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Kimberley marine biota. Historical data: additional phyla (Brachiopoda, Bryozoa, Annelida, Platyhelminthes, Sipuncula, Cnidaria and Chordata)

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ABSTRACT – This is the final paper in this series on historical marine biodiversity records of the Kimberley, north-western Australia from the *Woodside Collection Project (Kimberley) 2009–2015*. Here we document the historical records of seven additional phyla extracted from collection data from three Australian museums participating in the project. Although these data were not included as targeted project taxa and are too few for meaningful statistical analyses or comparison, they are of interest for their historical value (oldest specimens and presence data), the baseline information the data contain, and for highlighting the significant knowledge gap they represent. Within the seven phyla, 121 species are recorded from 44 locations in the Project Area, with 48.6% of the original records excluded for reasons explained in Sampey et al. (2014).

KEYWORDS: natural history collections, species inventory, biodiversity, NW Australia, baseline data

INTRODUCTION

The utilisation of natural science collections to provide baseline biodiversity information to inform conservation and environmental management decisions is increasingly being recognised (Pyke and Ehrlich 2010; Costello et al. 2013). The Western Australian Museum (WAM) and other Australian natural science institutions have accumulated marine voucher records from the Kimberley Project Area (Project Area) (see Sampey et al. 2014 and defined below) since the late 1800s. This has resulted in significant collections of marine specimens with associated metadata. However, much of the data, and their interpretation, are either unpublished or published in specialist taxonomic literature, and thus not readily accessible to researchers and conservation managers. To address this situation WAM instigated the *Woodside Collection Project (Kimberley) 2009–2015* (the Project) in conjunction with other Australian museums and the Western Australian Herbarium (WAH). The Project had two main components: an historical assessment of the known marine voucher-based records housed in Australian museum collections (Jones et al. 2017), and a series of marine biodiversity surveys undertaken during 2009–2014, with results currently in preparation.

The historical component (1880s–2009) collated records of shallow water (<30 m) marine flora and fauna (restricted to fishes and targeted invertebrate taxa) from the Project Area. The intent was to provide information on general trends in diversity patterns and collection gaps, both spatial and taxonomic, for these taxa.

The additional phyla included here were not targeted taxa for the Project, but were part of the original datasets, although their records were much fewer in number. Here we provide an inventory of the known records for these taxa. Because these phyla are represented by a small dataset comparative statistical analyses have not been undertaken.

METHODS

Full details of the Project methodology are outlined in Sampey et al. (2014).

The Project Area was defined by the coordinates 19.00°S 121.57°E; 19.00°S 118.25°E; 12.00°S 129.00°E; 12.00°S 121.00°E. It encompassed the coast, which formed a natural inshore boundary, from south of Broome to the Western Australian/Northern Territory border, extending beyond the 1000 m bathymetric contour to include the shelf edge atolls (Figures 1–5).

Data for the phyla were sourced from the collection databases of the WAM, Australian Museum (AM) and Museum and Art Gallery of the Northern Territory (MAGNT) as per Sampey et al. (2014). Three of the phyla are only partially represented, with the Scleractinia (Richards et al. 2014) and Octocorallia (Bryce et al. 2014) removed from the Cnidaria, the class Polychaeta (Hutchings et al. 2014) removed from the Annelida, and the Ascidiacea being the only class included in the Chordata.

Species names were checked (30 July 2016 to 18 January 2017) using the *World Register of Marine Species* (WoRMS, 2014). The species taxonomic determinations were assigned to a geographical location in Table 1 and the following assessments provided: number of species per phyla, number of inshore and offshore species for each phyla, number of species co-occurring at both inshore and offshore sites, and number of geographical locations per phyla. Also provided are total species counts, and totals for species inshore, offshore, and at both inshore and offshore sites. Table 2 details location coordinates, data on collection years, species counts per location, number of collection events and total collecting events, and occurrences of phyla across each location.

Location distribution maps (Figures 1–5) were prepared for each phylum from data provided in Appendices 1 and 2. Figure 1 is a composite map displaying locations for Brachiopoda (4 locations), Annelida (2) and Platyhelminthes (1). Figure 2 displays the locations for the Sipuncula (11 locations); Figure 3 the Cnidaria (28); Figure 4 the Chordata (17) and Figure 5 the Bryozoa with 9 locations. All maps have the Project Area boundary marked in grey with a map projection GDA94 and a scale of 1:6, 250,000.

RESULTS

A total of 121 species from seven phyla are documented (Appendix 1), with 48.6% of the original data excluded for a number of reasons including that the data was beyond the scope of the project (i.e. wrong depth and/or geographical location), specimens were incompletely identified, and potential for taxonomic duplication as a result of taxonomic qualifiers (e.g. “aff.”, “cf.” and “?”). A full explanation of the data exclusion rationale used in the Project is provided in Sampey et al. (2014).

The number of species for each phylum was: Brachiopoda (3 species), Bryozoa (12), Annelida (3), Platyhelminthes (2), Sipuncula (5), Cnidaria (27) and Chordata (69). These species were from 44 locations (5 offshore and 39 inshore), with 47 species inshore, 86 offshore, and 12 species occurred both inshore and offshore. Inshore is here defined as extending from the coast to the 50 m bathymetric contour, with the offshore continuing seaward to the continental edge.

There were 56 separate collecting events associated with the 121 species, with 37 single and seven multiple events, of which six occurred in Broome, three at Ashmore Reef and five other locations hosted two collecting events each. Although Broome had most collecting events, only 13 species across six phyla within a 77 year collection period were recorded, while Ashmore Reef had 77 species from five phyla over 16 years, and with half the collecting events (Appendix 2).

The time period for the collecting events was from 1913 to 2002. The three oldest records were the sea jelly, *Pseudorhiza haeckeli* Haarke, 1884, collected in 1913 from Freshwater Bay; the brachiopod, *Lingula adamsi* Dall, 1873 collected from Broome in 1921 and the ascidian, *Pyura arenosa* (Herdman, 1882) from Kuri Bay in 1964 (Appendix 2).

DISCUSSION

Historical marine floral and faunal collections provide baseline biodiversity and ecological data, and are important references for contributing to the determination of biotic assessments and human impacts associated with marine environments. The papers of this series (Jones et al. 2017) have detailed the historical collections found in the Kimberley Project Area, and provide fundamental knowledge for future research.

The majority of species reported here from the Project Area were collected from offshore reefs: Ashmore Reef (77 species), Rowley Shoals (11) and Scott Reef (1). Due to their remote location and the dates of the collecting events these species counts can be attributed to museum survey work. Inshore, Broome (13 species) had six separate collecting events over a wide date range (1921–2002), suggesting ad hoc collecting rather than targeted effort.

The collation of data on these phyla clearly indicates a lack of expert collecting and taxonomic attention. This highlights the critical information gap associated with these phyla.

Wilson (2014) noted that the Kimberley marine 'minor phyla', including the Platyhelminthes, nemertines, brachiopods and bryozoans are virtually unstudied. In this data synthesis we note the relatively high number of ascidian species (69), and modest number of non-scleractinian and octocoral cnidarian species (27), have counts much higher than those of the remaining five phyla, totalling 25 species.

The comparatively high ascidian species count (69) can be attributed to the extensive ascidian

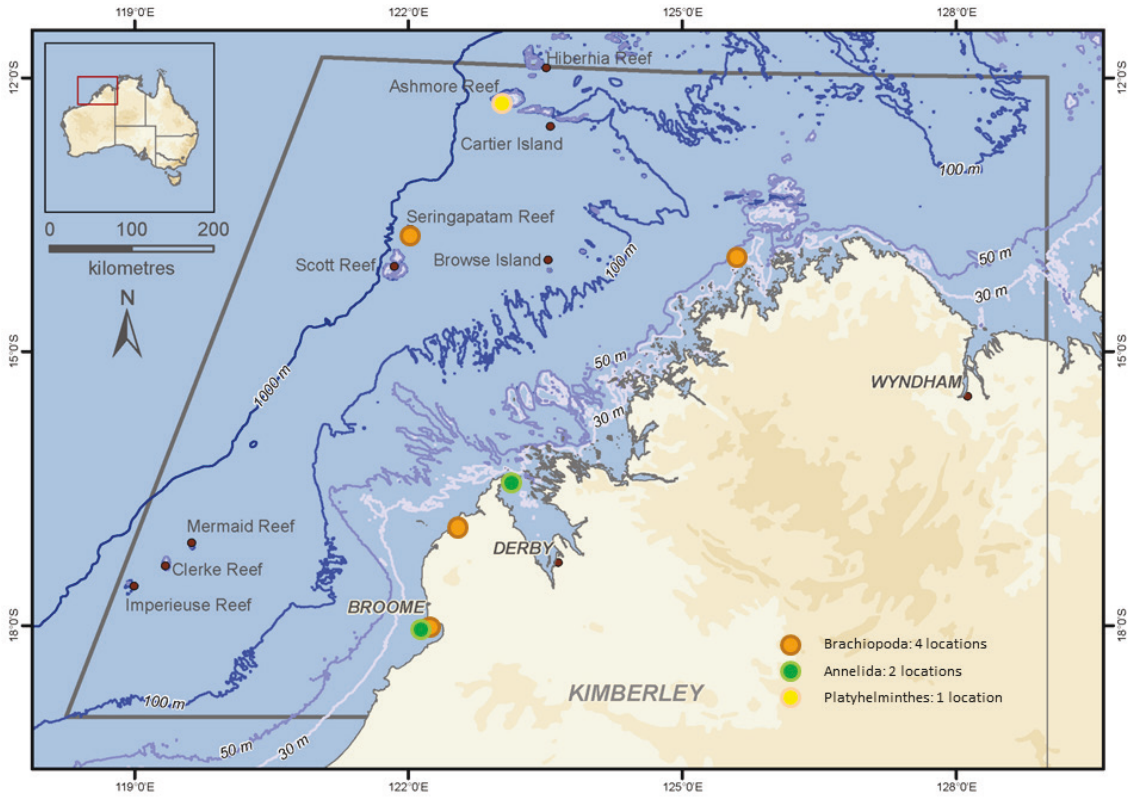

FIGURE 1 Brachiopoda locations (4 locations), Annelida (2) and Platyhelminthes (1). The Project Area boundary is marked in grey. Map projection: GDA94, Scale: 1:6, 250,000.

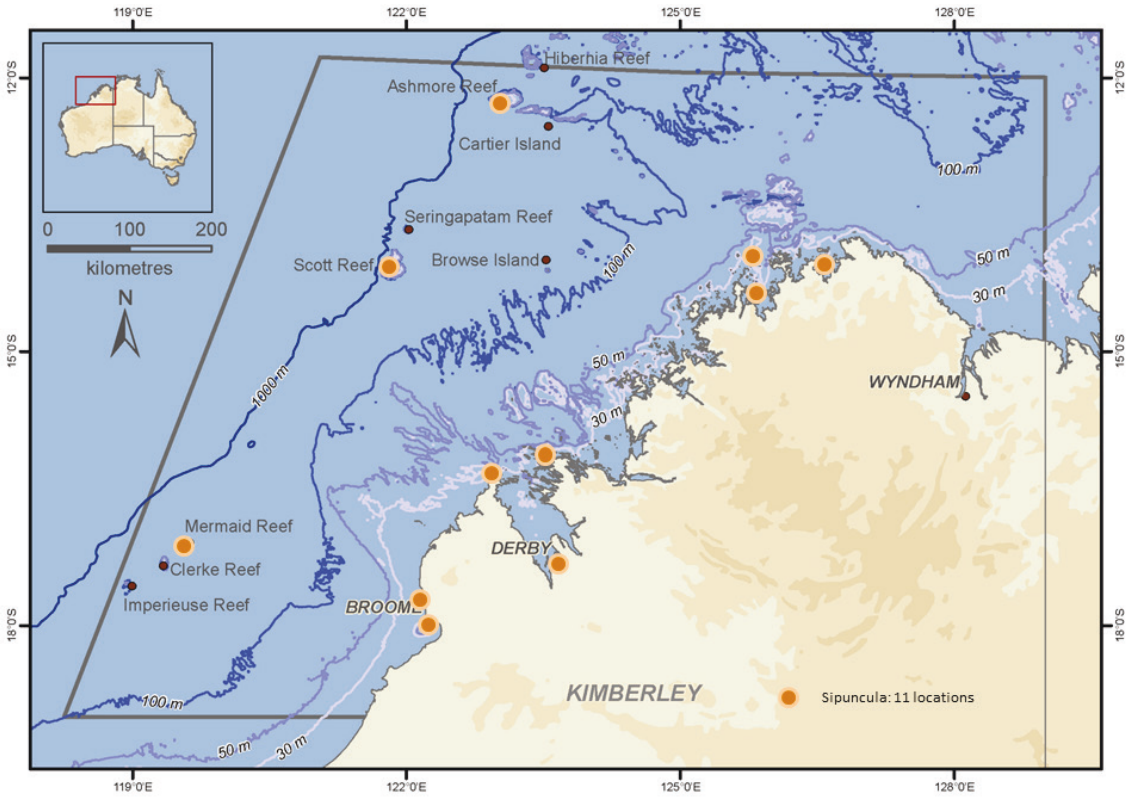

FIGURE 2 Sipuncula locations (11 locations). The Project Area boundary is marked in grey. Map projection: GDA94, Scale: 1:6, 250,000.

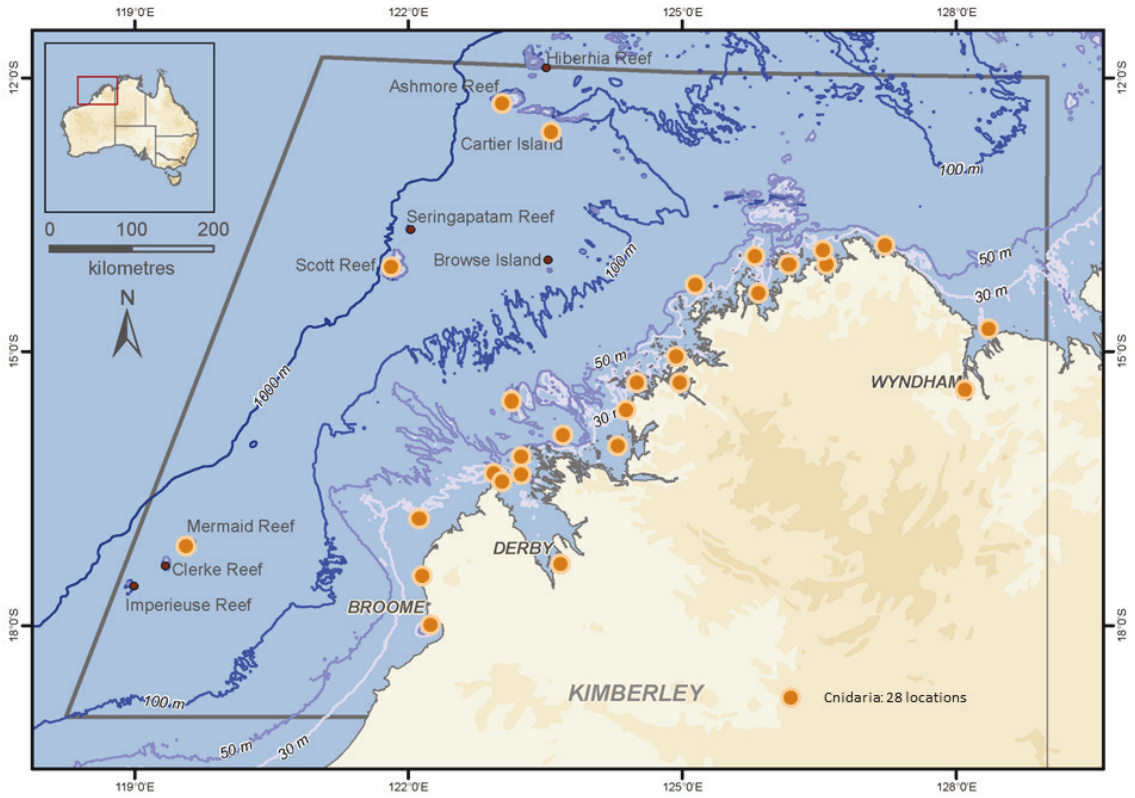

FIGURE 3 Cnidaria locations (28 locations). The Project Area boundary is marked in grey. Map projection: GDA94, Scale: 1:6, 250,000.

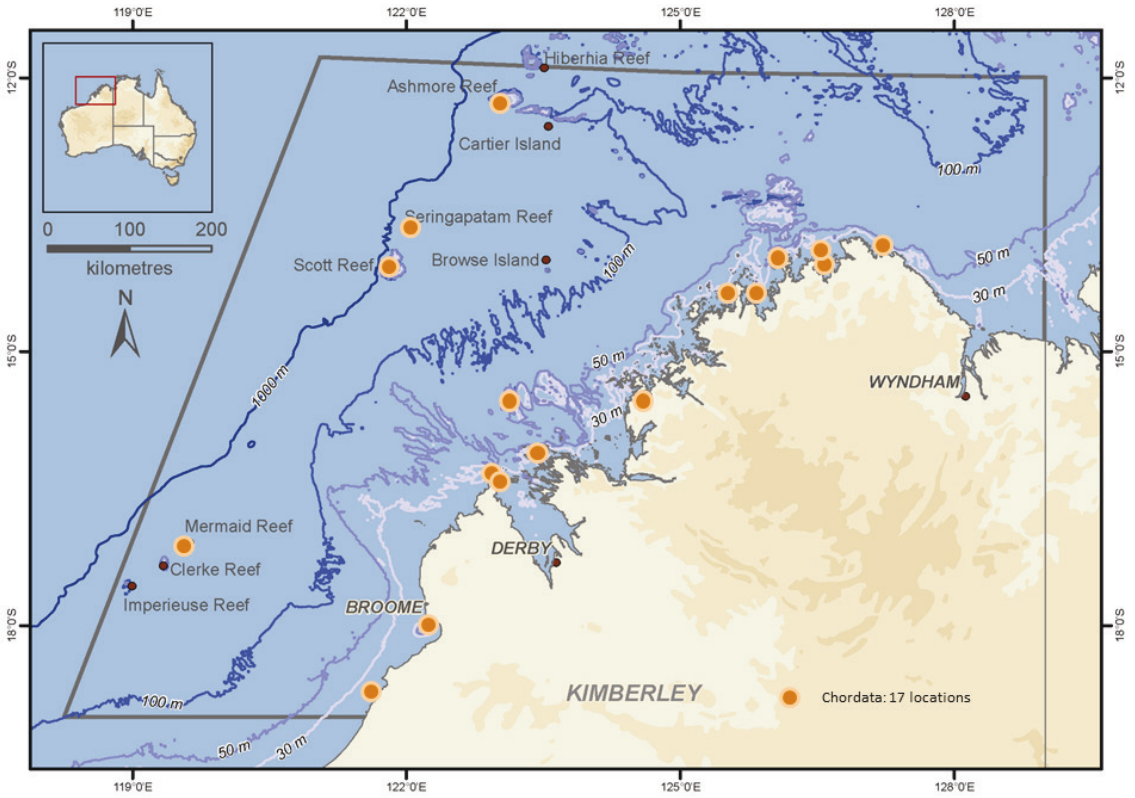

FIGURE 4 Chordata locations (17 locations). The Project Area boundary is marked in grey. Map projection: GDA94, Scale: 1:6, 250,000.

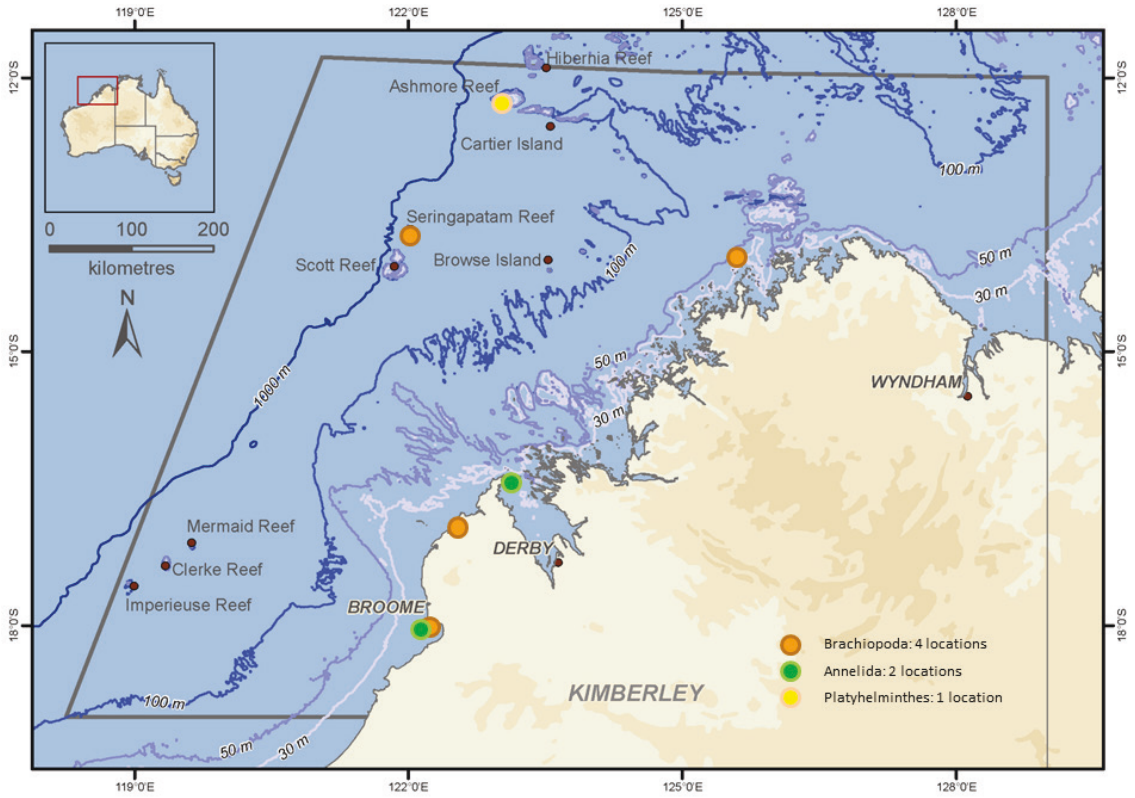

FIGURE 5 Bryozoa locations (9 locations). The Project Area boundary is marked in grey. Map projection: GDA94, Scale: 1:6, 250,000.

research of Dr. Patricia Mather (née Kott) (12 December 1925 – 4 January 2012). Kott (2006) noted that ascidians from Australian waters are known from relatively few locations and few specimens, with some known only from type specimens. Kott (2008b) reported that of the 50 known species previously recorded from Western Australia and/or adjacent locations only 21 were taken more than once. Examination of Kott's papers relevant to tropical Australia (Kott 2004, 2005, 2006, 2008a, 2008b, 2009) reveal that ascidian collections, albeit far from comprehensive, were obtained from trawl and sled surveys along the north-west Australian continental edge and slope. However, very little material, other than from opportunistic collecting, was made from remote coastal Kimberley waters.

The Bryozoa, Platyhelminthes, Cnidaria and Chordata had a greater number of species from offshore compared to inshore locations, and in all cases the majority of species originated from the continental edge atoll, Ashmore Reef. Ashmore was visited by both WAM (Berry, 1993) and MAGNT (Russell et al. 2005) who conducted museum surveys, and separately by individual researchers during the 1980s and 1990s. These phyla were collected incidentally.

Twelve bryozoan species were reported in this synthesis. The British Museum collections hold over 200 bryozoan specimens from the Kimberley region, including Holothuria Bank (Cook 1965). In her paper, Cook predicted a high proportion of free-living conical bryozoan species would be represented in tropical Australian habitats similar to those found at Holothuria Bank. This habitat, consisting of sand, mud and shell, is common at many inshore Kimberley locations (Bryce personal observation) yet to be surveyed for bryozoans.

In seven previously published reports from the Kimberley (Berry 1986; Johnstone 1990; Berry 1993; Brown and Skewes 2005; Russell et al. 2005; Willan 2005; Bryce 2009), and six unpublished reports (Wells 1989; Morgan 1992; Wells et al. 1995; Walker et al. 1996; Bryce et al. 1997; Walker 1997), none reported on any of the seven phyla included in this paper, although these records represent collecting effort on these expeditions.

The current survey work (2009–2014) by WAM and partner agencies has also not incorporated these phyla into survey methodology. This can be attributed to a lack of taxonomic expertise for these phyla and collection logistical constraints. However, it also highlights that biodiversity surveys still

focus on more abundant, and higher profile taxa, such as Scleractinian corals and fishes. Future research into these seven phyla is necessary to provide a more complete assessment of biodiversity in Kimberley marine habitats and bioregions.

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REFERENCES

Berry, P.F. (ed.) (1986). Faunal survey of the Rowley Shoals, Scott Reef and Seringapatam Reef, north-western Australia. *Records of the Western Australian Museum* Supplement **25**.

Berry, P.F. (ed.) (1993). Marine faunal surveys of Ashmore Reef and Cartier Island north-western Australia. *Records of the Western Australian Museum* Supplement **44**.

Brown, K. and Skewes, T.D. (2005). A preliminary assessment of the ecology of seagrasses at Ashmore Reef. *The Beagle, Records of the Museum and Art Galleries of the Northern Territory* Supplement **1**: 143–152.

Bryce, C.W. (ed.) (2009). Marine biodiversity survey of Mermaid Reef (Rowley Shoals), Scott and Seringapatam Reef. *Records of the Western Australian Museum* Supplement **77**.

Bryce, C.W., Hutchins, B. and Fromont, J. (eds) (1997). Restricted marine biological survey of the "garden bottom" of Beagle Bay, Kimberley, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Bryce, M., and Sampey, A. (2014). Kimberley marine biota. Historical data: soft corals and sea fans (Octocorallia). *Records of the Western Australian Museum.* Supplement **84**: 101–110.

Cook, P.L. (1965). Notes on some Polyzoa with conical zoaria. *Cahiers de Biologie Marine* **6**: 435–454.

Costello, M.J., Bouchet, P., Boxshall, G., Fauchald, K., Gordon, D., Hoeksema, B.W., Poore, G.C.B., van Soest, R.W.M., Stöhr, S. Walter, T.C., Vanhoorne, B., Decock, W. and Appeltans, W. (2013). Global coordination and standardisation in marine biodiversity through the World Register of Marine Species (WoRMS) and related databases. *PLoS ONE* **8**: e51629.

Hutchings, P., Glasby, C., Capa, M. and Sampey, A. (2014). 'Kimberley marine biota. Historical data: polychaetes (Annelida)'. *Records of the Western Australian Museum* Supplement **84**: 133–159.

Johnstone, R.E. (1990). Mangrove and mangrove birds of Western Australia. *Records of the Western Australian Museum*. Supplement **32**.

Kott, P. (2004). New and little-known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 2). *Journal of Natural History* **38**: 2455–2526.

Kott, P. (2005). New and little-known species of Didemnidae (Ascidiacea, Tunicata) from Australia (part 3). *Journal of Natural History* **39**: 2409–2479.

Kott, P. (2006). Observations on non-didemnid ascidians from Australian waters (1). *Journal of Natural History* **40** (3–4): 169–234.

Kott, P. (2008a). Biogeographic implications of Ascidiacea (Tunicata) from the Wesssel Islands (Arafura Sea). *The Beagle, Records of the Museums and Art Galleries of the Northern Territory* **24**: 63–67.

Kott, P. (2008b). Ascidiacea (Tunicata) from deep waters of the continental shelf of Western Australia. *Journal of Natural History* **42** (15): 1103–1217.

Kott, P. (2009). Taxonomic revision of Ascidiacea (Tunicata) for the upper continental slope off north-western Australia. *Journal of Natural History* **43** (31–32): 1947–1986.

Jones, D., Bryce, C., Fromont, J., Moore, G. (eds) (2017). Marine biodiversity of the Kimberley 1880s–2009. *Records of the Western Australian Museum.* Supplement **84**.

Morgan, G.J. (ed.) (1992). Survey of the aquatic fauna of the Kimberley islands and reefs, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Pyke, G. and Ehrlich, P. (2010). Biological collections and ecological/environmental research: a review, some observations and a look to the future. *Biological Reviews* **85**: 247–266.

Richards, Z.T., Sampey, A. and Marsh, L. (2014). Kimberley marine biota. Historical data: scleractinian corals. *Records of the Western Australian Museum.* Supplement **84**: 111–132.

Russell, B.C., Larson, H.K., Hutchins, J.B. and Allen, G.R. (2005). Reef fishes of the Sahul Shelf. *The Beagle, Records of the Museums and Art Galleries of the Northern Territory* Supplement **1**: 83–105.

Sampey, A., Bryce, C., Osborne, S. and Miles, A. (2014). Kimberley marine biota. Historical data: introduction and methods. *Records of the Western Australian Museum* Supplement **84**: 19–43.

Walker, D.I., Wells, F.E. and Hanley, J.R. (eds) (1996). Survey of the marine biota of the eastern Kimberley, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Walker, D.I. (ed.) (1997). Marine biological survey of the central Kimberley coast, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Wells, F.E. (ed.) (1989). Survey of the invertebrate fauna of the Kimberley islands, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Wells, F.E., Hanley, J.R. and Walker, D. I. (eds) (1995). Survey of the marine biota of the southern Kimberley islands, Western Australia. Western Australian Museum: Perth. Unpublished Report.

Willan, R.C. (2005). The molluscan fauna from the emergent reefs of the northernmost Sahul Shelf, Timor Sea — Ashmore, Cartier and Hibernia Reefs; biodiversity and zoogeography. *The Beagle, Records of the Museums and Art Galleries of the Northern Territory* Supplement **1**: 51–81.

Wilson, B.R. (2014). Kimberley marine biota: historical and environmental introduction. *Records of the Western Australian Museum* Supplement **84**: 1–20.

World Register of Marine Species (WoRMS) (2014). http://www.marinespecies.org/index.php (accessed 30 July 2016–18 January 2017).

APPENDIX 1 Species inventory for the seven phyla in this report, with summed data for voucher locations (OS = offshore).

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Phylum: Brachiopoda (Figure 1)																																														
Class: Lingulata																																														
Family: Lingulidae																																														
Lingula adamsi Dall, 1873	•							1																																						
Lingula anatina Lamarck, 1801	•					1		1				1																																		
Class: Rhynchonellata																																														
Family: Laqueidae																																														
Frenulina sanguinolenta (Gmelin, 1791)	•	•												1																														1			
Total Brachiopoda species	3																																													
Brachiopoda species inshore / offshore	3	1																																												
Brachiopoda species inshore and offshore	1																																													
Number Brachiopoda locations	5																																													
Phylum: Bryozoa (Figure 5)																																														
Class: Gymnolaemata																																														
Family: Adeonidae																																														
Adeonellopsis sp.		•		1																																									
Family: Candidae																																														
Caberea sp.		•		1																																									
Family: Catenicellidae																																														
Catenicella sp.	•		1																																										
Family: Lepraliellidae																																														
Celleporaria sp.	•	•		1			1																																							
Family: Margarettidae																																														
Margaretta sp.		•		1																																									
Family: Electridae																																														
Conopeum sp.	•																																													

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wallgwin Island	Willie Creek	Wyndham
Family: Petraliellidae																																														
Mucropetraliella sp.		●		1																																										
Family: Phidoloporidae																																														
Iodictyum sp.		●	1																																										
Triphyllozoon moniliferum (MacGillivray, 1860)		●	1																																										
Triphyllozoon tubulatum (Busk, 1884)		●	●					1																					1											1					
Family: Schizoporellidae																																														
Stylopoma viride (Thornely, 1905)		●																																					1		1						
Family: Colatooeciidae																																														
Cigclisula occlusa (Busk, 1884)		●	1																																										
Total Bryozoa species	12																																												
Bryozoa species inshore / offshore	4	10																																											
Bryozoa species inshore and offshore	2																																												
Number Bryozoa locations	9																																												
Phylum: Annelida (Figure 1)																																													
Class: Clitellata																																													
Family: Ozobranchidae																																													
Ozobranchus sp.		●						1																																					
Class: Oligochaeta																																													
Family: Tubificidae																																													
Heterodrilus devexus Erséus, 1997		●																																								1				
Class: Polychaeta																																													
Family: Bonelliidae																																													
Pseudobonellia biuterina Johnston & Tiegs, 1919		●						1																																					
Total Annelida species	3																																												
Annelida species inshore / offshore	3	0																																											
Annelida species inshore and offshore	0																																												
Number Annelida locations	2																																												

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Phylum: Platyhelminthes (Figure 1)																																														
Class: Rhabditophora																																														
Family: Planoceridae sp.		•		1																																									
cf. Pseudocerotidae sp.		•		1																																									
Total Platyhelminthes species	2																																													
Platyhelminthes species inshore / offshore	0	2																																												
Platyhelminthes species inshore and offshore	0																																													
Number Platyhelminthes locations	1																																													
Phylum: Sipuncula (Figure 2)																																														
Class: Phascolosomatidea																																														
Family: Aspidosiphonidae																																														
Aspidosiphon laevis Quatrefages, 1865		•		1																																									
Family: Phascolosomatidae																																														
Phascolosoma arcuatum (Gray, 1828)	•														1																					1									1		
Phascolosoma nigrescens (Keferstein, 1865)	•	•					1			1															1						1						1	1							
Class: Sipunculidea																																														
Family: Golfingiidae																																														
Nephasoma diaphanes corrugatum Cuttler & Cutler, 1986	•														1																															
Family: Themistidae																																														
Themiste lageniformis (Baird, 1868)	•						1																																							
Total Sipuncula species	5																																													
Sipuncula species inshore / offshore	4	2																																												
Sipuncula species inshore and offshore	1																																													
Number Sipuncula locations	11																																													

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Phylum: Cnidaria (Figure 3)																																														
Class: Anthozoa																																														
Order: Actiniaria																																														
Family: Actiniidae																																														
Entacmaea quadricolor (Leuckart in Rüppell & Leuckart, 1828)	•				1	1		1			1							1		1				1			1	1					1													
Macrodactyla doreensis (Quoy & Gaimard, 1833)	•	•		1																1																											
Family: Phymanthidae																																														
Phymanthus muscosus Haddon & Shackleton, 1893		•		1																																									
Family: Stichodactylidae																																														
Heteractis crispa (Hemprich & Ehrenberg in Ehrenberg, 1834)	•	•		1					1																							1													
Heteractis malu (Haddon & Shackleton, 1893)	•											1																																1		
Stichodactyla gigantea (Forskål, 1775)	•																									1								1											
Stichodactyla haddoni (Saville-Kent, 1893)	•			1																																									
Stichodactyla mertensii Brandt, 1835	•			1																																									
Stichodactyla tapetum (Hemprich & Ehrenberg in Ehrenberg, 1834)	•	•		1							1	1												1		1						1													
Family: Thalassianthidae				1																																									
Cryptodendrum adhaesivum Klunzinger, 1877		•		1																																								
Heterodactyla hemprichii Ehrenberg, 1834		•		1																																								
Order: Antipatharia																																														
Family: Antipathidae																																														
Antipathes sp.		•		1																																									
Cirrhipathes sp.		•		1																																					1					

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Order: Zoantharia																																														
Family: Zoanthidae																																														
Zoanthus coppingeri Haddon & Shackleton, 1891		•		1																																									
Class: Cubozoa																																														
Order: Carybdeida																																														
Family: Carybdeidae																																														
Alatina alata (Reynaud, 1830)		•																																							1				
Family: Chirodropidae																																														
Chironex fleckeri Southcott, 1956	•						1																																							
Class: Hydrozoa																																														
Order: Anthoathecata																																														
Family: Solanderiidae																																														
Solanderia secunda (Inaba, 1892)		•											1																																	
Family: Stylasteridae																																														
Distichopora violacea (Pallas, 1766)		•		1																																									
Stylaster tenisonwoodsi Cairns, 1988		•		1																																								
Family: Milleporidae																																					1									
Millepora intricata Milne Edwards,1860	•																																													
Millepora platyphylla Hemprich & Ehrenberg, 1834	•	•	1	1									1					1																				1	1	1		1				
Order: Leptothecata																																														
Family: Plumulariidae																																														
Macrorhynchia philippina Kirchenpauer, 1872		•																																						1		1				
Family: Aglaopheniidae																																														
Aglaophenia cupressina Lamouroux, 1816		•		1									1																											1		1				
Family: Sertulariidae																																														
Sertularella sp.	•																											1																	

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Order: Siphonophorae																																														
Family: Physaliidae																																														
Physalia physalis (Linnaeus, 1758)		•		1																																										
Class: Scyphozoa																																														
Order: Rhizostomae																																														
Family: Catostylidae																																														
Crambione cf. *mastigophora* Maas, 1903	•																																												1	
Family: Lychnorhizidae																																														
Pseudorhiza haeckeli (Haacke, 1884)	•															1																														
Total Cnidaria species	27																																													
Cnidaria species inshore / offshore	14	17																																												
Cnidaria species inshore and offshore	4																																													
Number Cnidaria locations	28																																													
Phylum: Chordata (Figure 4)																																														
Class: Ascidiacea																																														
Family: Clavelinidae																																														
Clavelina arafurensis Tokioka, 1952		•		1																																									
Clavelina meridionalis (Herdman, 1891)		•		1																																									
Clavelina moluccensis (Sluiter, 1904)		•		1																																									
Clavelina robusta Kott, 1990	•						1																																							
Family: Didemnidae																																														
Didemnum albopunctatum Sluiter, 1909		•		1																																							1		
Didemnum aratore Kott, 2004		•		1																																									
Didemnum candidum Savigny, 1816	•	•		1																															1										
Didemnum domesticum Kott, 2004		•		1																																									
Didemnum fragile Sluiter, 1909	•	•		1																						1																			
Didemnum fuscum Sluiter, 1909		•		1																																									
Didemnum lillipution Kott, 2004		•		1																																									
Didemnum membranaceum Sluiter, 1909		•		1																																									

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Didemnum molle (Herdman, 1886)	•	•		1																									1												1		1			
Didemnum nekozita Tokioka, 1967		•		1																																									
Didemnum precocinum Kott, 2001	•	•		1																					1																					
Didemnum psammatodes (Sluiter, 1895)	•																								1																					
Didemnum rota Kott, 2004		•		1																																									
Didemnum usitatum Kott, 2004		•		1																																									
Didemnum vesperi Kott, 2004		•		1																																									
Diplosoma listerianum (Milne-Edwards, 1841)		•		1																																								
Diplosoma versicolor Monniot, 1994		•		1																																								
Diplosoma virens (Hartmeyer, 1909)	•		1																																									
Leptoclinides rigidus Kott, 2001		•		1																																									
Leptoclinides sulawesi F & C Monniot, 1996		•		1																																								
Lissoclinum badium F & C Monniot, 1996		•		1																																								
Lissoclinum bistratum (Sluiter, 1905)	•																									1																				
Lissoclinum patella (Gottschaldt, 1898)	•																			1				1																		1			
Lissoclinum reginum Kott, 2001		•		1																																									
Lissoclinum taratara F & C Monniot, 1987		•		1																																								
Polysyncraton arvum Kott, 2004		•		1																																									
Polysyncraton catillum Kott, 2004		•		1																																									
Polysyncraton niveum Kott, 2004		•		1																																									
Tridemnum cyclops Michaelsen, 1921		•		1																																									
Tridemnum discrepans (Sluiter, 1909)		•		1																																									
Tridemnum farrago Kott, 2004		•		1																																									
Tridemnum miniatum Kott, 1977		•		1																																									
Tridemnum pigmentatum Kott, 2001	•																																										1			
Tridemnum savignii (Herdman, 1886)		•		1																																									
Family: Holozoidae				1																																									
Distaplia mikropnoa (Sluiter, 1909)		•		1																																									
Hypodistoma deerratum (Sluiter, 1895)		•		1																																									
Sigillina signifera (Sluiter, 1909)		•		1																																				1						
Sycozoa seiziwadai Tokioka, 1952		•		1																																									

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Waigwin Island	Willie Creek	Wyndham
Family: Polycitoridae																																														
Cystodytes dellechiajei (Della Valle, 1877)		•	1																																										
Eudistoma amplum (Sluiter, 1909)		•	1																																										
Family: Polyclinidae																																														
Aplidium clivosum Kott, 1992		•	1																																										
Polyclinum tsutsuii Tokioka, 1954		•	1																																										
Family: Ascidiidae																																														
Ascidia archaia Sluiter, 1890		•																																											
Ascidia capillata Sluiter, 1887		•	1																																										
Ascidia gemmata Sluiter, 1895	•							1																																					
Ascidia latesiphonica Hartmeyer, 1922		•						1																																					
Family: Corellidae																																														
Rhodosoma turcicum (Savigny, 1816)		•	1																																										
Family: Perophoridae																																														
Ecteinascidia sluiteri Herdman, 1906		•	1																																										
Perophora modificata Kott, 1985		•	1																																										
Family: Molgulidae																																														
Molgula ficus (MacDonald, 1859)	•							1																																					
Family: Pyuridae																																														
Herdmania momus (Savigny, 1816)	•							1																																					
Microcosmus helleri Herdman, 1881	•									1													1																							
Pyura arenosa (Herdman, 1881)	•																						1																							
Family: Styelidae																																														
Botrylloides leachii (Savigny, 1816)		•	1																																										
Botryllus schlosseri (Pallas, 1766)		•																																											
Botryllus tuberatus Ritter & Forsyth, 1917		•	1																																										
Cnemidocarpa areolata (Heller, 1878)	•										1																																		
Polycarpa argentata (Sluiter, 1890)		•																																										1	

Taxa	Inshore	Offshore	Adele Island	Ashmore Reef OS	Augustus Island	Beagle Bay	Bedford Island	Broome	Camden Sound	Cape Jaubert	Cape Leveque	Careening Bay	Cartier Island OS	Cassini Island	Cockatoo Island	Derby	Freshwater Bay	Gregory Island	Heritage Reef	James Price Point	Jones Island	Koolan Island	Kurri Bay	Lacepede Islands	Lesueur Island	Long Reef	Lord Island	Macleay Island	Medusa Banks	Montague Sound	Montgomery Reef	Napier Broome Bay	Naturalists Beach	One Arm Point	Parry Harbour	Port Warrender	Powerful Island	Rogers Strait	Rowley Shoals OS	Scorpion Island	Scott Reef OS	Seringapatam Reef OS	Sunday Island	Wailgwin Island	Willie Creek	Wyndham
Polycarpa hartmeyeri Michaelsen, 1927	•									1																																			
Polycarpa papillata (Sluiter, 1886)	•																						1																							
Polycarpa pigmentata (Herdman, 1906)		•		1																																									
Styela canopus (Savigny, 1816)	•							1																																					
Symplegma bahraini C & F Monniot, 1997		•		1																																								
Symplegma brakenhielmi (Michaelsen, 1904)		•		1																																			1					
Symplegma rubra Monniot, 1972		•		1																																								
Total Chordata species	69																																											
Chordata species inshore / offshore	19	54																																										
Chordata species inshore and offshore	4																																										
Number Chordata locations	17																																										
Total species	**121**																																										
Total species inshore / offshore	**47**	**86**																																									
Total species inshore and offshore	**12**																																										

APPENDIX 2 Location and collection data for specimens included in this report ([OS] = offshore).

Location	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Collection years	Species count	Number collection events	Brachiopoda	Bryozoa	Sipuncula	Annelida	Platyhelminthes	Cnidaria	Chordata
Adele Island	-15.49707	123.15976	1990	3	1		●				●	●
Ashmore Reef[OS]	-12.22469	123.01342	1986-2002	77	3		●	●		●	●	●
Augustus I	-15.39967	124.57206	1991	1	1						●	
Beagle Bay	-16.91552	122.49213	1988	1	1	●					●	
Bedford Island	-16.14178	123.31799	1989	1	1		●					
Broome	-17.97570	122.23610	1921–2002	13	6	●	●	●	●		●	●
Camden Sound	-15.54621	124.48663	1957	1	1						●	
Cape Jaubert	-18.94047	121.55237	1983	2	1							●
Cape Leveque	-16.40726	122.91059	1978, 1988	4	2			●			●	●
Careening Bay	-15.10048	125.02444	1998	2	1	●					●	
Cartier Island[OS]	-12.52797	123.55047	1992, 1996	2	2						●	
Cassini Island	-13.93935	125.62679	1991, 1998	1	2	●					●	
Cockatoo Island	-16.09227	123.59561	1961	1	1			●				
Derby	-17.32932	123.66716	1975	1	1			●				
Freshwater Bay	-13.99410	126.19765	1913	1	1						●	
Gregory Island	-16.31567	123.31276	1989	1	1						●	
Heritage Reef	-14.24354	125.15063	1991	1	1						●	
James Price Point	-17.47943	122.14527	1977	2	1						●	
Jones Island	-13.73949	126.35175	1991	1	1							●
Koolan Island	-16.13496	123.74915	1978, 1986	1	2				●			●
Kuri Bay	-15.47389	124.51000	1964	2	1							●
Lacepede Islands	-16.86275	122.14051	1982	1	1						●	●
Lesueur Island	-13.80000	127.25000	1991	4	1						●	●
Long Reef	-13.88209	125.77734	1991	1	1			●				
Lord Island	-16.15860	123.46530	1991	5	1						●	●
Macleay Island	-15.94149	123.69954	1996	1	1						●	
Medusa Banks	-14.65195	128.33742	1963	1	1						●	
Montague Sound	-14.33330	125.55830	1976	1	1							●
Montgomery Reef	-15.93150	124.20481	1990	1	1		●					
Napier Broome Bay	-14.05931	126.62001	1991	1	1			●				
Naturalists Beach	-15.02600	125.35556	1988	2	1						●	
One Arm Point	-16.43959	123.06824	1975	3	1						●	●

Location	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Collection years	Species count	Number collection events	Brachiopoda	Bryozoa	Sipuncula	Annelida	Platyhelminthes	Cnidaria	Chordata
Parry Harbour	-13.96987	126.08002	1991	2	1							●
Port Warrender	-14.52651	125.84677	1976	1	1			●				
Powerful Island	-16.08331	123.44091	1991	1	1						●	
Rogers Strait	-15.44165	124.61670	1990	1	1		●					
Rowley Shoals[OS]	-17.33581	119.33294	1982	11	1		●	●			●	
Scorpion Island	-13.86664	126.60000	1982	1	1						●	
Scott Reef[OS]	-14.05426	121.78070	1984	8	1		●	●			●	●
Seringapatam Reef[OS]	-13.65903	122.04328	1984, 1998	2	2	●	●					●
Sunday Island	-16.42605	123.18445	1991	5	1				●		●	●
Wailgwin Island	-15.53083	124.40167	1988	1	1						●	
Willie Creek	-17.76360	122.21371	1975	1	1			●				
Wyndham	-15.46387	128.12179	1980	1	1						●	
Total collecting events					**56**							