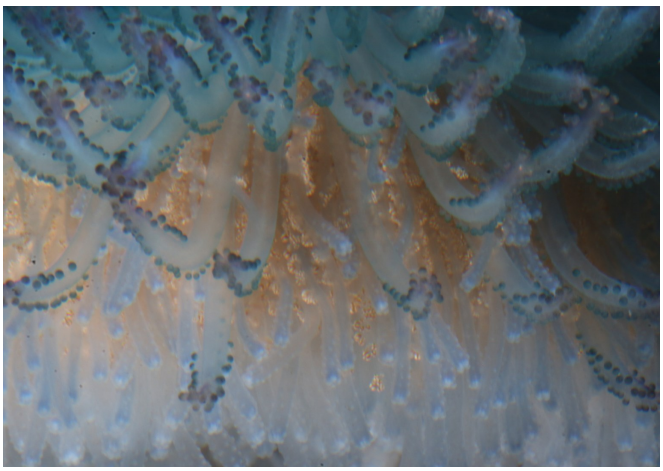

Fig. 12 Blue Button (*Porpita porpita*) tentacles (zooids) with nematocysts at Port Coogee Marina, July 2020

5.0 POINTS OF INTEREST (cont'd)

5.4 Introduced species

An introduced species of Dove Snail (*Mitrella bicincta*) was photographed as part of this study in Port Coogee Marina in February 2023 (Fig. 3.5). ARMS reported the record to Aquatic Pest Biosecurity at the Department of Primary Industries and Regional Development, who advised that it had been first reported in Western Australia in 2007, and was not currently a species of concern.

The Livid Fan Scallop (*Scaeochlamys livida*) was photographed four times within the Marina during the course of the surveys (Fig 13). This species was introduced to Western Australia from Eastern Australia, and is common around rocks and pylons along the Perth Coast. Although not considered a pest it may have locally replaced some of the native species such as the Doughboy Scallop (*Mimachlamys asperrima*).

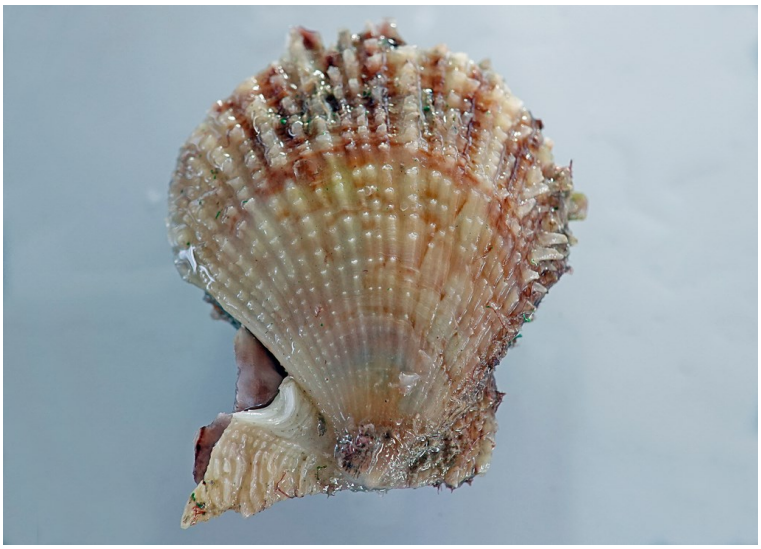

Fig. 13 Livid Fan Scallop (*Scaeochlamys livida*), Port Coogee Marina, Feb 2023

5.5 Undescribed species

During the survey there were many photographic records of critters that could not be classified to species level. In some cases this was due to the quality of the photograph or lack of distinguishing features that can be identified at the scale required. As mentioned in 3.5, identification without physical samples can be very challenging (e.g. some of the byrozoa, sponges and ascidians). However in many other cases the species have not been described yet. There are numerous nudibranchs, including several *Hypselodoris* and *Goniobranchus* species that are commonly seen around the Perth Coast and several of which were seen in the Marina, that are still undescribed.

6.0 RECOMMENDATION

The authors recommend that the City of Cockburn updates the database established during this project on a 2-3 year cycle, as it will provide invaluable data relating to the health of the Port Coogee Marina ecosystem.

APPENDIX 1: Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
1	Annelida		Sipuncula	Phascolosomatidae	*Phascolosoma scolops*
2	Annelida		Sipuncula	Phascolosomatidae	*Phascolosoma scolops*
3	Annelida		Sipuncula	Phascolosomatidae	*Phascolosoma scolops*
4	Annelida	Polychaeta	Echiuroidea	Bonelliidae	*Metabonellia haswelli*
5	Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice* sp.
6	Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice* sp.
7	Annelida	Polychaeta	Eunicida	Eunicidae	*Leodice* sp.
8	Annelida	Polychaeta	Eunicida	Lumbrineridae	
9	Annelida	Polychaeta	Phyllodocida	Syllidae	*Odontosyllis* sp.
10	Annelida	Polychaeta	Phyllodocida	Syllidae	
11	Annelida	Polychaeta	Phyllodocida	Polynoidae	
12	Annelida	Polychaeta	Phyllodocida	Polynoidae	
13	Annelida	Polychaeta	Phyllodocida	Polynoidae	
14	Annelida	Polychaeta	Phyllodocida	Polynoidae	
15	Annelida	Polychaeta	Phyllodocida	Polynoidae	
16	Annelida	Polychaeta	Phyllodocida	Polynoidae	
17	Annelida	Polychaeta	Phyllodocida	Polynoidae	*Thormora* sp.
18	Annelida	Polychaeta	Sabellida	Sabellidae	
19	Annelida	Polychaeta	Sabellida	Sabellidae	
20	Annelida	Polychaeta	Sabellida	Sabellidae	
21	Annelida	Polychaeta	Sabellida	Sabellidae	
22	Annelida	Polychaeta	Sabellida	Sabellidae	*Sabellastarte australiensis*
23	Annelida	Polychaeta	Sabellida	Sabellidae	*Branchiomma* sp.
24	Annelida	Polychaeta	Sabellida	Sabellinae	
25	Annelida	Polychaeta	Sabellida	Serpulidae	*Serpula* sp.
26	Annelida	Polychaeta	Sabellida	Serpulidae	
27	Arthropoda	Hexanauplia	Balanomorpha	Balanidae	*Balanus trigonus*
28	Arthropoda	Hexanauplia	Balanomorpha	Balanidae	*Balanus trigonus*
29	Arthropoda	Hexanauplia	Balanomorpha	Balanidae	*Balanus trigonus*
30	Arthropoda	Hexanauplia	Balanomorpha	Balanidae	*Amphibalanus* sp.
31	Arthropoda	Malacostraca	Amphipoda	Caprellidae	
32	Arthropoda	Malacostraca	Amphipoda	Caprellidae	
33	Arthropoda	Malacostraca	Decapoda	Alpheidae	
34	Arthropoda	Malacostraca	Decapoda	Caridea	
35	Arthropoda	Malacostraca	Decapoda	Caridea	
36	Arthropoda	Malacostraca	Decapoda	Caridea	
37	Arthropoda	Malacostraca	Decapoda	Caridea	
38	Arthropoda	Malacostraca	Decapoda	Crangonidae	*Philocheras* sp.
39	Arthropoda	Malacostraca	Decapoda	Diogenidae	*Calcinus dapsiles*
40	Arthropoda	Malacostraca	Decapoda	Epialtidae	*Paranaxia serpulifera*
41	Arthropoda	Malacostraca	Decapoda	Epialtidae	*Paranaxia serpulifera*
42	Arthropoda	Malacostraca	Decapoda	Epialtidae	
43	Arthropoda	Malacostraca	Decapoda	Grapsidae	*Planes minutus*
44	Arthropoda	Malacostraca	Decapoda	Grapsidae	*Planes minutus*
45	Arthropoda	Malacostraca	Decapoda	Hippolytidae	*Hippolyte* sp.
46	Arthropoda	Malacostraca	Decapoda	Hippolytidae	*Latreutes* sp.
47	Arthropoda	Malacostraca	Decapoda	Hymenosomatidae	*Halicarcinus ovatus*
48	Arthropoda	Malacostraca	Decapoda	Hymenosomatidae	*Halicarcinus ovatus*
49	Arthropoda	Malacostraca	Decapoda	Hymenosomatidae	*Halicarcinus ovatus*
50	Arthropoda	Malacostraca	Decapoda	Hymenosomatidae	*Halicarcinus ovatus*

APPENDIX 1 (cont'd): Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
51	Arthropoda	Malacostraca	Decapoda	Leucosiidae	
52	Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemon* sp.
53	Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemon serenus*
54	Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemon serenus*
55	Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemon serenus*
56	Arthropoda	Malacostraca	Decapoda	Portunidae	*Palaemon serenus*
57	Arthropoda	Malacostraca	Decapoda	Portunidae	*Palaemon serenus*
58	Arthropoda	Malacostraca	Decapoda	Penaeidae	*Penaeus latisulcatus*
59	Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Pilumnus* sp.
60	Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Pilumnus* sp.
61	Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Pilumnus fissifrons*
62	Arthropoda	Malacostraca	Decapoda	Plagusiidae	*Guinusia chabrus*
63	Arthropoda	Malacostraca	Decapoda	Plagusiidae	*Guinusia chabrus*
64	Arthropoda	Malacostraca	Decapoda	Porcellanidae	*Pisidia dispar*
65	Arthropoda	Malacostraca	Decapoda	Porcellanidae	*Pisidia dispar*
66	Arthropoda	Malacostraca	Decapoda	Portunidae	*Leptograpsus variegatus*
67	Arthropoda	Malacostraca	Decapoda	Portunidae	*Leptograpsus variegatus*
68	Arthropoda	Malacostraca	Decapoda	Portunidae	*Ozius truncatus*
69	Arthropoda	Malacostraca	Decapoda	Portunidae	*Portunus* sp.
70	Arthropoda	Malacostraca	Decapoda	Portunidae	*Portunus armatus*
71	Arthropoda	Malacostraca	Decapoda	Portunidae	*Portunus armatus*
72	Arthropoda	Malacostraca	Decapoda	Portunidae	*Portunus armatus*
73	Arthropoda	Malacostraca	Decapoda	Portunidae	*Portunus sanguinolentus*
74	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita* sp.
75	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita* sp.
76	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita* sp.
77	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
78	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
79	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
80	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
81	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
82	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
83	Arthropoda	Malacostraca	Decapoda	Portunidae	*Thalamita sima*
84	Arthropoda	Malacostraca	Decapoda	Portunidae	*Trionectes rugosus*
85	Arthropoda	Malacostraca	Decapoda	Varunidae	*Helograpsus haswellianus*
86	Arthropoda	Malacostraca	Decapoda	Xanthidae	*Actaea* sp.
87	Arthropoda	Malacostraca	Decapoda	Xanthidae	*Actaea* sp.
88	Arthropoda	Malacostraca	Decapoda	Xanthidae	*Megametope carinatus*
89	Arthropoda	Malacostraca	Decapoda	Xanthidae	
90	Arthropoda	Malacostraca	Isopoda	Idoteidae	*Euidotea* sp.
91	Arthropoda	Malacostraca	Isopoda	Sphaeromatoidae	
92	Bryozoa	Gymnolaemata	Cheilostomatida	Phidoloporidae	*Triphyllozoon* sp.
93	Bryozoa	Gymnolaemata	Cheilostomatida	Phidoloporidae	*Triphyllozoon* sp.
94	Bryozoa	Gymnolaemata	Cheilostomatida		
95	Bryozoa	Gymnolaemata	Cheilostomatida		
96	Chordata	Ascidiacea	Aplousobranchia	Clavelinidae	*Clavelina lepadiformis*
97	Chordata	Ascidiacea	Aplousobranchia	Clavelinidae	*Clavelina moluccensis*
98	Chordata	Ascidiacea	Aplousobranchia	Holozoidae	*Sycozoa sigillinoides*
99	Chordata	Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium* sp.
100	Chordata	Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium* sp.

APPENDIX 1 (cont'd): Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
101	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania* sp.
102	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania* sp.
103	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania* sp.
104	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania* sp.
105	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania momus*
106	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania momus*
107	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania momus*
108	Chordata	Ascidiacea	Stolidobranchia	Pyuridae	*Herdmania momus*
109	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Botrylloides* sp.
110	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Botrylloides* sp.
111	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Botrylloides* sp.
112	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Botrylloides* sp.
113	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Styela plicata*
114	Chordata	Ascidiacea	Stolidobranchia	Styelidae	*Symplegma* sp.
115	Chordata	Ascidiacea			
116	Chordata	Ascidiacea			
117	Chordata	Ascidiacea			
118	Chordata	Ascidiacea			
119	Chordata	Ascidiacea			
120	Chordata	Ascidiacea			
121	Chordata	Ascidiacea			
122	Chordata	Ascidiacea			
123	Chordata	Ascidiacea			
124	Chordata	Ascidiacea			
125	Chordata	Ascidiacea			
126	Chordata	Ascidiacea			
127	Chordata	Ascidiacea			
128	Chordata	Ascidiacea			
129	Chordata	Ascidiacea			
130	Cnidaria	Anthozoa	Actiniaria	Actiniidae	*Isanemonia australis*
131	Cnidaria	Anthozoa	Actiniaria		
132	Cnidaria	Anthozoa	Actiniaria		
133	Cnidaria	Anthozoa	Spirularia	Cerianthidae	
134	Cnidaria	Anthozoa	Spirularia	Cerianthidae	
135	Cnidaria	Hydrozoa	Anthoathecata	Porpitidae	*Porpita porpita*
136	Cnidaria	Hydrozoa	Leptothecata	Aequoreidae	
137	Cnidaria	Hydrozoa	Limnomedusae	Geryoniidae	*Liriope* sp.
138	Cnidaria	Scyphozoa	Rhizostomeae	Mastigiidae	*Phyllorhiza punctata*
139	Cnidaria	Scyphozoa	Semaeostomeae	Pelagiidae	*Chrysaora* sp.
140	Cnidaria	Scyphozoa	Semaeostomeae	Ulmaridae	*Aurelia* sp.
141	Echinodermata	Ophiuroidea	Amphilepidida	Ophiotrichidae	
142	Echinodermata	Ophiuroidea	Ophiacanthida	Clarkcomidae	*Clarkcoma canaliculata*
143	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
144	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
145	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
146	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
147	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
148	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
149	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*
150	Echinodermata	Asteroidea	Forcipulatida	Asteriidae	*Coscinasterias muricata*

APPENDIX 1 (cont'd): Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
151	Echinodermata	Asteroidea	Valvatida	Archasteridae	*Archaster angulatus*
152	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
153	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
154	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
155	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
156	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
157	Echinodermata	Asteroidea	Valvatida	Asterinidae	*Nepanthia crassa*
158	Echinodermata	Asteroidea	Valvatida	Goniasteridae	*Pentagonaster duebeni*
159	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
160	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
161	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
162	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
163	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
164	Echinodermata	Asteroidea	Valvatida	Oreasteridae	*Anthenea australiae*
165	Echinodermata	Asteroidea	Velatida	Pterasteridae	*Euretaster insignis*
166	Echinodermata	Asteroidea	Velatida	Pterasteridae	*Euretaster insignis*
167	Echinodermata	Holothuroidea	Dendrochirotida	Cucumariidae	*Colochirus crassus*
168	Echinodermata	Holothuroidea	Dendrochirotida	Cucumariidae	*Colochirus crassus*
169	Echinodermata	Holothuroidea	Dendrochirotida	Cucumariidae	*Cercodemas anceps*
170	Echinodermata	Holothuroidea	Synallactida	Stichopodidae	*Australostichopus mollis*
171	Echinodermata	Holothuroidea			
172	Echinodermata	Echinoidea	Camarodonta	Echinometridae	*Heliocidaris erythrogramma*
173	Echinodermata	Echinoidea	Camarodonta	Echinometridae	*Heliocidaris erythrogramma*
174	Mollusca	Bivalvia	Arcida	Arcidae	*Barbatia pistachia*
175	Mollusca	Bivalvia	Arcida	Arcidae	*Barbatia pistachia*
176	Mollusca	Bivalvia	Carditida	Carditidae	*Megacardita* sp.
177	Mollusca	Bivalvia	Mytilida	Mytilidae	*Mytilus edulis*
178	Mollusca	Bivalvia	Mytilida	Mytilidae	*Mytilus* sp.
179	Mollusca	Bivalvia	Mytilida	Mytilidae	
180	Mollusca	Bivalvia	Mytilida	Mytilidae	
181	Mollusca	Bivalvia	Mytilida	Mytilidae	
182	Mollusca	Bivalvia	Ostreida	Malleidae	*Malleus meridianus*
183	Mollusca	Bivalvia	Ostreida	Malleidae	*Malleus meridianus*
184	Mollusca	Bivalvia	Ostreida	Malleidae	*Malleus meridianus*
185	Mollusca	Bivalvia	Ostreida	Margaritidae	*Pinctada* sp.
186	Mollusca	Bivalvia	Ostreida	Margaritidae	*Pinctada* sp.
187	Mollusca	Bivalvia	Ostreida	Margaritidae	*Pinctada albina*
188	Mollusca	Bivalvia	Ostreida	Pinnidae	*Pinna* sp.
189	Mollusca	Bivalvia	Ostreida	Pinnidae	*Pinna bicolor*
190	Mollusca	Bivalvia	Ostreida	Pinnidae	*Pinna bicolor*
191	Mollusca	Bivalvia	Ostreida	Pinnidae	*Pinna bicolor*
201	Mollusca	Bivalvia	Ostreida	Pinnidae	
192	Mollusca	Bivalvia	Pectinida	Pectinidae	*Pecten fumatus*
193	Mollusca	Bivalvia	Pectinida	Pectinidae	*Pecten fumatus*
194	Mollusca	Bivalvia	Pectinida	Pectinidae	*Scaeochlamys livida*
195	Mollusca	Bivalvia	Pectinida	Pectinidae	*Scaeochlamys livida*
196	Mollusca	Bivalvia	Pectinida	Pectinidae	*Scaeochlamys livida*
197	Mollusca	Bivalvia	Pectinida	Pectinidae	*Scaeochlamys livida*
198	Mollusca	Bivalvia	Pectinida	Pectinidae	*Mimachlamys sp.*
199	Mollusca	Bivalvia	Pectinida	Pectinidae	
200	Mollusca	Bivalvia	Venerida	Veneridae	*Chione* sp.

APPENDIX 1 (cont'd): Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
201	Mollusca	Bivalvia	Venerida	Veneridae	*Chione* sp.
202	Mollusca	Bivalvia			
203	Mollusca	Bivalvia			
204	Mollusca	Cephalopoda	Idiosepida	Idiosepiidae	*Xipholeptos notoides*
205	Mollusca	Cephalopoda	Idiosepida	Idiosepiidae	*Xipholeptos notoides*
206	Mollusca	Cephalopoda	Idiosepida	Idiosepiidae	*Xipholeptos notoides*
207	Mollusca	Cephalopoda	Octopoda	Octopodidae	*Octopus djinda*
208	Mollusca	Cephalopoda	Octopoda	Octopodidae	*Octopus djinda*
209	Mollusca	Cephalopoda	Sepiida	Sepiidae	*Ascarosepion apama*
210	Mollusca	Cephalopoda	Sepiida	Sepiidae	*Ascarosepion apama*
211	Mollusca	Cephalopoda	Sepiida	Sepiidae	*Ascarosepion apama*
212	Mollusca	Cephalopoda	Sepiida	Sepiidae	*Ascarosepion apama*
213	Mollusca	Cephalopoda	Sepiida	Sepiidae	*Ascarosepion apama*
214	Mollusca	Cephalopoda	Sepiida	Sepiidae	
215	Mollusca	Gastropoda		Plakobranchidae	*Elysia* sp.
216	Mollusca	Gastropoda		Plakobranchidae	*Elysia marginata*
217	Mollusca	Gastropoda	Caenogastropoda	Epitoniidae	*Janthina janthina*
218	Mollusca	Gastropoda	Littorinimorpha	Rissoinidae	
219	Mollusca	Gastropoda	Littorinimorpha	Vermetidae	*Thylacodes sipho*
220	Mollusca	Gastropoda	Neogastropoda	Columbellidae	*Mitrella bicincta*
221	Mollusca	Gastropoda	Neogastropoda	Columbellidae	
222	Mollusca	Gastropoda	Neogastropoda	Muricidae	*Cronia avellana*
223	Mollusca	Gastropoda	Neogastropoda	Muricidae	*Dicathais orbita*
224	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Aplysia reticulata*
225	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Aplysia reticulata*
226	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Dolabella auricularia*
227	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Dolabella auricularia*
228	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Dolabella auricularia*
229	Mollusca	Gastropoda	Aplysiida	Aplysiidae	*Dolabella auricularia*
230	Mollusca	Gastropoda	Cephalaspidea	Aglajidae	*Spinophallus falciphallus*
231	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Ceratosoma brevicaudatum*
232	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Ceratosoma brevicaudatum*
233	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
234	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
235	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
236	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
237	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
238	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
239	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
240	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
241	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Goniobranchus* sp.
242	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Hypselodoris* sp.
243	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Hypselodoris* sp.
244	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Hypselodoris saintvincentius*
245	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Hypselodoris saintvincentius*
246	Mollusca	Gastropoda	Nudibranchia	Chromodorididae	*Hypselodoris saintvincentius*
247	Mollusca	Gastropoda	Nudibranchia	Dendrodorididae	*Dendrodoris krusensternii*
248	Mollusca	Gastropoda	Nudibranchia	Discodorididae	*Rostanga* sp.
249	Mollusca	Gastropoda	Nudibranchia	Scyllaeidae	*Scyllaea pelagica*
250	Mollusca	Gastropoda	Nudibranchia	Trinchesiidae	*Phestilla* sp.

APPENDIX 1 (cont'd): Classification of critters identified during the Port Coogee Marina critter study, 2018-2024

#	PHYLUM	CLASS	ORDER	FAMILY	SPECIES
251	Mollusca	Gastropoda	Nudibranchia		
252	Mollusca	Gastropoda	Cycloneritida	Neritidae	*Nerita atramentosa*
253	Mollusca	Gastropoda		Lottiidae	*Patelloida alticostata*
254	Mollusca	Gastropoda		Lottiidae	*Patelloida alticostata*
255	Mollusca	Gastropoda		Lottiidae	*Patelloida alticostata*
256	Mollusca	Gastropoda	Seguenziida	Chilodontaidae	*Herpetopoma aspersum*
257	Mollusca	Gastropoda	Trochida	Trochidae	*Stomatella impertusa*
258	Mollusca	Gastropoda	Trochida	Trochoidea	*Trochoidea* sp.
259	Mollusca	Polyplacophora	Chitonida	Acanthochitonidae	*Acanthochitona bednalli*
260	Mollusca	Polyplacophora	Chitonida	Chitonidae	*Liolophura hirtosa*
261	Mollusca	Polyplacophora	Chitonida	Chitonidae	*Liolophura hirtosa*
262	Mollusca	Polyplacophora	Chitonida	Chitonidae	*Liolophura hirtosa*
263	Mollusca	Polyplacophora	Chitonida	Cryptoplacidae	*Cryptoplax striata*
264	Mollusca	Polyplacophora	Chitonida	Ischnochitonidae	*Ischnochiton cariosus*
265	Mollusca	Polyplacophora	Chitonida	Ischnochitonidae	*Ischnochiton contractus*
266	Mollusca	Polyplacophora	Chitonida	Loricidae	*Lorica volvox*
267	Nemertea	Pilidiophora	Heteronemertea	Valenciniidae	*Baseodiscus delineatus*
268	Platyhelminthes		Polycladida	Euryleptidae	*Maritigrella fuscopunctata*
269	Platyhelminthes		Polycladida	Notocomplanidae	*Notocomplana* sp.
270	Platyhelminthes		Polycladida	Pseudocerotidae	*Pseudoceros* sp.
271	Porifera	Calcarea	Leucosolenida	Syconidae	*Sycon* sp.
272	Porifera	Calcarea	Leucosolenida	Syconidae	*Sycon* sp.
273	Porifera	Demospongiae	Clionaida	Clionaidae	
274	Porifera	Demospongiae	Clionaida	Clionaidae	
275	Porifera	Demospongiae	Dictyoceratida	Thorectidae	
276	Porifera	Demospongiae	Dictyoceratida	Thorectidae	
277	Porifera	Demospongiae	Dictyoceratida	Thorectidae	
278	Porifera	Demospongiae	Haplosclerida		
279	Porifera	Demospongiae	Tethyida	Tethyidae	*Tethya* sp.
280	Porifera	Demospongiae	Tethyida	Tethyidae	*Tethya* sp.
281	Porifera	Demospongiae	Tethyida	Tethyidae	*Tethya bergquistae*