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Introduction to the marine environment of Dampier, Western Australia

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INTRODUCTION

The Pilbara coast of northwestern Australia has a low relief with gently sloping beaches, numerous headlands and many small offshore islands. Headlands are composed of isolated patches of very hard haematite-bearing quartzite, which is more resistant to erosion than the surrounding rocks. Normal erosion processes, combined with submergence, have led to a broken, rough coastline. Mangroves are conspicuous. Coral reefs and atolls occur north of the Tropic of Capricorn, where tropical seagrasses are found in lagoons, as well as in mangrove swamps and around islands (Walker and Prince, 1987). There is a progressive increase in tidal amplitude with decreasing latitude.

The continental coastline is largely Precambrian igneous rock overlain in some areas by Pleistocene limestone. Subtidally, the rock is covered with a veneer of sand, gravel and mud of varying thickness. All of these features occur in a variety of locations with varying height above or below sea level, exposure to waves and currents, and differing topographies. The mixture provides a complex range of habitats in the Dampier Archipelago (Semeniuk *et al.*, 1982; Semeniuk and Wurm, 1987)).

The continental coast west of West Intercourse Island, just off Dampier, is dominated by a wide variety of types of mangrove formations (Semeniuk and Wurm, 1987). The Dampier Archipelago is immediately offshore of the town. It has an area of about 4,000 km^2 of seabed, reefs, and intertidal zones to the north of the town. There are 42 islands, islets and rocks within a 45 km radius of Dampier (Hatcher, 1988; Driscoll, 1996) (Figure 1). Enderby Island, with an area of 3290 ha is the largest island. With a maximum height of 120 m, Dolphin I. is the highest (Morris, 1989). Until 6–8,000 years ago the outer periphery of what is now the Dampier Archipelago was the shoreline of the continental mainland. The outer islands are remnants of consolidated limestone ridges which formed the previous coastline (CALM, 1994). The remainder of the Dampier Archipelago is an inundated land mass which is topographically

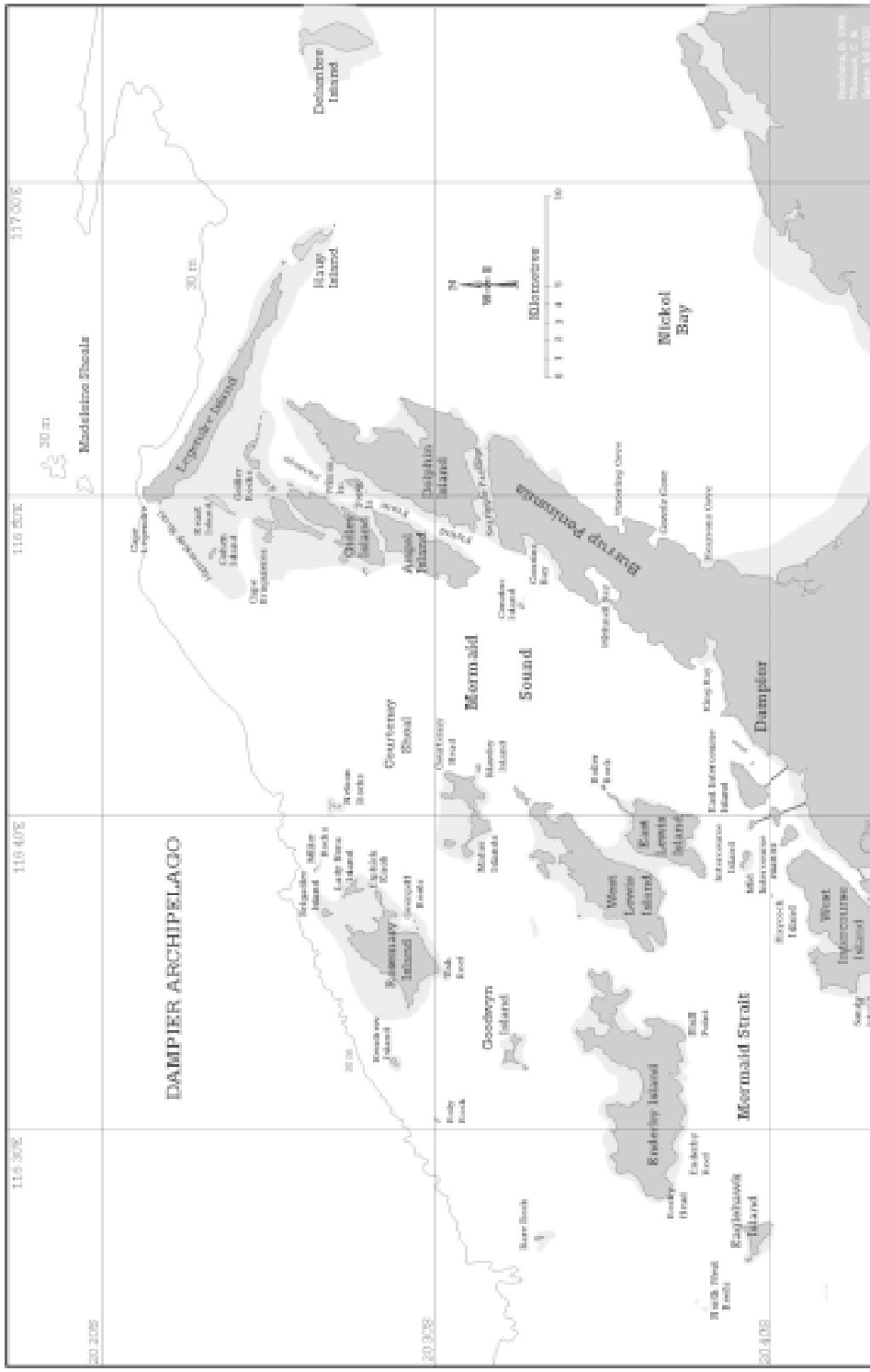

Figure 1 Map of the Dampier Archipelago and Burrup Peninsula, Western Australia.

similar to the present hinterland behind Dampier, except that it is under water. The bottom is a gently rising subtidal plain with a depth of 5–20 m out of which former hills rise for varying distances. Some do not reach sea level and form isolated rocks and reefs; others form islands above the water surface. There are a number of subtidal rocky reefs in addition to the islands in the archipelago. Inundated valleys form straits, channels and embayments in the archipelago.

To the east of Dampier, the Burrup Peninsula extends into the Indian Ocean. Both sides of the peninsula have rocky coastlines with small bays with mud or muddy sand in the lower intertidal and are fringed with mangroves in mid to upper intertidal areas. An extensive, shallow bay, Nickol Bay, lies to the east of the Burrup Peninsula. The southern and southeastern shores of Nickol Bay are an extensive mudflat with a wide mangrove zone in the upper intertidal.

The coastal town of Dampier, population of about 2,000, is located on the shores of Mermaid Sound (20º40'S; 116º42'E). Port facilities were constructed at Dampier in the 1960's at the end of a rail line from the inland Pilbara mines of what is now Hamersley Iron. The town was built to provide accommodation for employees and their families. Until 1969 the peninsula on which Dampier is located was actually an island separated from the mainland at high tide by seawater covering the flats behind the mangroves. A causeway built in 1969 and use of some of the tidal flats have since connected Dampier permanently to the mainland. A large area of mangroves was destroyed for construction of the salt ponds.

The town of Karratha is on the southern shoreline of Nickol Bay. Karratha was built after Dampier, initially as an governmental administrative centre and to service Dampier. More recently the town has grown with the influx of other businesses into the region. The current population is about 16,000.

The present section describes the general marine habitats and features of the Dampier region as background to the international marine biological workshop held in Dampier in July and August 2000. It concentrates on references which are available in the scientific literature. The Western Australian Department of Environmental Protection is currently undertaking a multiyear management study of the Western Australian North West Shelf, of which the Dampier area is part. Heyward *et al.* (2000) present a major analysis of our understanding of the region and gaps in present knowledge of the shelf. This report is available on the worldwide web. Jernakoff (1999) generated a bibliography of published literature and unpublished reports from the area, which is also on the web. Both can be accessed at the addresses given in the literature cited section. Further information can be obtained from the Register of the National Estate Database (NHT, 2002).

Climate

Pearce *et al.* (2003) present a detailed analysis of the oceanography of the Dampier Archipelago in the next paper in this volume. The present section is simply intended to provide background information to the marine habitats which occur in the Dampier region and the archipelago.

Dampier lies in the Western Australian arid zone tropics. Average rainfall in the area is 249 mm, but is very erratic. Most rainfall occurs between January and May, either as the result of tropical cyclones or depressions. Annual evaporation is on the order of 3.5 m, an order of magnitude higher than rainfall. Winds can be high in Dampier, particularly during cyclones, with an average of 1.4 cyclones per year passing within 200 km of Dampier. These can have winds of up to 70 m/sec and cause substantial storm surges. Tides are semidiurnal with an inequality between the two daily tides. The maximum tidal range can reach 5 m, but the mean range on

springs is 3.6 m; the mean for neaps is 1.0 m. Tidal and wind driven currents can reach 50 cm/sec in passages between the islands but are lower in more open areas. Sea surface temperatures range from about 22ºC in winter to 30ºC in summer. Salinities range from about 35.5‰ to 36.5‰.

Biogeography

The shallow water marine environment of Western Australia can be divided into three biogeographical components. The north coast of the State, extending northeastwards from North West Cape, is part of the vast tropical Indo-West Pacific biotic region. The tropical biota extends across the entire coastline of northern Australia to the southern extent of the Great Barrier Reef in Queensland. There are no major biogeographical limits along the north coast of Western Australia, though there are differences in biota between the eastern and western sides of Cape York, Qld. This is the Tropical Australia Province, sometimes referred to as the Dampierian province (Womersley, 1990). The south coast of the State, from Cape Leeuwin eastwards, is part of the warm temperate southern Australian biota which extends across the southern shores of the continent and up the east coast to southern Queensland. The west coast of the State, between Cape Leeuwin and North West Cape, is an overlap zone between the tropical and temperate regions. The relative components vary with latitude, with tropical species dominating in the north and temperate in the south. Superimposed on this is a small component of the biota which is endemic to Western Australia. While WA endemics can be found in all parts of the State, they are concentrated on the west coast. There, the proportion of endemics varies in different taxonomic groups from 5% in fishes to 25% in shallow water echinoderms (Wilson and Gillett, 1971; Wilson and Allen, 1987; Marsh, 1976; Wells, 1980; 1997; Morgan and Wells, 1991; Hutchins, 1994).

Being located on the continental coastline of the north coast of Western Australia, the marine biota of the Dampier region is overwhelmingly tropical. A small component of the biota is composed of species endemic to Western Australia, such as the thaid snail *Cronia avellana*, whose range extends from Albany to the Kimberley, and the potamidid snail, *Cerithidea reidi*, which extends from North West Cape to the Kimberley. A very few southern Australian warm temperate species extend as far north as Dampier; some extend even further up the coast, such as the moon snail *Polinices conicus*, which ranges from southern Queensland across the entire southern portion of the continent, then up the north coast as far as Broome.

There is a series of open ocean atolls on the outer portions of the North West Shelf, the largest of which are Rowley Shoals, Scott and Seringapatam Reefs, and Ashmore Reef . While the biota of the offshore atolls is also tropical, it differs considerably from species found along the continental mainland in areas such as Dampier (Wells, 1986b; Berry, 1986; 1993).

MAJOR BENTHIC HABITATS PRESENT

Rocky shores

Rocky shores are the most common habitat in the Dampier region (Semeniuk and Wurm, 1987). As described above, the coastline is largely Precambrian igneous rock, but in some areas there is an overlay of Pleistocene limestone. Species living on the boulder shores have not been examined in detail in the Dampier area. The fauna of the upper shores is sparse, dominated by littorinid snails and grapsid crabs. The intertidal region has a diverse fauna dominated by

oysters and associated species such as limpets, chitons, crabs, and barnacles. The biota becomes increasingly diverse in the lower intertidal, with a variety of sessile and motile invertebrates and benthic algae. Corals reach into the lowest portions of the intertidal zone, then dominate most subtidal rocks.

Sandy and muddy shores

Sedimentary shorelines dominate in the bays and inlets of the Dampier region. There are few sandy beaches in the area. Hearson's Cove on the Burrup Peninsula is an exception, with a white sand beach which grades into a sandflat in the lower intertidal. There are also clean, coarse sand beaches and sand flats in the outer areas of the Dampier Archipelago.

The sedimentary upper intertidal areas are dominated by extensive mudflats, which generally have mangroves. Seaward of the mangroves the mudflats extend into subtidal areas. The seabed is mostly mud and fine sand. In many areas both the intertidal and subtidal areas have a rich and diverse benthos which has received relatively little study. However, the biota is impoverished in the vicinity of the port, where there is a very fine mud on the bottom.

Both seagrasses and algae are also relatively sparse in the intertidal, increasing in the shallow subtidal, but still reduced in biomass compare to temperate regions.

Mangroves

Mangroves are one of the key coastal ecosystems in many tropical and warm temperate areas of the world. A mangrove is simply a plant which is adapted to live in a coastal environment where it is in periodic contact with seawater. The term mangrove has no taxonomic meaning: there are approximately 80 species of plants which are considered to be mangroves, but they belong to approximately 30 genera spread over 20 plant families. Different species of mangroves can be either full grown trees or smaller shrubs (Hutchings & Saenger, 1987). Primary production is high in the mangroves, and tidally exported debris can be a significant input into adjacent marine systems.

Semeniuk *et al.* (1978) divided Western Australian mangroves into four zones based on latitude and rainfall. Semeniuk (1993) subsequently examined the mangrove systems of the entire State, and placed the Pilbara mangroves into the broader regional context. Mangroves are most diverse and have the largest communities in the tropical subhumid Kimberley region of northern Western Australia, where 17 species occur. The tropical arid Pilbara region, at higher latitudes, has only 7 species. Six species occur in the Dampier region: *Avicennia marina*, *Aegialitis annulata*, *Aegiceras corniculatum*, *Bruguiera exaristata*, *Ceriops tagal*, and *Rhizophora stylosa*. Semeniuk and Wurm (1987) examined the structure of Dampier mangroves in detail. They found mangroves to be most luxuriant, abundant and diverse in embayments and connective tidal lands. Most mangrove stands have more than one species, and they reported a variety of structures of zonation which are dependent on the underlying sediment type, tidal height, and wave and current action. *Avicennia marina* is by far the most abundant species, and often forms monospecific stands which range from forests down to stunted shrubs. *Rhizophora stylosa* also forms smaller monospecific stands along creek banks.

Marine animals living in the mangroves can be readily divided into two groups: permanent residents and transients. Permanent inhabitants may have planktonic larvae that settle among the mangroves at metamorphosis. Once the benthic stage is reached, the animals live in the mangroves throughout their juvenile and adult stages. There is an unending tidal movement of transient species into and out of the mangroves. As the tide rises, a wide variety of animals enter

the mangroves to feed, reproduce and undertake their other biological functions. Among these are a number of vertebrates such as fish, sea snakes, turtles, and, further north, the estuarine crocodile, *Crocodylus porosus*. These animals leave the mangroves when the tide falls and are replaced by immigrants from the land, which include birds, mammals, reptiles, and insects.

Animals that are permanent residents of mangroves are largely invertebrates. Permanent inhabitants can be further divided into species that characteristically occur only in mangroves and those which are common on adjacent rocky, sandy or muddy shores and use the mangrove as only part of the habitat which they occupy. The number of species characteristic of mangroves is relatively small; most species also occur in adjacent habitats. For example, several hundred species of molluscs have been recorded in mangroves in the Indo-West Pacific (McNae 1967; 1968). Less than 50 of these are characteristic of mangroves. Many are uncommon or cryptic, but others such as three species of the mudwhelk genus *Terebralia* (two of which occur in the Dampier area) and the related *Telescopium telescopium* are conspicuous inhabitants of mangroves. Crustaceans are also important mangrove invertebrates. Jones and Morgan (1994) figure many species common in Pilbara mangroves; fiddler crabs are particularly abundant (George and Jones, 1982). Johnstone (1990) surveyed the mangrove birds of Western Australia, that is the 22 species which are confined to mangroves over all or part of their range in the State. As with the mangrove species, mangrove birds were most diverse in the Kimberley. Only 10 species were found in Pilbara mangroves.

Wells (1983; 1984; 1986a) examined in detail the invertebrate communities of the Bay of Rest, Exmouth Gulf in the extreme west of the Pilbara region, some 300 km west of Dampier. The intertidal portion of the Bay of Rest was divided into four habitats, all of which occur in Dampier:

- seaward mudflat (3.82 km^2);
- *Avicennia* zone (1.96 km^2);
- *Rhizophora* zone (0.36 km^2); and
- upper intertidal salt flat(2.39 km^2).

Molluscs, crustaceans, and polychaetes dominated the fauna. These three groups dominated all characteristics in all habitats, but the relationships between the three varied in the different habitats. The fauna on the mudflat seaward of the mangrove was diverse (112 species), dense (992 m^{-2}), and had a high biomass (4,056 $mg.m^{-2}$). Molluscs had the greatest diversity (66 species), comprising more than half of the total diversity. As their mean size was large, molluscs also comprised more than 60% of total biomass (2,514 mg. m^{-2}). Polychaetes were abundant, comprising two-thirds of total abundance (633 m^{-2}), but as they were small polychaetes had only half the total biomass of the molluscs (1,258 $mg.m^{-2}$). Invertebrate density, diversity and biomass all decreased sharply in the mangroves. The only exception to this was biomass in the *Avicennia* zone, which increased slightly to (4,594 $mg.m^{-2}$), entirely due to the potamidid snail *Terebralia semistriata*, which was 55.4% of total biomass. Molluscs, crustaceans and polychaetes remained the most important groups in the two mangrove zones. Total diversity (59 species) and biomass (4,594 $mg.m^{-2}$) were greater in *Avicennia* than in *Rhizophora* (31 species and 1,088 $mg.m^{-2}$), but density was greater in *Rhizophora* (473 m^{-2}) than in *Avicennia* (257 m^{-2}). Five species of crustaceans, with a total density of only 1 m^{-2} and a biomass of 193 $mg.m^{-2}$ were the only invertebrates on the salt flat behind the mangroves.

Vegetation free salt flats shoreward of mangroves occur in areas with a high tidal range and a dry, or seasonally dry, climate. Extensive salt flats are characteristic of Pilbara mangroves. Interstitial salt concentrations, which exceed tolerances of both mangroves and halophytic

shrubs, keep the area free of significant vegetation. In some areas the salt flats may have the halophytes *Wilsonia backhousii* and *Arthrocnemum* sp. (Paling, 1986).

In the Dampier region many areas of the otherwise bare zone contain intertidal blue-green algal mats. These have been studied by Paling (1986) and Paling and McComb (1994). The mats occur at varying distances behind mangroves, ranging from 4 m in King Bay to 1 km at Karratha. The algal mat is a cohesive fabric consisting of cyanophyte filaments, usually incorporated within organic sediment. They may be monospecific or contain a mixture of species. In Dampier the mats consist largely of the filamentous genera *Microcoleus, Phormidium,* and *Oscillatoria* and the coccoid genus *Aphanocapsa*. The mats may also have complex mixture of cyanobacteria and green algae. Several factors are instrumental in controlling the distribution of the mats: tidal height, degree of tidal current and sediment influx, and sediment drainage. The mats bind the soil and stabilise the substrate, decreasing erosion and conserving moisture. They are rich in organic matter and act as a storage area for carbon (500–800 $g.m^{-2}$, nitrogen (14–21 $g.m^{-2}$), and phosphorus (0.7–1.5 $g.m^{-2}$). *In situ* studies conducted by Paling (1986) and Paling and McComb (1994) showed a low rate of nitrogen fixation (8–60 µm C_2H_4 produced m^{-2} hr^{-1}). The nutrients leach out in freshwater, and Paling and McComb considered this to be a potentially nutrient significant source to Dampier mangroves.

Coral reefs

Extensive coral reefs occur in the shallow waters near islands and submerged pinnacles along the seaward margins of the Dampier Archipelago. The best developed coral reefs occur on the seaward slopes of Delambre I., Hamersley Shoal southwest of Legendre I., at Sailfish Reef, north west of Rosemary I., the seaward side of Kendrew I., and on the northwest side of Enderby I. These are fringing reefs with pronounced formations of spur and grooves (Hatcher, 1988; CALM, 1994).

Simpson and Grey (1989) conducted transects in many areas of the archipelago, and reported that live coral cover coverage is greatest on upper seaward reef slopes in the eastern half of the archipelago, where coral coverage reached 70% in areas. In contrast to the live coral coverage in the western half was 2–30%. Inshore areas have minimal coral coverage, but there is subtidal coral along the western side of the Burrup Peninsula. In their monograph on the scleractinian corals of Western Australia, Veron and Marsh (1988) recorded 216 species from the Dampier Archipelago. The biota is dominated by acroporids, and to a lesser extent by pocilloporids. *Acropora hyacinthis* is the dominant species (Simpson and Grey, 1989). Some species occur throughout the Dampier region, while others are restricted to the turbid inshore waters or alternatively to the clearer waters near the margins of the offshore islands.

The ecology, particularly reproductive ecology, of corals in the Dampier Archipelago has been extensively studied (Simpson, 1985a; 1985b; 1988; Heyward *et al*. 2000). Most of the major coral species are broadcast spawners and have their major peak of reproductive activity between March and April, about seven to ten nights after the full moon. A second, though less pronounced, peak occurs in October and November, coinciding with the major spawning on the Great Barrier Reef in eastern Australia. Brooding species tend to spawn more evenly throughout the year.

In the late 1960s there was a series of reports from widely separated areas of the western Pacific Ocean that outbreaks of the crown-of-thorns starfish, *Acanthaster planci*, were destroying coral reefs in many areas. The phenomenon is still occurring today, and has been extensively studied on the Great Barrier Reef. The largest known population of *A. planci* in Western Australia is found in the Dampier Archipelago, and it is the only population which has

been studied in detail. The Western Australian Museum conducted a series of expeditions to Kendrew Island over a 2 year period from 1972 to 1974 to examine the population dynamics of the starfish (Wilson and Marsh, 1974; 1975). Spawning occurs over a prolonged period during summer. Wilson and Marsh found spawning aggregations at Kendew I. of 250 and 180 per hectare in October 1972 and 1973 respectively. Simpson and Grey (1989) extended this study in October 1985, using transects to survey the outer portions of the archipelago (13 reefs) and inner areas (2 sites) for both *A. planci* density and coral cover. *Acanthaster* was relatively common on the outer reefs, but not in the inner areas. Density averaged 52 per hectare, with a range of 0 to 170. The mean density on the outer reefs was 58 per hectare, considered to be in the 'normal' range. Predation on the starfish was high, with 47% showing signs of recent damage. Ninety-six percent of the starfish were found in the western half of the archipelago, but animals in eastern areas tended to be larger. It is interesting that densities of *A. planci* were inversely related to coral cover. Simpson and Gray (1989) speculated that the low coral coverage in the west may be due to predation by *A. planci*.

Outbreaks of corallivorous snails of the genus *Drupella* which have caused substantial coral damage have been reported in many parts of the Indo-West Pacific. The largest, and probably best studied, such occurrence was the outbreak of *D. cornus* on the Ningaloo Reef Tract off North West Cape, Western Australia. Turner (1992) presents the results of a symposium held to investigate the problem at Ningaloo. She later published a broader study of the general problem (Turner, 1994). More recent references are cited by Cumming (1999). Hilliard and Chalmer (1992) investigated *Drupella* densities along the north coast of Western Australia from Serrurier Island, near Onslow, to Mermaid Sound and found no outbreaks.

Marine plants

In the present volume, Huisman and Borowitzka (2003) provide a detailed account of the marine plants of the Dampier region. The 210 species include 114 species of Rhodophyta, 50 species of Chlorophyta, 32 species of Phaeophyceae, 5 species of Cyanophyta. Fifty-seven species are newly recorded for Western Australia, with five of those (*Codium dwarkense*, *Dictyota friabilis*, *Balliella subcorticata*, *Cottoniella amamiensis*, *Polysiphonia pentamera*) also being new records for Australia. The algal flora of the region includes many elements common to tropical areas worldwide. Western Australia is well known for the high diversity of seagrasses which occur in the waters surrounding the State, and 9 species have been recorded in the Dampier Archipelago. While the biota is diverse, the seagrasses in the Dampier Archipelago do not form the dense meadows found in the southern half of the State.

Marine vertebrates other than fish

The waters of the Dampier Archipelago are rich in vertebrates other than fish. The known fauna includes six species of whales and dolphins: humpback whale (*Megaptera novaeangliae*), false killer whale (*Pseudorca crassidens*), southern bottle nosed whale (*Hyperoodon planifrons*), Risso's dolphin (*Grampus griseus*), bottle nose dolphin (*Tursiops truncatus*), and Indo-Pacific hump backed dolphin (*Sousa chinensis*). Dugong (*Dugong dugon*) frequent the area, as do four species of turtles, some of which breed in the Dampier Archipelago: loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), hawkesbill turtle (*Eretmochelys imbricata*) and flatback turtle (*Natator depressus*). There are also six species of sea snakes known from the Dampier Archipelagos: *Aipysurus laevis*, *Astrotia stokesii*, *Ephalophis greyi*, *Hydrelaps darwiniensis*, *Hydrophis* sp. and *Fordonia leucobalia*.

USAGE OF THE MARINE ENVIRONMENT

The marine environment of the Dampier region is heavily utilised for a number of purposes. Foremost among these is the Port of Dampier. The port exports over 80 million tonnes per year of iron ore, liquefied natural gas, other petroleum products and salt. Together these exports are worth over $5 billion Australian. Although the number of ship movements is relatively small because of the size of the ships using the port, Dampier is one of the largest Australian ports in terms of annual tonnage shipped. The port area was initially dredged to provide access for seagoing ships and areas of Mermaid Sound were used for dumping the dredge spoil. Maintenance dredging continues when necessary to maintain sufficient depth in the channels. The dredging has resulted in unnaturally high sedimentation rates in some parts of the archipelago (up to 260 $g.m^{-2}d^{-1}$)(NHT, 2002), and imposex in gastropod snails caused by tributyltin has been reported (Reitsema and Spickett, 1999). A number of areas of Mermaid Sound are used as anchorages. The continental coastline at Dampier and along the western side of the Burrup Peninsula has been highly modified to develop export facilities for a number of companies. In particular, a considerable area of mangroves and salt flats were flooded to develop salt ponds. In addition to the area used for the salt ponds, there has been disruption of the biota at “Back Beach” in Dampier. Causeways have been constructed from the mainland to Mid Intercourse Island and East Mid Intercourse Island. Several major new facilities are planned for construction in the next few years on the Burrup Peninsula.

Commercial prawn fishing occurs in Nickol Bay and to a lesser extent in Mermaid Sound. Wetlining for finfish also occurs in the Archipelago. The Dampier Archipelago is used for aquaculture of pearls by both the *Pinctada maxima* and other pearl industries. Because of concerns over the potential for conflicts between the pearling industry and other users of the Dampier Archipelago, a discussion paper was developed on the future of aquaculture in the Dampier Archipelago (Driscoll, 1996).

The waters of the Dampier Archipelago are extensively used for general boating, fishing, swimming and other recreation pursuits by the people of Dampier, Karratha, and other areas of the Pilbara. Registration data show that there are over 1600 boats in the area, most of which are recreational. A wide variety of fish are sought, including pelagic species, such as Spanish mackerel, and reef fish, including nor-west snapper, cod and emperor. Crustaceans, such as the ornate rock lobster (*Panulirus ornatus*) and the painted rock lobsters (*P. versicolor*) and mud scabs (*Scylla* spp.) are also widely collected (Driscoll, 1996). Approximately 30 shacks have been built on some of the islands (East Lewis, West Lewis, Malus, and Rosemary Is.) for recreational use, and there are some charter boat operations in the area.

There has been a long Aboriginal association with the Dampier area, the Dampier Archipelago, and the Burrup Peninsula. The Burrup Peninsula and the islands have some of the finest rock art in the world. There is a major native title claim to both marine and terrestrial areas by the Nganga Ngoona Moora-Joonga Land Council.

MANAGEMENT OF THE DAMPIER ARCHIPELAGO

Most of the islands are terrestrial nature reserves for conservation, but some are recreation reserves. A total of 25 islands are included in the reserves, which go to the low water mark (Morris, 1989).

The Dampier Archipelago has long been recognised as having considerable conservation values. From 1981 to 1986 the then Department of Conservation and Environment conducted

extensive survey of the marine habitats in the Dampier Archipelago. A number of publications (e.g. Chittleborough, 1983; DCE, 1981; Gordon, 1987; Paling, 1985; 1986; Simpson, 1985a; 1985b; 1988; Simpson and Gray, 1989) resulted which form the basis for management proposals. The Dampier Archipelago Management Plan, 1990 (Morris, 1989) recommended that waters of archipelago be declared marine park.

In 1994 the Marine Parks and Reserves Selection Working Group presented a report to the Western Australian government which recommended 72 areas in the State for further consideration for reservation as marine parks or reserves. The Dampier Archipelago was recommended for reservation by CALM (1994), but the presence of the Port of Dampier made determination of potential boundaries problematical: "the waters of the Dampier Archipelago, excluding the Port of Dampier, be reserved for the purposes of public recreation and protection of flora and fauna, and that the seaward boundary should be the limit of the State Territorial Sea." Later in the document, CALM (1994) proposed alternatively that the marine reserve be extended to Cape Preston. Planning for the proposed marine park is now at an advanced stage.

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