Submission to the Draft Public Environment Report for the "Coral Coast Resort" development proposal at Maud's Landing in Western Australia

Environment Protection and Biodiversity Conservation Act 1999

(Version 4, November 2001, EPBC Reference No. 2000/98)

11 January 2002

The Wilderness Society WA

Australian Marine Conservation Society WA

Conservation Council of WA

Australian Wildlife Conservancy

Version 3, 22 January 2002

For ease of use, this draft of the submission has been modified from the version sent to the proponent's environmental consultant, ATA Environmental, for the close of the Invitation to Comment period on 11 January 2002.

Due to technical difficulties in the closing stages of preparation of this submission, the earlier draft:

(1) Was not formatted
(2) Did not have an index (Table of Contents)
(3) Did not have an executive summary
(4) Contained a number of typographical errors eg. duplicated paragraphs, etc
(5) Did not contain an analysis of the electronic submissions received by the authors, or samples of comments (instead, the entire body of emails were forwarded to ATA)

This version of the submission has rectified these matters but has not modified or added to the substance or nature of the document.

The only exceptions to this are the following typographical corrections:

- Corrected by replacing Mauds with Maud's and Batemans with Bateman's
- Corrected headings and index formatting for consistency
- Justified text
- Corrected spelling mistakes.
- Moved 'location' section (original p 7) to beginning of 'Ningaloo Marine Park' chapter (p 4)
- Typing error 'Impeccably' corrected to 'implacably' in Peter Mack's personal communication (p 20)
- Inserted 'Physical Environment' and 'Biological Environment' headings

EXECUTIVE SUMMARY

The proposal by Coral Coast Marina Development Pty Ltd (CCMD) to build a large marina and resort near Coral Bay on the Ningaloo coral reef in Western Australia triggered a federal environmental assessment under the Environment Protection and Biodiversity Conservation Act, 1999 (EPBC). This is because the area that would be affected by the development supports many important threatened and migratory species. It is likely also to impact Commonwealth waters and is considered to be of "national environmental significance." The Act is administered by "Environment Australia" which advises the Federal Minister for the Environment and Heritage, The Hon Dr David Kemp, MP. This assessment will be one of the first major tests of the legislation.

The would-be developer, CCMD, was asked to prepare a detailed Draft Public Environment Report (PER) describing the resort's environmental impacts and management strategies. As part of this process, public comment on the PER was invited. Submissions were accepted until 11 January 2002. The developer now has an opportunity to respond to the issues raised in the submissions.

Despite difficulties in accessing some of the relevant documentation, the public response to the call for input was enormous. Submissions representing over 7000 people (including over 1000 from overseas) were received, many of which were individual letters. The main issues raised in these submissions were:

- concerns about the ecological fragility of the area;
- warnings that the wilderness appeal would be lost; and,
- a disinclination to travel to the area if the resort went ahead.

This submission, from the "Save Ningaloo" campaign, drew on the expertise of leading scientists, researchers and local tour operators from Coral Bay and Exmouth. The guidelines issued to the proponent by Environment Australia were carefully reviewed by the campaign as part of the analysis of the PER. While many of the broad requirements are addressed, the all-important detail is often missing. The weaknesses of the PER can be divided into the following categories:

- **Failure to adhere to the guidelines and the regulations.**

There are numerous deviations from the guidelines. "Feasible alternatives" (Section 3) to the marina development, such as the option of "taking no action" were not described. There was a failure to provide sufficient detail on mitigation strategies, which meant that this fundamental requirement was not assessable. Another major omission was a discussion of the proposal's compliance with environmental

sustainable development (ESD) principles (Section 11). This submission includes a discussion of the key components of an ESD assessment using nature-based tourism assets as the resource base.

- **Failure to provide sufficient data on the impacts of the resort, including its likely oceanographic and hydrological effects, and the marina's internal dynamics.**

There was very little information provided on crucial elements of the marina structure and dynamics, particularly sediment transport amounts, origins and destinations, current speeds and directions, and groundwater. There are also serious flaws in the modelling of currents in Batemans Bay and within the marina. Geomorphologic issues have also not been addressed adequately, which is of particular concern to species such as turtles and birds which rely heavily on the beach and shallows.

- **The absence of adequate baseline data and management strategies.**

A primary function of the PER was to identify the full range of EPBC listed species and communities that would be impacted by the proposal, including those not listed in the guidelines. However, the PER fails to provide any baseline data on listed species such as the spinner dolphin and the Asiatic common tern, despite the fact that both are frequently seen in the immediate vicinity of the proposed resort site. In many cases, the PER relies on indefensible assumptions (in the absence of data) to justify its claims that the proposal will not impact listed threatened, vulnerable and migratory species.

Furthermore, the PER fails completely to acknowledge the potential of the area for the populations of key listed species, some of which may have been substantially reduced by previous interactions with humans and feral animals. At the very least, this represents a crucial misunderstanding the ecology of the area. For example, loggerhead turtle numbers have previously been affected by hunting and predation, but with good management, their habitat could be rehabilitated and previous numbers restored.

Of great concern is the limited information provided on impact-management strategies, although given the lack of information on the ecology of the area, this is not surprising. Some key threatening activities have not been identified, let alone addressed. There is a pro forma approach to the management strategies in the PER, despite the very different needs of the species, with great reliance on practices such as public education, maintaining records of boat impacts and management plans to be developed in the future.

- **Failure to assess the ecological relationships between species and develop impact mitigation strategies.**

Fundamental to an assessment of the resort proposal should be a detailed description of the key interactions between species, which is a reflection of the ecological richness of the area. This submission attempts to provide additional information on this crucial element, with a discussion of species such as corals and sea grasses. For example, the proposal could have substantial impacts on these systems, and

subsequently on listed species such as whale sharks and dugong as a consequence of "knock-on" effects. However, there are many other interactions that should have been described and for which management strategies should have been provided.

- **Many commitments made are highly contingent upon uncertain future actions and therefore are not assessable.**

Many of the commitments to undertake further biological survey work amount to both an admission that data on ecological species is lacking and an indictment of the PER, which was required to provide this data, particularly for the assessment of management strategies. Furthermore, some of the work would not be adequately completed by the construction timelines proposed by the developer. We also understand that some of the key commitments with government agencies are not legally enforceable and lack commercial efficacy.

In summary, this submission demonstrates that the PER:

- provides an inadequate description of the ecological values of the area;
- understates the potential impacts of the proposal on matters of national significance; and,
- does not provide strategies that could adequately mitigate impacts on matters of national significance.

INTRODUCTION

About the Environmental Protection & Biodiversity Conservation Act 1999

We note that the *Environmental Protection & Biodiversity Conservation Act 1999* (EPBC Act) holds within its objects:

(a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and

(b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and

(c) to promote the conservation of biodiversity; and

(d) to assist in the co-operative implementation of Australia's international environmental responsibilities;

This submission will demonstrate that a profound lack of baseline data on matters of national significance within area to be impacted, and the size and nature of the development, make these objects impossible to achieve.

We further note that under Object 2 (above) the principles of ecologically sustainable development (ESD) are fundamental to the Act. (EPBC Act s3A)

Principles Of Ecologically Sustainable Development

The following principles are *principles of ecologically sustainable development*:

(a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;

(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

(c) the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;

(e) improved valuation, pricing and incentive mechanisms should be promoted.

This submission will show that the Coral Coast Resort Public Environment Report (PER) fails to address ESD, and compromises all of the principles above.

GENERAL BACKGROUND TO THE INVITATION TO COMMENT ON THE PUBLIC ENVIRONMENT REPORT

The Coral Coast Resort PER is the first major test of the *Environmental Protection & Biodiversity Conservation Act 1999* in Western Australia. The State Public Environment Review for the project (November 2000) attracted in excess of 5000 submissions. Since then public interest in the Ningaloo Reef and the Cape Range region has continued to grow. The decision over the Coral Coast Resort is seen as being vitally important, not just because of local impacts, but because if approved this project will set in train a pattern of development that will lead to the ultimate demise of the eco-systems of the entire region.

Given the prior level of public interest in this issue, access to this PER has been identified as a major failing of the *EPBC Act Regulations 2000*. In the first instance, there were two copies at one library in Perth, with six further copies available regionally. Black & White copying of the document cost respondent's approximately $80. In Perth, queues to read the 500-page document were common.

Pressure from dissatisfied parties saw parts of the PER made available on the Internet, but well into the response period. The public comment period was extended from 24 December 2001 to 11 January 2002.

The limited access to the PER afforded by the proponent may have satisfied minimum requirements under the relevant regulations, but was also interpreted by many to be an attempt to hide the PER from open public debate. The fact that the Invitation for Public Comment on the PER was conducted over the run up to the Christmas period has been taken as further evidence of this.

The most unfortunate consequence of the process being run during this time is that much scientific advice is unavailable, due to experts taking holidays at this time. Many of the academics with an interest in the issue, who would normally provide a sound 'brains trust' to analyse a document such as this, were similarly unavailable.

Deviation From The Guidelines And Failure To Comply With The Regulations

We note in the PER deviations from the Guidelines as set down by Environment Australia and a lack compliance with Schedule 4 of the *EPBC Act Regulations 2000*:

(1) Failure to provide unpublished sources for public inspection (General Advice On Guidelines, 1. General Content) "Any additional supporting documentation and studies, reports or literature not normally available to the public from which information has been extracted should be made available at appropriate locations during the period of public display of the PER."

(2) Absence of a review of feasible alternatives (Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000*, 1 (h) and 2.01 (g))

(3) Failure to declare threatened or migratory species, e.g., Asian Common Tern, Spinner and Indo–Pacific Humpback Dolphins; all common in the area. The Guidelines did not

identify these species but required baseline data on 'any additional listed or migratory species which may be impacted … (Specific Content, 4. Description of the Environment). These matters were not mentioned by the proponent in the State PER either.

(4) Failure to identify all affected parties (e.g., conservation sector), including a statement describing their views [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000,* 2.01 (i)].

(5) Failure to include a statement of whether any relevant impacts are likely to be unknown, unpredictable or irreversible [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000*,3.01 (c)]. The PER repeatedly contends that impacts will not be 'significant'. Given the extreme paucity of baseline data for the area and the species likely to be impacted, the PER's failure to acknowledge uncertainty or admit to the possibility of irreversibility is cause for alarm.

(6) Failure to adequately describe proposed safeguards and mitigation measures to deal with relevant impacts of the development [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000,* 2.01 (e)].

Particular failure to comply with (Guidelines, Specific Content, 6. Proposed Safeguards and Mitigation Measures): Specific and detailed measures must be provided and substantiated and must include:

1. an assessment of the predicted effectiveness of the mitigation measures [Guidelines, Attachment 2, Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000,* 4.01 (a)];
2. the cost of the mitigation measures; [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000,* 4.01 (c)];
3. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000*, 4.01 (d)].

The baseline data provided in relation to matters of national significance is totally inadequate to meet the criteria set out in the *EPBC Act Administrative Guidelines*. Adequate baseline data must be a precursor to any proposed management and mitigation measures. Without it monitoring for the effectiveness of these measures is impossibility.

For example no attempt has been made to address the size, distribution, genetic structure and conservation status of the Bateman's Bay Loggerhead Turtle population.

The scientific baseline work does not compare with that being done by oil and gas producers on the North West Shelf faced with similar "matters of national significance" issues.

(7) Failure to provide details of the corporation's environmental policy and planning framework (Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000,* 6.02). As the corporation was created for

the purpose of this development and has no environmental track record, it would have been appropriate to include a summary of the environmental record of directors.

(8) Failure to state how the reliability of information sources was tested [Matters that must be addressed in a PER, Schedule 4 of the *EPBC Act Regulations 2000*, 7(c)]. This is particularly relevant in cases where data from non-scientific sources has been used as primary justification for dismissing impacts on listed species as insignificant.

(9) Failure to "ensure that the PER assesses compliance of the action with principles of Ecological Sustainable Development as set out in the EPBC Act, and the objectives of the Act at Attachment 1." (General Advice On Guidelines – 1. General Content) This failure has the potential to diminish the future options for the region in the achievement of ESD.

These omissions and shortcomings lead us to contend that the Coral Coast Resort Public Environment Report is not adequate for the purpose of making decisions on whether this action will have significant impacts on matters of national significance.

Environmental And Temporal Setting

The world's coral reef systems are in rapid decline due to coral bleaching from a changing ocean climate and multitude of human impacts. The resilience of these reefs in the face of these major threatening processes will in part be determined by our ability to protect these systems from catchment impacts, marine pollution, human disturbance and over-fishing. Decisions about any development adjacent to Ningaloo must be made in the context of the global threat to coral reefs. This has not been the perspective adopted by the proponent in either the State or Commonwealth PERs.

Ningaloo Marine Park And Proposed Additions, Ningaloo WA Are Listed In The Register Of The National Estate: Australian Heritage Commission

Class: Natural, Registered (30/05/1995)

Location

About 470,000 ha, comprising Ningaloo Marine Park (State Waters), Ningaloo Marine Park (Commonwealth Waters), those parts of Petroleum Exploration Permits within Commonwealth waters proposed for eventual inclusion in the park and described in the Plan of Management for the Commonwealth park (ANPWS 1990) and Reserve 40079, being a strip of land extending 40 m above High Water Mark between Winderabandi Point and Amherst Point.

Statement of Significance

Ningaloo Reef is the longest fringing barrier reef in Australia and one of the few extensive continental fringing reefs in the southern hemisphere. It extends over 260km from Juradi Point to Amherst Point on the west coast of North West Cape, Western Australia (WA). The Ningaloo Reef area forms part of the migratory route of the endangered humpback whale (*Megaptera novangliae*). More than twenty-five species of trans-equatorial migratory wading birds listed in the schedules to the Japan Australia Migratory Bird Agreement (JAMBA) and the China Australia Migratory Bird Agreement (CAMBA) also utilise the area. Four species of rare and threatened marine mammals are found in the Ningaloo Reef area. These are the humpback whale and the endangered blue whale (*Balaenoptera musculus*), the vulnerable fin whale (*Balaenoptera physalus*) and a breeding population of the rare dugong (*Dugong dugon*). There is a single record this century of the sighting of an endangered southern right whale (*Eubalena australis*) at Exmouth. The rare whale shark (*Rhincodon typus*) congregates around Ningaloo Reef following the mass coral spawning in March each year. The vulnerable green turtle (*Chelonia mydas*) is very common along the coast, with several breeding rookeries. Less common are the hawksbill turtles (*Eretmochelys imbricata*) and the endangered loggerhead turtle (*Caretta caretta*).

Description

Ningaloo Reef Marine Park and Adjacent Areas comprises the waters surrounding Exmouth Peninsula in WA to a distance of up to 25 km offshore, extending from 5 km north of Exmouth northwards to the tip of Cape Range and then southwards as far as Amherst Point. The area includes both State and Commonwealth waters.

Ningaloo Reef is the longest fringing barrier reef in Australia, forming a discontinuous barrier over approximately 260 km and enclosing a lagoon which varies in width from 200 m to just over 6 m. At the extreme northern end of the area, from just north of Jurabi Point to Bundegi Reef, there is no barrier reef, but there are shore reefs and some off shore bands. In the southern section of the area adjacent to Warroora Station, the reef is closer to the shore and less continuous than in the central and northern sections.

The reef flat is, on average, several hundred metres wide and becomes partially exposed at Spring low tide at many localities where *Platygyra* and *Acropora* coral species are characteristic. The reef consists of a partially dissected basement platform of Pleistocene marine or aeolian sediments, or tertiary limestone, which is covered by a thin layer of living or dead coral or macro-algae. The Ningaloo Reef is in this way distinct geologically from the Great Barrier Reef, which rests wholly on a fossil reef basement.

Living coral occurs over most of the tract but areas of 100 % cover are patchy, possibly due to localised cyclone damage or biotic factors such as predation by *Drupella cornus*. Coral is able to survive close to the shore due to the arid and undeveloped nature of the adjacent land. The necessary clear water conditions exist because of the low level of runoff from the adjacent land, resulting in minimal sediment or other pollution.

The lagoon between the reef and the foreshore is, on average, only about 2–4 m deep, but there are longshore drainage channels up to 12 m deep that lead to passages through the reef. The bottom is usually covered by a thin veneer of sand with occasional areas of bare rock. The lagoon bottom has coarse calcareous sand where it is shallow, or fine calcareous sand or silt in the deeper basins and gutters. Some areas of the lagoon have areas of algae and seagrasses. Numerous isolated porites coral pinnacles or bommies are scattered through the lagoon, some up to 3 m high and 3 m across. There are extensive staghorn coral thickets in many of the deeper channels.

The reefs are very variable, with coral cover and species richness changing within short distances. Species diversity is generally highest in or near passages or breaks in the reef which occur every few kilometres and generally correspond with inflowing ephemeral creeks. The coral communities are rich in species with 217 species of fifty-four genera and containing many species typical of the tropical Indo-Pacific region that do not occur further south in WA.

North West Cape is at the northern limit of the transitional zone between tropical and temperate faunas. Under the ACIUCN Habitat Classification Scheme for Australian Marine and Estuarine Areas, the Reef embraces two geographic zones: the West Oceanic Zone (Zone 16) and the Central West Coast Zone (Zone 3). The reefs support a rather limited echinoderm fauna, with ninety-seven species of seventy-two genera recorded so far. This is a common feature of coral reefs. Most are widespread Indo-Pacific coral reef species, with nearly half at, or near, the southern limit of their distribution.

Surveys of Ningaloo Reef Marine Park have yielded over 600 species of mollusc, a large number of which are restricted to either the open coastline or to the more sheltered waters of Exmouth Gulf. New species have tended to be found on the western side of the Cape, reflecting the significantly different and unusual environment created by shelter from wave action. The greatest diversity and abundance of molluscs occurs on rock and dead coral substrates (areas which are not rich in living corals).

More than 460 species of fish have been identified. The fauna from North West Cape to Bundegi Reef is exceptionally rich and diverse. Bundegi Reef is the only coral reef adjacent to North West Cape which lies in Exmouth Gulf, where the wave energy is much lower than on the western side of the peninsula. The deep water portion of the area (Commonwealth waters) is known to contain hard corals. Whilst the deepwater corals are known only from 1981 collections of coral fragments at depths ranging from 23 m to 108 m, studies of coral communities in similar situations elsewhere in the world show that lush and diverse communities of hermatypic corals can occur at depths of more than 100 m under favourable conditions.

It is also important as a habitat for whales, the whale shark, fish such as marlin and sailfish and marine reptiles and provides food for resident and migratory birds, including the more than twenty-five species of birds protected under JAMBA and CAMBA.

The area is important for marine mammals. The dugong (*Dugong Dugon*) is found in the waters of the lagoon where it feeds on the seagrass beds of Norwegian Bay and the lagoon north of Bruboodjoo Point. It is listed as vulnerable in the IUCN Red

Data Book (IUCN, 1982) and is listed in Schedule 2 of the WA Wildlife Conservation Act as 'in need of special protection'. Australian sea lions (*Neophoca cinerea*), which are also listed in Schedule 2 of the WA Wildlife Conservation Act, are occasionally sighted. Six species of cetacean occur in the park: the humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), fin whale (*B. physalis*), blue whale (*B. musculus*), bottle nosed dolphin (*Tursiops truncatus*) and the killer whale (*Orcinus orca*), with the southern right whale (*Eubalaena australis*) possibly still present, although rare this far north.

The humpback, blue and southern right whales are classified by CONCOM as endangered and the fin whale is classified by the International Whaling Commission as vulnerable. The migration route of the humpback whale passes very close to Ningaloo Reef at Norwegian Bay. The whales pass by between June and October on their way to and from breeding grounds further north. A rare species seen most often in the deeper waters is the whale shark (*Rhincodon typus*) which congregates around the reef following the mass spawning of coral in March each year. Three species of turtle inhabit both the shallow and deeper waters. The loggerhead turtle (*Caretta caretta*) is classified by CONCOM as endangered, whilst the green turtle (*Chelonia mydas*) and the hawksbill turtle (*Eretmochelys imbricata*) are classified as vulnerable.

The area has many historic associations of regional significance for the European exploration and development of the North West Cape and the north of WA. Eight shipwrecks have been discovered within the nominated area dating from 1811 to 1923. These are: Rapid, Fairy Queen, Stefano, Perth, Ada May, Zuir, Mildura and Fin. Whaling was carried out at Norwegian Bay intermittently from 1913–55. Initially a factory ship was used, but in 1915 a processing station was constructed on the coast at Norwegian Bay. Whilst no whales were caught by shore based operations from 1917-20 or from 1929-48, pelagic operations continued along the north-west coast from factory ships.

Condition and Integrity

The reef and surrounding marine environments are generally in excellent condition. Uncontrolled amateur collecting of shallow water molluscs is believed to have depleted Bundegi Reef, but collecting is now controlled, and no adverse impact on diversity is noticeable. A dramatic increase in the population of the snail *Drupella cornus*, which was first detected in 1982, has resulted in degradation of very large areas of the back reef. It is not yet clear whether the infestation is part of a natural cycle or the result of human activities. Suggested causes include physical damage (eg due to storms), predator pressure release (eg due to overfishing) and physical disturbance by siltation or flooding with fresh water. The infestation initially focussed on acropora and monitporas coral species in the northern portion of the reef, leading to the death of most acropora on the northern third of the reef and extremely low live coral cover between Ned's Camp and Osprey Bay.

However, in the last few years the snails have also turned their attention to presumably less preferred coral species, and the southern portion of the reef has come under attack. By

September/October 1991, most of the snail's preferred coral species in the back reef area had either been killed or were supporting snail populations at a level which is likely to cause significant reductions in live coral cover in the future. However, there is some evidence of a decrease in *Drupella* density and an increase in live coral coverage at several of the points surveyed in late 1991. Development in the area has been minimal. The only developments along the coastal fringe are the Navy Pier and boat ramps at Bundegi and Tantabiddi.

Southern Bateman Bay

Southern Bateman Bay, the focus of this PER, is the largest lagoon in the Ningaloo Reef tract. There is considerable evidence that this body of water is the single most important section of the Ningaloo Marine Park for turtles, dugong, humpback whales and manta rays, however this cannot be easily proved in an absence of adequate scientific study of the area.

Numerous eco-tour operators and others who know the Ningaloo Reef well will vouch for this however, and a personal communication from one of them is included here by way of introduction to the southern Bateman Bay lagoon.

Personal Communication

Richard Todd wildlife documentary maker, Australasian cameraman of the Year, long time, part time Ningaloo resident.

Indo-Pacific Humpback Dolphin

The lagoons of the Ningaloo Reef particularly between the turtle sanctuary, North Passage and Maud's Landing, are one of the few areas in the world I have regularly seen the shy and allusive Indo pacific Humpback Dolphin. It currently uses the lagoon to forage for food and to seek shelter for newborn calves. Unlike other species of dolphins, particularly the bottlenose, they avoid boats at all costs. I believe one of the reasons for the prevalence of this species in the area is the lack of boat traffic.

Spinner Dolphins

I have filmed large schools of spinner dolphins, up to 200, around the mouth of Bill's Bay at Cardabia Passage. They are regularly seen at the mouth of the passage.

Manta Rays

The manta rayss at Bill's Bay are the only ones in Australia to aggregate and feed so close to the mainland. Nowhere else in Australia can mantas be seen with such predictability 12 months of the year. They spend a lot of time on the surface due to their feeding patterns and are very susceptible to boat strikes.

Humpback Whales

The humpbacks pass the length of the Ningaloo Reef on their Southern and Northern migrations. The area in front of Cardabia passage is the only section of the 260km long reef that has a large gap in the shape of a dogleg. For some reason, that has not been researched by the whale experts of WA thus far, the whales tend to congregate each year and rest in this area and the Exmouth gulf. I have filmed hundreds of humpback whales at the mouth of Cardabia Passage, more so than anywhere else on the Ningaloo.

Loggerhead Turtles

I have been researching a documentary on endangered turtles of Western Australia. In all of my findings thus far I have not been able to find one example of a coastal resort not having a negative impact on turtle populations, regardless of what low light system they have used. Turtles follow glows in the opposite direction of the water and die.

Dugongs And Whalesharks

Though this area is not the main area of dugong and whaleshark aggregations I have filmed them on numerous occasions in and around Cardabia Passage. Several dugongs and whalesharks have been filmed in different years, which proves they return to this area for food and or breeding.

I have done thousands of interactions with the above mentioned wildlife over the past 10 years and one thing I know which is one hundred percent guaranteed, a large increase of boat traffic and or fishing numbers will result in these aggregations discontinuing to visit this very special place. Not only is this area around Maud's unique from the Ningaloo's perspective but it is also unique amongst the best of the world's underwater eco-systems. It is so precious that it is insane to even entertain the idea of any coastal development until proper studies into sustainable eco-tourism options are undertaken.

Contrary to the picture painted by the PER, an extraordinary suite of ecological values overlap in the southern Bateman Bay lagoon, a combination which exists nowhere else in the Ningaloo Reef tract. While totally inadequate to properly evaluate this proposal, even the limited research, which has been undertaken in this area, is testimony, in part, to this fact.

PHYSICAL ENVIRONMENT

Marina/Canal Estate

The proposed development is designed around a single entrance/ exit inland marina upon which is situated both residential and tourist accommodation. These types of development are commonly referred to as 'canal estates' and the design of the development is likely to have similar hydrological characteristics and problems as the canal estates found in Perth and other states. NSW has legislation specifically relating to these developments (NSWSEPP50) and defines a canal estate as a development that:

- incorporates wholly or in part a constructed canal, or other waterway or waterbody, that is inundated by or drains to a natural waterway or natural waterbody by surface water or groundwater movement (not being works of drainage, or for the supply or treatment of water, that are constructed by or with the authority of a person or body responsible for those functions and that are limited to the minimal reasonable size and capacity to meet a demonstrated need for the works); and,
- includes the construction of dwellings (which may include tourist accommodation) of a kind other than, or in addition to:
  - (i) Dwellings that are permitted on rural land, and
  - (ii) Dwellings that are used for caretaker or staff purposes, and
- requires the use of a sufficient depth of fill material to raise the level of all or part of that land on which the dwellings are (or are proposed to be) located in order to comply with requirements relating to residential development on flood prone land.

Many canal estates are constructed on wetlands, or adjoining estuaries and have recently become the focus of the RAMSAR convention. RAMSAR define canal estates as waterfront housing, resorts and boat marinas constructed along artificial canal systems. They are commonly located in, or adjacent to, wetland areas along rivers, estuaries, coastal bays and shorelines.

The modern worlds first canal estate was constructed in 1904 in Venice, California. It proved to be an instant but temporary success. In 1912 the canal was declared a menace to public health due to stagnation, dead fish, foul odours and disease. The canals design showed gross ignorance for environmental factors in engineering design (Catlan & Williams, 1985).

Approval was given for the first Australian canal development "Florida Gardens" in 1957, on the Nerang River, Gold Coast. Construction of canals continued relatively unabated in south-east Queensland over the next 15 years (Catlan & Williams, 1985). Unfortunately during the critical period of maximum proliferation of canal developments the importance of comprehensive understanding of the hydraulics of these systems was not realised (McCowan, 1985).

The main causes of problems of such canal estates result from inadequate hydraulic functioning which may reduce water quality through poor flushing, cause sedimentation, or affect structural integrity (RAMSAR). Sedimentation caused by urban and stormwater run off in a partially enclosed water body is likely to act as a nutrient sink reducing the likelihood of proper tropic functioning. There are many documented cases where an increase in finer particles in the more remote areas of developments increases the organic content in the sediment, which upon deposition increases Biological Oxygen Demand (BOD), and releases plant nutrients, potentially stimulating algal growth which further aggravates oxygen demand problems. This leads to fish kills, production of hydrogen sulphide, algal blooms, further degradation of the proper functioning of the water body and production of an undesirable area for both marine organisms and humans. Biodiversity is also likely to differ greatly from the parent water body. Low levels of colonisation of canal bottom sediments have been documented in a number of studies. This is attributed to the unsuitability of such sediments for metamorphosis of larvae of many benthic invertebrates, with consequent reduction in available food supply for demersal (near bottom) organisms. The lack of benthic organisms will also affect the ability of the water body to cycle nutrients and will contribute to the build up of nutrients and organic material. Effects of anoxia may be exacerbated by fresh water run off as stratification of the water body with an upper freshwater layer reduces water circulation. A halocline may prevent re-aeration of lower levels and if sufficient BOD occurs, the lower levels may become anoxic. Again, nutrients will be released and sulphides may be produced.

Increased sedimentation may also require that the area to be regularly dredged to remove nutrients or to maintain depth, thus routinely further upsetting the trophic balance. Indeed the construction of the marina itself and the inordinate amount of material that will have to be removed will impact on the turbidity levels of the surrounding waters and settlement of such material may cause considerable damage to the reef by smothering. The developers have acknowledged that the effects of construction may be prevalent over an area of 9 square km for up to 5years, but have not indicated where that 9 square km covers.

The issues of mobilisation of toxic sediments during the construction phases are concerns addressed by RAMSAR but have not been adequately addressed in the PER. Other similar developments have mobilised toxic compounds and acid sulphate soils which have caused severe environmental degradation and fish kills.

The number of boats to be accommodated in the marina requires the examination of the levels of contamination from anti foul coatings on boats. The level of vessel traffic will also create levels of hydrocarbons from oil and fuel. The PER has not addressed these effects adequately.

There are now over 200 artificial waterways in NSW, QLD, Victoria and WA (Freeman, 1994). As a concept they offer the advantages of waterfront living to a broad section of people, previously reserved for a few. Unfortunately, as the huge number of studies on water quality and environmental degradation testify, most of them fall well below the water mark of practical perfection. Similar studies in Europe and the USA have pointed out similar issues.

Many states now have guidelines and legislations that relate to the construction of canal estates. The Gold Coast City Council (1988) determined that developments should be less than 2.5m deep at low water, and should not be constructed in areas with less than 1.0m tidal range. They also recommend that dead end designs such as the Maud's development should not be used as they are inefficiently flushed. The Western Australian Steering Committee on Canal Estates produced recommendations for the development of canal estates until 1984. The content of the huge range of environmental impact statements, legislation, guidelines, papers and studies available for canal estate developments nationally and internationally, should serve as a warning to the caution that should be adopted when planning a development involving a man made inland waterway. However the decision taken by the NSW government in 1997 to completely ban canal estate developments indicates the severity and likelihood of the serious environmental degradation that can be caused (SMH, 1997).

The State Environmental Planning Policy no. 50, Canal Estate Development under the environmental planning and assessment act 1979 (updated 16 march 1998) states in section 5 that "A person must not carry out canal estate development". There are very few exceptions to this rule.

Due to the problems associated with inland marinas and the effect on the coastal waters of the developments construction, maintenance and increased boat activity, it is our feeling that the proposed development by CCMD at Maud's landing is not appropriate for the area. The construction of a residential inland marina would be considered illegal in New South Wales, and would fall under specific strict guidelines in other states. These legislative measures have been made on the basis of well-documented worldwide attitudes to inland marina developments should forewarn us of possible ecological degradation to a unique area of our coastline.

The objects and principles of the *Environment Protection and Biodiversity Conservation Act 1999* Section 3A lists the Principles of Ecologically Sustainable Development. These principles are also listed in the Guidelines for a Draft Public Environmental Report as Attachment 1. Principle (b) requires the application of 'precautionary principles' and states that ' if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.

The plans submitted in the PER by the proponent certainly do not indicate 'full scientific certainty'. In many places there is no scientific certainty. Management plans are vague or non-existent and the baseline study carried out cannot be verified as it is not included in the Appendix. The guidelines state that as an unpublished document it should be included.

The construction of the marina itself may do irreparable damage to the seagrass meadows and reef system from the resuspension of sediment. The toxic components of the sediment, which have been shown to exist in considerable quantities (DER 1985), will not be limited to the marine organisms in the immediate area of the proposed development but may impact on Commonwealth Waters. As the proponent states that dredging will be necessary to maintain the depth of the marina, the impacts resulting from the suspension of such toxic sediments will extend these possible

impacts throughout the life of the resort. There is no evidence of scientific certainty that this will not happen.

Oceanographic Issues

The study of the oceanographic features that will affect the Maud's Landing development is inadequate and does not provide the detail required to properly assess the impact of the development. Indeed many of the simple questions we asked could not be answered due to the lack of real data in the report. This includes questions regarding sediment transport amounts and origins and destinations, current speeds and directions. The lack of real data concerning oceanographic issues is evident through the entirety of the Coastal Engineering Study.

There is no direct assessment of the currents that occur in the locality of the development and there are no details concerning particle size analysis of the shallow sand platform or of the water column. Indeed assumptions have been made about the area by extrapolating from data sets that are a considerable distance from the proposed site. (Appendix 3, P 5, Section 2.4).

Tide and Currents

The PER cites details of the tidal range at a site 5 km from Maud's Landing. This data has been applied to Maud's Landing and may be assumed to be a correct representation. However there is not sufficient detail giving the movement of water in the area. Figure 6 of volume 1 describes the overall picture but does not give factual accounts of the currents that occur at Maud's Landing.

Figure 1, which is a component map drawn from Figure 6 of the PER, shows that lack of detail regarding Maud's Landing. The only quantitative detail that may be drawn from this image is that the currents along the shore are smaller than the currents passing through Cardabia Passage. With no detail regarding sampling points or speed and direction, it is difficult to accept this diagram as anything other than a generalist description of the surface currents in the area.

This chart and its supporting documentation fail to discuss all the currents that may exist within the bay in sufficient detail. There may be currents that run counter to surface currents and these may play a factor in the distribution of sediment in the bay. It is the lack of information regarding the presents of these types of current that weakens the validity of this study.

Indeed the PER uses conjecture to describe the currents that occur in Bateman Bay with statements such as " The largest currents in Bateman Bay are **BELIEVED** to be caused by" and "Typically the currents **WOULD** be in the order of 0.1 to 0.2m/s." The PER is also unable to determine the actual current that passes Point Maud where the current speed is likely to be faster. The statement used here is "Rough estimates indicate that in this narrow channel, the currents may reach 0.5m/s. (Appendix 3, P 6)

These should be factual statements that cover everything from neap tides to the equinox tides that include the degrees by which wind and wave forcing enhances or diminishes the currents.

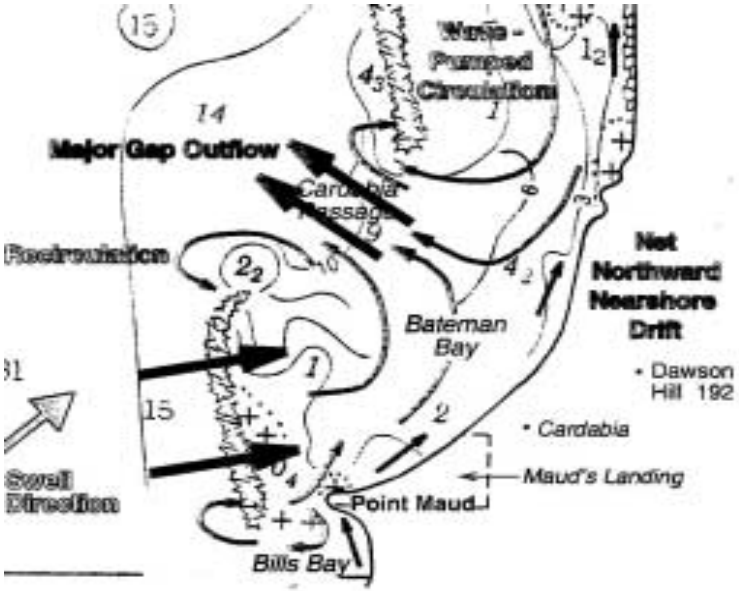

Figure 1 Local Area

The only assessment of the currents at the mouth of the proposed marina was "A brief drogue tracking exercise carried out during flood and ebb spring tides." (P 6 Appendix 3) and the drogue travelled 0.1 m/s directly downwind. This exercise at best measures the direction that flotsam may travel in, at the surface. It does not measure the real speed and direction of the currents at the surface and subsurface. There may be a density driven subsurface counter current in the region of the proposed marina that may lead to the accelerated silting up of the marina and other areas in Batemans Bay.

A more full and proper data set of the area would include the following analysis:

Development of at least 9 sampling points within Bateman Bay. These points to be spaced in Bateman Bay as 3 lines of 3 sites. These sites to be sampled vertically at every metre with a current meter, CTD and an OBS or other method of recording SPM. Each site should be sampled during a spring tide and a neap tide. The time period should be at least 1 tidal cycle plus 30 minutes. The selection of sites should where possible use the sites that have previously been used for evaluation of water quality.

The data that results from this depth of study would allow anomalies that may occur in Bateman Bay to be discovered. It would also allow for the discovery of where the water flows and allow currents and undercurrents to be identified. The inclusion of an OBS or other method of determining SPM will allow the determination of the amount of SPM that flows through the bay and the direction that it moves throughout the water.

This study should be accompanied by a long-term study of the currents by deploying current meters for extended periods of time. This is particularly necessary for gauging the effect of storms and cyclones.

Modelling (Bay)

An understanding of the currents in Bateman's Bay based on fact rather than interpolation is the only way to accurately gauge the impact Maud's Landing may have on the surrounding area. The developers have failed to develop a model of Bateman's Bay or gather the type of data required to generate accurate models of Bateman's Bay and the marina. They have only gathered peripheral information form other sources that does not necessarily address the issues of the area. The lack of modelling in the bay should be considered a major deficiency of the developer.

Without modelling of the bay before and after the proposed development it is impossible to answer questions about the changes in the bay. The developer cannot state that this development will not have a negative impact based on the data used. Changes that may occur as the result of the groynes and marina may lead to a major alteration in the sediment transport within the bay. This may lead to loss of beaches needed for turtles, loss of seagrass in areas removed from the development and smothering of corals and other algae.

The modelling also fails to explore the effect that the marina will have on the bay as a whole. The PER mentions that the marina will cause acute deposition of sand during storm events and even quantifies this with the 1 in 100 year event. It also expects these deposits to be washed away. However, there is no modelling or discussion of the chronic effects of altering the natural currents that exist now in equilibrium. Without detailed exploration of the impact of this marina on the circulation in Bateman's Bay the developers cannot be sure that their development will not cause catastrophic and irreversible damage to the environment of Batemans Bay.

Modelling (Marina)

The components of the hydrodynamic model of the dynamics within the marina are extensive, however, it includes the drogue tracking as optional. This suggests that the engineering company sees the need to include data representing the currents in the bay, but at the same time by referring to the drogue data as optional, suggests that they are questioning the quality of this data. The currents existing outside the marina will be a contributing factor to the circulation within the marina. With this component missing there can be little faith in the accuracy of the model.

Groundwater

Stormwater Contamination

One of the possible causes of pollution from the CCR proposal is contaminated stormwater runoff.

In particular runoff from road systems include contaminant from heavy metals such as zinc, lead iron, copper, chromium, cadmium and arsenic, (from petrol combustion, engine and break wear, corrosion, and vehicle leaks) and hydrocarbons, as well as nitrogen.

The PER notes that: "Input of nutrients into the Ningaloo ecosystem is possible through the groundwater system from a hinterland that is also low in nutrients or from coastal currents." (Vol. 1, p 79) Later in the report it notes that: "Resort stormwater design will be directed away from the waterway in all but exceptional rainfall events." (Vol. 1, p 97) In describing the surface hydrology in Section 3.1.5 the report explains that "The balance of the Marina site east of the dunes is generally flat and low-lying and storm runoff drains to the south-east, generally towards the salt lake areas that form a large shallow basin. The capacity of this shallow basin and salt lake system is sufficiently large so that stormwater and runoff from major storm events is collected and stored before eventual dissipation by evaporation with some infiltration into the shallow unconfined groundwater aquifer. This collects all surface runoff from Maud's Landing and its hinterland and has no oceanic outlet." (Vol.1, p 44) That is no surface oceanic outlet. But the groundwater of the area flows into the ocean.

In other words there is a hydrological link between the stormwater runoff of any proposed resort at Maud's Landing and the adjacent marine environment and the Ningaloo Reef. This linkage has not been identified in the PER, and an assessment of the associated potential environmental impacts has not been provided. The Maud's Landing area is inappropriate for a development of the scale and character proposed because of the inevitable contamination of the marine environment from the stormwater runoff that would result.

Modelling

It is important to note density driven currents were considered important in the Section 5 covering modelling within the marina, this is in contrast to section 4. Maud's Landing Coastal Engineering Study p 14 states "In general, the density of the marina water is expected to be almost identical to that of the source water in Bateman Bay and as such, there will be little or no density gradients between the marina and the bay that could set up density driven currents." In addition they say that "The effect of surface run-off and ground water inflow from sporadic tropical cyclone events and winter rainfall events, both by bringing pollutant into the system and creating density currents (Horizontally and Vertically) were considered important aspect of

water quality modelling." (Maud’s Landing Coastal Engineering Study, p 15).

These two statements were made exclusively of each other but raise the question of the importance of density driven currents in the marina. We would expect density driven currents to occur infrequently in the marina given the salinity of ground water in the area. For this reason we question the motivation for using density gradients as an important factor for modelling.

In addition to questioning the importance of density gradients there is a discrepancy regarding the figure used for the salinity of the ground water. Volume 1, section 3, p 44 states that “Bores drilled to depths of 13–60 m at distance of up to 10 km inland from point Maud encountered water in the salinity range of 1000 to 14000 mg/L total soluble salts (TSS). Salinities increase from east to west, and reach 35,000 mg/L at depth near the coast where a wedge of sea water underlies less saline water.”

However the value of salinity used for run-off and ground water inflows into the marina does not reflect reality. “The input surface run-off and ground water inflows were assumed to be fresh and had a modelled salinity of 1 ppt” (Vol 2, Appendix 3, p 21). Although the inflow of water from the superficial aquifer and rainfall is expected to be minimal, the discrepancy in the modelled salinity and the real salinity raises questions as to the accuracy of the data produced concerning flushing, nutrients and other events such as algae blooms.

The importance of the models used to establish the effects within the marina are a vital part of assessing the impact of the marina properly. In this case the modelling done here cannot be considered to be correct. This situation should be remedied by re-running the model with the correct figure, which should be 35 ppt.

Marine Geomorphology

The discussion concerning the marine geomorphology is a description of the district surrounding the development. This section does not consider the sediment makeup of the immediate area surrounding the development. The PER states " Sediment in the lagoon are generally coarse calcareous sand with finer calcareous sand or silt in deeper basins and gutters."

The PER does note that sometimes the limestone pavement is exposed by the sand being swept away. However, there is no detail concerning the conditions under which sand may be swept away, nor where it is most likely to occur. Presumably, this is the result of currents or storm events, however, there is insufficient detail to determine the causal factors.

In the coastal processes section an assumption has been made that the origin of the sand that has been feeding the development of the beaches has been the nearby reefs. This is combined with the statement that the sandy beach in the southern portion of Bateman Bay are believed to be stable. The only measured attribute is the beach profiles, which have been found to be typically swell built. This section again is supposition and interpolation rather than statements based on factual evidence.

Conclusion

It is our opinion that the work done in collecting data to run models concerning currents and suspended particulate matter is insufficient. This is the result of keeping costs to a minimum for the sake of profit, rather than undertaking a study that is designed to produce an outcome that will deliver a good understanding of an area and allow a sound, well-informed basis for decision making.

A development such as this has a responsibility to prove it does not have a negative effect on its surrounding area. The data used in this document regarding currents and movement of sediment is simply not sufficient to prove that the marina will not be destructive. The lack of data must be considered in the decision making process

Marina: Other Issues		
Issue	**PER Reference**	**Issue With Respect To Adequacy Of The PER**
Artificial reef		No flushing, possible nutrient spilling into Bateman Bay and sedimentation from dredging.
Marina	p 43	No information on the effects or mitigation of the re-suspension of sediments (ie. gypsiferous clays and silts) with excavation of the marina area and continuous dredging during the operational phase. Concern for regular sediment plumes from the mouth of the marina affecting the surrounding ecosystems (particularly coral reefs) through smothering.
Limestone	Appendix 3	Limestone Potential damage to ecological community, vague as to source and quantity of limestone.
Quarrying		Lack of clarity of tonnage and location of quarries and possible environmental problems

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BIOLOGICAL ENVIRONMENT

Marine Turtles

Ningaloo Reef has been identified as a crucial habitat for marine turtles, nationally and internationally. This is not in dispute. The EPBC Act lists Loggerhead (LT), Green (LV) (LM) and Hawksbill (LV) (LM) as species that require consideration in terms of impacts and mitigation measures.

Part 4 (b) of the guidelines states that the proponent should provide baseline data for all three listed species. It is abundantly clear that there is very little data on the populations in this area and that until more work is undertaken, Part 4 (b) requirements cannot be fulfilled.

The area proposed for development is known to be of particular importance to the loggerhead turtle and green turtle, to a lesser extent. The proponents encountered the data shortage problem and relied exclusively upon information collected over a very limited period of time by a volunteer (Peter Mack "Turtle Man") who is not a scientist and who did not conduct scientific research. For example, the research undertaken by the Department of Conservation and Land Management in other parts of Ningaloo, involves at a minimum, the tagging of nesting turtles. This was not undertaken in the vicinity of Maud's Landing. Instead, the data is based on personal communications only and not on published information, despite the reference style used in the PER, i.e. (Mack, 2001). The lack of baseline data makes any discussion of impacts highly hypothetical and the measurement of impacts impossible.

Peter Mack, who has the most detailed knowledge of turtle nesting areas in the area of Maud's Landing has expressed grave concerns about the proposed development and has indicated that he is "implacably opposed to the Coral Coast Resort proposal." (Personalcommunication, 2002)

It is also clear that scientific understanding of turtle behaviour is still limited, particular the understanding how and why they react to particular natural and human influences within their environments. Further to this, experience internationally and in Australia shows that turtles can be negatively affected by a wide range of interventions (Lutcavage, M. E., 1997). Many of these would be introduced by the proposed development.

The combination of a lack of baseline data and less than conclusive scientific understanding of turtle behaviour makes developing meaningful mitigation strategies impossible. What is known is that they are very sensitive to environmental change and are an excellent example of a species that should invoke the precautionary principle.

Loggerhead Turtles (Threatened/Migratory) And Other Listed Species		
Issue	**PER Reference**	**Issue With Respect To Adequacy Of The PER**
Nesting/occurrence data	p 71	The PER is not assessable in relying on personal communications (Mack, 2001) for its data on loggerhead nesting occurrence in the vicinity of the proposed resort. In addition, the data presented appears to be based on information from only two seasons. This is quite inadequate in terms of certainty about both numbers of loggerheads and their potential nesting locations in relation to the proposed resort. Further to this, without turtles being tagged, the assumption that 71 nests (albeit with data problems mentioned above) translates to a total of 24 adult females is highly questionable. The number of females could be much higher. Scientific work over a number of seasons, with tagging, would be necessary to provide a reliable baseline because turtle utilisation in the area is known to vary widely between years. Without this data, potential harm cannot be predicted or management plans accurately developed. There is also a lack of data on the resident, non-nesting turtle populations, their feeding characteristics and other behaviours.
Lack of data on turtle population genetics	71, 142 Ecological value	"Nesting turtles represent a breeding population of about 24 loggerheads and one or two green turtles. This constitutes about 0.5 % of the estimated stock of breeding female loggerhead turtles in Western Australia." Flaws in the population estimates are discussed elsewhere in this submission but a further point that is germane to a consideration of impacts is that the turtles utilising the area might be genetically unique. This would substantially increase their ecological value and mean that a loss of breeding stock could represented 100 % loss of a genetic lineage. However, due to the lack of data on turtles in this area, it is not possible to assess this. The precautionary principle should prevail in this case because, for reasons mentioned

		elsewhere in this submission, interaction with humans can cause turtles to release their eggs at sea which in this case could cause a loss of unique genetic stock.
Effects of possible decline in numbers of nestlings		The probability for survival for of an individual hatchling is strongly associated with the number of other hatchlings in the water at the same time (Miller, 1997). Consequently, a decline in the total population of nestlings could lead to an exponential fall in nestling populations over a season.
Hawksbill, Flatback, Leatherback and Green turtles	pp 69–74	The lack of extensive surveys of all turtle populations means that the claims that these species are not significant should be treated with great caution. No references are provided for the claim that "Only one or two green turtles are known to nest on Bateman Bay beaches."
Importance of the area for turtle utilisation — possible decline from effects of previous harvesting	142 Ecological value	The carrying capacity of the area for turtles is likely to be greater than recent counts quoted (based on the inadequate data from personal communications between the proponent and Mack 2001, see above) because the local population was harvested approximately 30 years ago for few years and would not have had sufficient time to recover. It may also have been subject to more intensive interactions with human and cats. Therefore, the area is likely to be of much greater ecological value in the long term than has been indicated. Furthermore, the previous harvesting may soon lead to a decline in nesting numbers as those turtles that would otherwise have been returning to nest will not be.
Destruction of at least 300 m of nesting habitat	p 144	"The loss of 300m of nesting habitat will result in females that otherwise nest in that specific location moving to alternative acceptable areas of the beach." It is by no means conclusive that the females would find "alternative acceptable" areas of the beach. Research shows that there is a very strong tendency for turtles to return to the region of birth, find a nesting beach and return when mature to a closely proximity space to renest

		during subsequent attempts (Miller, 1997). Increased interaction with humans and predators could make re-nesting even more difficult and effectively increase the loss of nesting habitat to well over 300m.
Gull predation		Predation of hatchlings by seabirds can be a serious problem (Musick, J. A. and Limpus, C. J., 1997). Some researchers even use gull aggregations as a proxy indication of where turtle nests are when conducting surveys. The PER does not mention the threat posed to turtles by gulls, which is a serious flaw because gull numbers are likely to increase significantly with increased human presence in the area.
Lighting effects	Page 71, Vol. 2, Appendix 8.	"Lighting will be managed by implementation of best practice lighting procedures…" This statement is not supported by any references to any research or a description of any best practice models so it cannot be assessed. Peter Mack, the "Turtle Man" who is very familiar with the Maud's Landing area and turtle nesting sites stated that "There is no way they could control the lighting from the development so as not to harm the turtles" (Mack, 2002,Personal Communication) "Loggerhead turtles have an aversion to artificial light in the near-ultraviolet range of the spectrum (green/yellow to yellow) and, depending on the intensity of the artificial light, are less likely to become disorientated Lutz (1996)." The science on lighting effects on hatchlings and mature turtles is not conclusive (Lohmann, 1997). The reference quoted in the PER from Lutz (1996) on the effects of different forms of radiation is based on limited research and does not support the comment quoted above. Ongoing research is being conducted on lighting effects on turtles, particularly on loggerheads (e.g. Lohmann, 1997). Some key issues and preliminary findings that are relevant to assessing mitigation strategies are: • The glow caused by developments that have lighting has been found to disorientate

		loggerhead hatchlings particularly because they navigate by light on the horizon (Lohmann, 1997). A development so close to the beach would inevitably have a significant glow no matter what management plans were adopted. • The effects of "spot" lighting (e.g. torches) can cause nesting females to abort attempts at egg laying. Managing "spot" lights is notoriously difficult, particularly when visitor numbers are high. • Lights on boats can also be a problem and this is currently being investigated. Anecdotal evidence suggests that lights on boats can confuse hatchlings moving out to sea and cause aggregations where they can be at higher risk of predation.
Vehicle impacts on nesting sites	p 9	The proposed development will increase tourism in the area, risking increased 4WD vehicle impacts on turtles. One problem, vehicle tracks, have been known to trap and/or disorientate loggerhead turtles (Lutcavage et al., 1997). The PER relies on future unresolved discussions with the department of CALM and owners of leasehold land to resolve access issues. This is not adequate for a matter of national environmental significance
Construction and altered coastal geomorphology impacts	Table 20, pp 122–124	The PER has not addressed the potential population status of loggerheads nesting in Bateman Bay (see above). Consequently and erroneously it has not considered adequately the potential for future coastal erosion and construction activities to disrupt an important nesting population. Any coastal erosion close to a built environment like the proposed development can instigate "beach armouring" to protect buildings. These protective structures are detrimental to nesting access for turtles. Examples include "vertical or inclined concrete walls, wooden walls, rack revetments, and sandbag/sandtube structures…" or "… 'soft' structures such as sand fences", and "Structures meant to control longshore sand movement such as groins and jetties also may present similar barriers to nesting turtles." (Lutcabage, 1997, p 389)

		The data on oceanographic characteristics in the area is negligible (see section in this submission on "Oceanographics.") No modelling of the effects of the marina and groyne was undertaken, so the future effects of these major constructions on beach morphology cannot be predicted. This represents a serious flaw in the PER.
Predation	Appendix 8	The mitigation strategies described for cats, foxes, dogs are inadequate. Without significantly more information, assessments of the likely efficacy of management plans are not possible. However, experience in Australia and internationally indicates that managing predation by canines, in particular, is very difficult. Baiting for foxes could also be difficult in a resort environment.
Solid waste pollution (particularly plastic bags)		Turtles are extremely sensitive to pollution. Loggerheads are particularly prone to mortality from ingesting plastic bags, which resemble jellyfish, their main food source. (Lutcavage, 1997) Managing the increased levels of human terrestrial and marine activities which lead to pollution is very difficult, particularly given the strength of the prevailing winds that would blow material from the resort onto the turtle feeding grounds.
Boating interactions (interference and strike)	p 8, p143	Turtles are vulnerable to injury or death from boat strike (Lutcavage, 1997). This point is acknowledged in the PER, however, management plans are not provided. Increasing the ease of boat access is likely to lead much higher boat traffic in the area, over a much longer period of time. Interactions can also disrupt turtle mating which has been seen to occur in near shore waters in Bateman Bay. (Personal Communication, Brad Norman, 2001) Private boats, in particular, are difficult to manage and this crucial issue has not been addressed in the PER. A management plan would, at a minimum, include intensively policed speed limits and restricted areas.

Wave refraction from disturbance and hatchling navigation		Wave refraction has been found to be crucial as an orientation cue for loggerhead hatchlings as they enter the water and navigate in the shallows (Lohmann et al., 1997). The breakwaters of the marina would likely alter the refraction pattern of the waves and potentially disorientate hatchlings. This important issue should have been addressed in the PER.
Turtles may travel up the marina		The turtle species in the area, both hatchlings and adults are known to travel up creeks and mangrove areas. If they were to travel into the marina they would be at much greater risk of being struck by boats and of getting caught in the shark netting.
Recreational Fishing		Turtles sometimes take bait and are caught by recreational fishermen. This is not addressed in the mitigation strategy but should be, particularly given that more shore and boat fishing can be expected around areas used by resident and nesting turtles.
Turtle Management Plan to be determined	p 9.	"All aspects of turtle management will be described in a Turtle Management Plan to be developed in consultation the [sic] CALM and relevant experts…" We believe that the "CCMD Marine Turtle Management Strategy" provided in Appendix 8 (Vol. 2) does not constitute "specific and detailed measures" for each item as required under Section 6 of the guidelines. Therefore, the adequacy of the management plan cannot be assessed because it has not yet been developed. This criticism is also relevant to all other species listed in the guidelines.

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Cetaceans

The Ningaloo Reef is notable for the diversity of cetacean species that reside in its waters year-round or on a seasonal basis (e.g. during migrations) [see following Table]. As the only substantial tropical coral reef in Western Australia, the Ningaloo Reef represents a unique and significant habitat for Australian cetaceans. All cetaceans in Australian waters are protected under Commonwealth legislation and several of the species that occur in Ningaloo are listed as endangered, vulnerable, or migratory species under the *Environment Protection and Biodiversity Conservation Act 1999* [see following Table].

Relevant Commonwealth Guidelines for Cetaceans

On 8 December 2000, the Minister for Environment and Heritage has indicated that the proposal presented by the Coral Coast Marina Development Pty Ltd has the potential to have a significant impact on three matters of national significance:

- Commonwealth Marine area;
- Listed threatened species and communities; and
- Listed migratory species.

The listed cetacean species likely to be most impacted by the proposed development include: the humpback whale, the common dolphin, the spinner dolphin, the Irawaddy dolphin, and the Indopacific humpback dolphin. Existing scientific survey data and anecdotal evidence (Personal Communication, Richard Todd, Cinematographer who has footage of Spinner Dolphins and Indo-Pacific Humpback dolphins in Bateman Bay) indicate that all of these species utilise Bateman Bay, at least on a seasonal basis. Other listed species may be affected by the proposed development in Commonwealth waters, in waters close to Bateman Bay, or within the bay itself.

Impacts on Cetaceans

Population estimates for the west coast population of humpback whales, i.e, the Group IV population, indicate that the population currently numbers between 3–4000 individuals and is increasing at a rate of ~10% a year (Bannister et al. 1996). Disturbance and harassment from acoustic pollution, whale-watching vessels, and recreational craft have been recognised as key threatening processes for this population as it recovers after the removal of whaling pressure. Baseline Data and Threatening Processes

The abundance, distribution, and population structuring of small cetacean species along the north coast of Australia, from the North West Cape to beyond Cape York, is not well known (Bannister et al. 1996; Hale 1997). The need for such data is recognised as a management priority in *The Action Plan for Australian Cetaceans* (1996). Key threatening processes for small cetaceans in inshore and Commonwealth waters of northern Australia include: habitat degradation, disturbance and harassment, and interactions with fisheries (Bannister et al. 1996; Hale 1997).

Significance Of The Waters Within And Close To Bateman Bay For Cetaceans

Bateman Bay is the only protected habitat along the western edge of the North West Cape. As a cetacean habitat, Batemans is significant for its geographic uniqueness and the combination of protected waters, nearshore coral reef, and shallow sandy substrate it provides. These characteristics suggest that the area may be of considerable regional importance as a foraging, resting, and breeding habitat. There is a lack of baseline scientific data on the habitat use patterns of cetaceans for the area. Anecdotal evidence of the significance of the area for cetaceans is discussed below.

Management of Cetaceans

Consideration of the impacts on cetaceans arising from the proposed development must be considered within the context of:

(1) the need for a precautionary approach to the management of cetaceans and assessment of anthropogenic impacts;

(2) a lack of scientific baseline data from which to adequately assess the potential significance of the Bateman Bay area as a cetacean habitat;

(3) the recognised impact of disturbance and harassment from boating traffic on the behavioural ecology of cetaceans in other areas;

(4) in the case of the humpback whale, the cumulative effect of disturbance and harassment along nearly the entire course of the population's migration along the West Australia coastline;

(5) the inadequacy of the mitigation measures proposed by the proponent to ameliorate the impact of boating traffic on cetaceans.

For cetaceans, the central impact from the development will be disturbance and harassment resulting from the predicted increase in boating traffic in the Bateman Bay area. We believe that the PER does not adequately address the impact of boating traffic on listed cetacean species. Further, we suggest that such a large increase in boating traffic in a confined area of considerable potential ecological importance, will inevitably result in a significant impact (as defined under the *Environment Protection and Biodiversity Conservation Act 1999*) for humpback whales and possibly for one or more of the smaller cetacean species. We stress such an impact will be likely to occur regardless of the management measures implemented by the proponent.

Specific details of the points above with relevance to the adequacy of the Public Environmental Review (PER) are discussed below.

Whales and Dolphins found in Ningaloo Marine Park and adjacent waters

Sources: Bannister et al. 1996; Bryden et al. 1998; Hale 1997; Tucker 1991

Baleen Whales (Mysticeti)		**Status under Commonwealth legislation**
Blue Whale	*Balaenoptera musculus*	Endangered; protected
Humpback Whale	*Megaptera novaeangliae*	Vulnerable; protected
Minke Whale	*Balaenoptera acutorostrata*	Protected
Bryde's Whale	*Balaenoptera edeni*	Protected
Sei Whale	*Balaenoptera borealis*	Vulnerable; protected
Fin Whale	*Balaenoptera physalus*	Vulnerable; protected
Southern Right Whale	*Eubalaena australis*	Endangered; protected
Toothed Whales (Odontoceti)		
Sperm Whale	*Physeter macrocephalus*	Protected
Pygmy Sperm Whale	*Kogia breviceps*	Protected
Killer Whale	*Orcinus orca*	Protected
Pygmy Killer Whale	*Feresa attentuata*	Protected
False Killer Whale	*Pseudorca crassidens*	Protected
Short Finned Pilot Whale	*Globicephala macro*	Protected
Melon Headed Whale	*Peponocephala electra*	Protected
Bottlenose Dolphin	*Tursiops sp.*	Protected
Indopacific humpback dolphin	*Sousa chinensis*	Migratory; protected

dolphin		
Common Dolphin	*Delphinus delphis*	Protected
Risso's Dolphin	*Grampus griseus*	Protected
Striped Dolphin	*Stenella coeruleoalba*	Protected
Spinner Dolphin	*Stenella longirostris*	Migratory; protected
Irawaddy Dolphin	*Orcaella brevirostris*	Protected

Precautionary Management and Environmental Assessment

Generally the evaluation of anthropogenic threats to cetaceans can be evaluated in two ways:

(1) the threat-based approach, which focuses on estimating the significance of a given threat and

(2) the population-based approach, which seeks to determine if a population is at risk and if so, to identify the threats responsible.

Since most cetacean populations are affected by multiple human impacts, disentangling the relative contribution of a particular threat (except in certain situations such as by-catch) is often impractical. As such, most management efforts concentrate on evaluating and monitoring the status of populations. If the population is judged to be at risk, e.g., due to small and or declining numbers, management action is undertaken to reduce the effect of impacts identified as key threatening processes (Whitehead et al. 2000). The indeterminate status of small cetacean populations, such as the Irawaddy dolphin and the humpack dolphin, along the north coast of Australia and in the Ningaloo area mitigates against the use of the population-based approach.

Even when monitoring programmes are undertaken, the abundance of cetacean populations is often difficult to estimate with great precision. This difficulty is a critical management issue because negative population trends may go undetected for some time. Even if such trends are detected, the slow reproductive rate of cetaceans limits the extent to which populations can compensate for increased adult mortality, diminished recruitment due to falling survivorship of calves, or reduced reproductive output (e.g. due to longer inter-birth intervals) by adult females.

The life histories of cetaceans are characterised by long life-spans, slow growth rates, extended periods of periods of dependence and adolescence, and small clutch size. These factors mean that populations cannot usually increase at more than a few

percent per year and, as such, population decline, once initiated, is difficult to reverse.

The aftermath of whaling is replete with examples of populations whose recovery has been exceedingly slow despite the removal of whaling pressure. Thus, when considerable scientific uncertainty exists about the status of a population or the significance of a given threat, management approaches have increasingly sought to implement a precautionary framework to population monitoring and the amelioration and assessment of anthropogenic impacts (Thompson et al. 2000).

Personal Communication

January 2002

Curt Jenner, Managing Director, Centre for Whale Research (WA) Inc.

There has been very little direct research conducted on animals in this particular location. However, it is known that humpback whale cow/calf pairs and/or adult pods use Bateman's Bay annually. It would be quite useful to conduct a series of aerial surveys over the course of the southern migration (August to November) to establish just how important this bay is to southbound cow/calf pairs.

As we have realised from sailing down the coast, there are few protected areas along the WA coast south of North West Cape that afford protection from the southerly winds and swell. Bateman's Bay is likely to be of particular importance as a staging or resting area for whales because it faces northwards and is sheltered. Exmouth Gulf and Shark Bay are larger scale examples of this need. Cows migrating south with their 2 to 3 month old calves would undoubtedly take advantage of every protected bit of coastline available, including Bateman Bay.

High densities of small boat operators have been known to displace whales. Similar conditions exist in Exmouth Gulf with boaters and resting cow/calf pairs. However, Exmouth Gulf is a much bigger body of water than Bateman's Bay and although there are no obvious signs of displacement at Exmouth, this may not hold true in a more confined setting.

Lack of baseline data

As discussed in the introduction, few scientific data are available on the abundance and habitat use patterns of cetaceans within Bateman Bay and in areas proximate to it, even for the humpback whale (C. Jenner, personal communication, 2002). Since this baseline ecological information is not available, effective scientific assessment of the significance of the area to be affected by the proposed development to cetaceans and impacts arising from the proposed development is highly problematic. Again, a precautionary approach would necessitate an adequate period of monitoring and research to more fully understand the potential importance of this area to listed cetacean species.

The consideration given to this lack of baseline data in the PER and the ecological data the document does provide are

insufficient and inaccurate. Section 4.4.11 (Volume 1, p1146) states the common dolphin and the humpback whale are the "only cetaceans that are regularly seen in the NMP (Ningaloo Marine Park) waters." This statement is misleading since other cetacean species are commonly sighted in Commonwealth and inshore State waters by Coral Bay residents. While anecdotal evidence is inadequate as more than a qualitative measure of abundance, the assertion of the PER is not based on scientific data.

Section 3.2.2 of Volume 1 (pp66-7) indicates that humpback and minke whales do not use Bateman Bay. Surveys by whale researchers following humpback whales along their migration show that humpback whales cow/calf pairs and or adult pods have utilised Bateman Bay every year since 1995 (C. Jenner, personal communication, 2002).

Personal communication

January 2002

Curt Jenner, Managing Director, Centre for Whale Research (WA) Inc.

"Although we have never conducted long term studies in this particular area, it stands to reason that any northwards facing bay or engulfment along this coast line will be used as a resting or staging area for southbound whales. Exmouth Gulf and Shark Bay are larger scale examples of this need.

Impact of disturbance and harassment on the behavioural ecology of cetaceans

Disturbance and harassment from vessels, both commercial and recreational, has been recognised as a key threatening process for cetaceans in Australian waters and elsewhere (Bannister et al. 1996). Research from other locations indicates that boat strikes, general vessel traffic, and harassment from whale watching vessels and recreational craft can directly affect the behavioural ecology of cetaceans (e.g. Allen and Read 2000). These threats are of particular concern within Bateman Bay due to:

(a) the shallow and confined nature of the bay and its limited spatial extent;

(b) the density of mega-fauna within Bateman Bay, particularly at certain periods of the year;

(c) the likely spatial concentration of vessel traffic as vessels enter and leave the area (the funnel effect);

(d) the potential volume of vessel traffic; and

(e) and use of Bateman Bay area by humpback whales as a resting/staging area during their migration and possibility that other cetaceans utilise the area for activities (such as resting and socialising) which are highly sensitive to disturbance.

We thus suggest that the potential for adverse impacts on cetaceans from disturbance and harassment is high. If the area, due to its habitat characteristics, is regionally significant for certain cetacean species, changes in the behavioural ecology (e.g.

decreased habitat occupancy) are likely. Since the populations of small cetaceans (e.g. the Irawaddy dolphin and the humpback dolphin) in the region are likely to be minimal and at, or near the limit of their range (Hale 1997), small adverse changes to the behavioural ecology (e.g. use of less optimal habitats) of a subset of the population (such as mother and calf pairs) may lead to population-level effects (e.g. decreased reproductive rate).

Impacts on cetaceans due to disturbance, harassment, and boat strikes

Inappropriate practices by commercial and recreational craft which can cause disturbance to cetaceans include: repeated approaches at high-speed or towards the head or tail-end of the animals; rapid movements at speed; and crowding around animals (Bannister et al. 1996). Harassment (e.g. from boat traffic) or other forms of disturbance (e.g. noise from construction of breakwaters) can impact on cetaceans in two ways (Kruse 1991; Norris and Reeves 1978). Over the short-term, such impacts cause stress to marine mammals and they may exhibit a series of behavioural or physiological responses (e.g. increased respiration, rapid movement away from the area). The long-term cumulative impact of these impacts is more difficult to assess but may include:

(1) changes in habitat use including under-utilisation of preferred habitat and use of more marginal habitats with lower prey availability and increased predation risk;

(2) decreased frequencies of key activities such as nursing and mating in impacted areas;

(3) changes in activity budgets to reflect use of more marginal habitats;

(4) decreased survivorship of calves due to declining maternal investment; and

(5) increased adult mortality related to 1–3 above.

Since the reproductive rate of marine mammals is generally very low and populations are dependent upon high survivorship of calves and low adult mortality, long-term effects that negatively affect these demographic characteristics can lead to initiation of population decline. The sensitivity of cetaceans and marine mammals to small changes in reproductive rate is an especially acute concern here, since many of the populations involved are:

- small;
- of uncertain size;
- recovering;
- exposed to similar impacts in other locations;
- genetically discrete; and
- at or near the limit of their distribution.

Research on cetaceans from other locations indicates that disturbance from interaction with vessels can significantly alter the behaviour of large and small cetaceans (Bannister et al. 1996). Boat approaches affect the movement patterns of large cetaceans such as killer whales (Kruse 1991) and humpback whales (Baker et al. 1983). Small cetaceans, such as bottlenose dolphins and humpback dolphins, often exhibit a flight response to

approaching vessels, particularly in shallow waters (e.g. Irvine et al. 1981). Humpback dolphins are especially sensitive to boat traffic (H. Finn, personal observation).

In Hervey Bay, whale watching is known to affect the behaviour of whales involved in breeding ground activities (Corkeron 1995). Research from other locations indicates that adult females with calves have deserted habitats which they once used intensively in an apparently response to vessel traffic (Salden 1988, Glockner-Ferrari and Ferrari 1990). The potential for short-term changes in behaviour to lead to avoidance of once-favoured areas over longer timeframes is the subject of on-going research in Hawaii and the east coast of Australia (Corkeron 1995).

Many lay observers feel that the speed and agility of dolphins allows them to avoid vessel impacts or undesired interactions (Stone and Yoshinaga 2000). In recent years, however, the degree to which recreational boating traffic can impact upon small cetaceans has become widely recognised and it is now recognised as a key threatening process in certain areas (Allen and Read 2000). Collisions between dolphins and boats are relatively common off the coast of Florida (Wells and Scott 1997) and have also been recorded in New Zealand and elsewhere (Stone and Yoshinaga 2000). As with whales, dolphin mothers with calves appear to be particularly vulnerable to disturbance and boat strikes, whether due to lack of manoeuvrability and experience with boats or due to habitat use patterns, which expose them to greater amounts of vessel traffic (Stone and Yoshinaga 2000; Wells and Scott 1997).

Humpback whales

Volume 1 of the PER (pp112–3) suggest that humpback whales may be displaced from Bateman Bay and adjacent waters due to high densities of small craft. The confined waters of Bateman Bay may cause exacerbate negative interactions between small recreational vessels and resting cow/calf pairs to an extent not observed in more open waters such as the Exmouth Gulf (C. Jenner, personal communication). Cows with newborn (2-3 month old) calves are the population subset most susceptible to disturbance and harassment since they require protected areas to rest and nurse, have limited mobility (i.e. slow sustained swimming speed), and in the case of newborns, have limited experience with boats. Lactating females may seek protected areas such as Bateman Bay not only for protection from southerly winds and swell but to avoid predators such as killer whales and white sharks, who appear to shadow the southerly migration path of humpbacks. Changes in habitat use (e.g. a more offshore migration path) thus may expose newborns to increased predation risk, as well as limiting opportunities for rest and nursing (Bannister et al. 1996). Since humpback cow/calf pairs are typically concentrated towards the tail end of the southerly migration, the impact of commercial operators and recreational operators seeking interactions at the end of the "whale season" would be concentrated on this population subset (Corkeron 1995).

It is worth emphasising the tolerance level of humpback whales to various forms of disturbance is not well understood, but appears to have been exceeded in certain locations, leading to long-term changes in habitat use (e.g. Salden 1988). These observations

suggest that the proponent's claim (Volume I, p148) that the proposed development will not significantly affect the life cycle, habitat occupancy, or migration path of humpback whales, or otherwise degrade the habitat to an appreciable extent is not based on an adequate understanding of the potential impacts.

Cumulative impacts on humpback whales

A precautionary management approach to the management of the Group IV humpback whale requires a holistic view of impacts on the population. Several threatening processes (e.g., acoustic pollution from seismic testing, disturbance from whale watching, shipping traffic) affect whales as they migrate along the West Australia coastline. Assessment which focuses on a single development or single impact can miss the cumulative and synergistic effects of multiple impacts (Stone and Yoshinaga 2000). The Commonwealth is uniquely positioned to adopt a precautionary position on the assessment of impacts on listed species.

Inadequacy of the mitigation measures in the PER

As discussed above, the most fundamental obstacle to an adequate assessment of the impacts of the proposed development is the lack of relevant baseline ecological data for humpback whales, humpback dolphins, spinner dolphins, common dolphins, and the Irawaddy dolphins. Without baseline data on the habitat use of these species and their habitat requirements of the area in and around Bateman Bay and the establishment of a adequate monitoring programme (with a sufficient time period prior to initiation of construction to establish baseline patterns), it is not feasible to determine if a significant impact on a listed species will occur.

Further, the PER does not effectively address the potential effect of impacts relating to disturbance, harassment, and boat strikes. The PER suggests three mitigation strategies to minimise human impacts on cetaceans (Section 4.4.11, p 147):

- Development of a Marine Mammal Management Plan to establish records of interactions, entanglement, boat collisions, and stranding;
- Maintenance of records on the incidence of entanglement, boat collisions, and stranding; and
- Implementation of protocols to ensure that whale interaction activities do not impact wildlife, primarily education measures and liaison with operators.

These management strategies do not address the lack of baseline data, the necessity for an adequate cetacean monitoring programme, and the volume of boat traffic through Bateman Bay. The strategies are essentially reactive in nature and will not effectively manage the core impact issue in terms of disturbance, harassment, and boat strikes—the large predicted increase in boat traffic through the confined waters of Bateman bay Indeed, we suggest that, regardless of the management strategies proposed by

the proponent, a significant impact on the behavioural ecology of humpback whales is unavoidable and that a significant impact on one or more of the small cetacean species that use the area, is probable.

Precautionary management requires a proactive approach to identify threatening processes and provide for their mitigation prior to any action being undertaken. If the impacts from an action cannot be ameliorated so that a significant impact will not occur, or if there is considerable scientific uncertainty about whether such an impact will occur, a precautionary requires that the action not be approved.

In this case, we suggest that Bateman Bay, due to its potential importance as a cetacean habitat and the considerable potential for boating traffic to have a significant impact on humpback whales and other cetacean species, is an appropriate location for development of this form and scale. Such a unique ecological area, both for cetaceans and for other fauna, is more worthy of consideration as a Marine Nature Reserve under State legislation.

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Whale Shark

The whale shark (*Rhincodon typus*) aggregation at Ningaloo Marine Park is arguably the most important in the world – given the predictability and appearance of large numbers very close to shore Brad Norman (Personal Communication). Although scientists around the world have very little information on the breeding cycle of this species (only one pregnant whale shark has ever been studied and their location of 'pupping' has not been established) (Joung *et. al*, 1996), unusually high numbers of whale shark / whale shark interactions – which may be perceived as breeding behaviour - have been observed in the area immediately north of the proposed development (significantly more than observed in the northern part of Ningaloo Marine Park where whale shark ecotourism is even further established) (Brad Norman Personal Communication). More work is necessary to determine the importance of the region for the future survival of this VULNERABLE species before the impact of the proposed development can be adequately assessed.

Increased boating traffic will likely render the area unsuitable for the whale sharks given that they are known to react to and avoid vessels in many situations (Norman, 1999). This could possibly give rise to the short-term occupancy decrease in the area of and long-term decrease in the actual size of an important population of this whale shark species.

It is inevitable that should this development go ahead both the availability and quality of habitat for whale sharks will be modified and decreased as a result of the CCR. This species will avoid the area adjacent to Bills and Bateman Bay with the increase of 120 vessels per day in the region and the difficulty for CALM to manage and regulate private vessels from interacting with whale sharks,. The fact that a whale shark has been photographed at the pylon ruins of Maud's Landing jetty proves that this area has previously been utilised by individuals visiting the region during their global migration (Brad Norman Personal Communication). With such a major development proposed, it is virtually assured that whale sharks will not again enter the lagoon at North Passage – adjacent to CCR – thereby resulting in a decline in the appearance of this species at this location

The proposed development will interfere substantially with the recovery of the Whale shark species. This species was successfully nominated and listed as THREATENED on the 16th October 2001 under the EPBC Act (Hon. Robert Hill, Minister for the Environment and Heritage – PRESS RELEASE October 2001). As a result Environment Australia will endorse the preparation of a Recovery Plan for this species (Brad Norman Personal Communication). However, if CCR goes ahead, there will be a new 'hurdle' for the whale shark – making it even more difficult to implement a suitable Management Plan for the 'recovery' of this species in the vicinity of the CCR.

The proposed development triggers the EPBC Act as it is 'likely to have a significant impact on this migratory species because it will seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of whale sharks'.

The whale shark utilises the area in close proximity to the proposed development during its migration (Bennett Personal

Communication). The area is extremely important to the feeding cycle of this species – with large numbers aggregating each year to feed on the rich and diverse food supply (Norman, 1999). In fact an increase in food to the area is believed to be triggered as a result of the annual mass spawning of corals on the Ningaloo Reef each autumn (Taylor, 1994). Thus the importance of maintaining the present coral communities in regards to this migratory species is clearly identified (please also refer to the separate section on "Coral"). This spawning event attracts large numbers of whale sharks within the global population, resulting in one of the single most important aggregations throughout all the world's oceans. In addition, apparent breeding behaviour in the area may, with further study, serve to identify the region as important in the breeding cycle of this species (Brad Norman Personal Communication).

It should especially be noted that the World Conservation Union (IUCN) lists this species as VULNERABLE TO EXTINCTION with numbers declining worldwide (IUCN, 2000). It is therefore important to protect the habitat of this species in Australian waters where the numbers are not declining as a result of fishing pressure – but are at risk of declining if tourist and boating pressure increase beyond the current sustainable levels. This protection will not be possible with an increase of 120 vessels per day in the area frequented by this species during its global migration (Brad Norman Personal Communication).

The PER contains a number of incorrect statements in regards to whale sharks, which indicates an inconsistency in the research carried out and gives a false impression of the viability of the CCR.

In the whale shark section (CCMD PER, Version 4., 22 Nov 2001, 4.4.10: Whale Shark, p145–146*)* The Management objective *stated* "To ensure **cetaceans** in the MSMA are not significantly disturbed by human activities". This is a glaringly incorrect statement as Whale sharks are sharks not cetaceans, calling into question the degree of knowledge of the species, especially where its survival is at risk.

Additionally the PER makes the following evaluation "Only CALM authorised and licensed operators can interact with whale sharks". Again, this statement is wrong! There is no current legislation, which prevents a private vessel from accessing the waters frequented by whale sharks. In fact, provided the occupants are not undertaking commercial activities, it is possible for snorkellers to enter the water and swim with whale sharks. The CCR would in fact provide the opportunity for the expected 120 vessels operating in the area to search, find and swim with whale sharks on any given day. This would not be sustainable to the whale shark population and would almost certainly drive the sharks from the area and the commercial operators out of business.

In relation to this issue the PER states, "*Due to the distance to the interaction sites…..contact is principally with Licensed commercial boats*". In contradiction there is evidence of a whale shark at the pylon ruins of the Maud's jetty – therefore the distribution of the whale shark is in fact at the site of the proposed development. Up to 120 private vessels per day may attempt to find and interact with whale sharks in the immediate vicinity (Brad Norman, Personal Communication)

Once again in regards to the requirements of the EPBC Act in terms of strategies and mitigation the development *must "2. Ensure whale shark interaction activities do not impact wildlife, through education programs and liaison with charter operators"*.

Despite this requirement there is no mention of education of up to 120 private boat operators per day that may find and interact with whale sharks in the area.

Predicted outcome

PER states: "It is CCMD's view that State controls on commercial operators, research and public education will reduce foreseen impacts resulting from additional pressures brought about by implementation of the proposed action …"

These State controls are largely undefined, especially in the area of research and education.

This section is informed by whale shark expert, Brad Norman, who has intimate knowledge of the area off Maud's Landing.

Conclusion

Main Points

The EPBC ACT requirements not satisfied, blatantly incorrect information in PER, world Conservation Status-IUCN as well as Australian EPBC listed (Oct '01)

Finally, the socio-economic effect of this increase in private vessels has not been discussed. The whale shark ecotourism industry is worth in excess of $5 million to the region (Norman, 1999). No sharks = devastating economic impact.

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Personal Communication

Richard Todd, wildlife documentary maker, Australian Cameraman of the Year, and long-time, part-time Ningaloo resident:

"Altough this area is not the main area of dugong and whale shark aggregations, I have filmed them on numerous occasions in and around Cardabia Passage. Several dugongs and whale sharks have been filmed in different years which proves they return to this area for food and or breeding.

I have done thousands of interactions with the above mentioned wildlife over the past 10 years and one thing I know which is one hundred percent guaranteed, a large increase of boat traffic and or fishing numbers will result in these aggregations discontinuing to visit this very special place. Not only is this area around Maud's unique from the Ningaloo's perspective but it is also unique amongst the best of the world's underwater eco-systems. It is so precious that it is insane to even entertain the idea of any coastal development until proper studies into sustainable eco-tourism options are undertaken."

Whale Sharks		
Issue	**PER Reference**	**Issue with respect to adequacy of the PER**
Interactions with boats	Page 145–146 Evaluation	"Only CALM authorised and Licensed operators can interact with whale sharks." This is not the case.
Education	Page 146 Strategies and mitigation	"2. Ensure whale shark interaction activities do not impact wildlife, through education programs and liaison with charter operators". There is no mention of education of up to 120 private boat operators per day that may find and interact with whale sharks in the area.
Distance to interaction sites	Page 146 Evaluation	"Due to the distance to the interaction sites …..contact is principally with Licensed commercial boats". Whale sharks have been observed at the pylon ruins of the Maud's jetty. Up to 120 private vessels per day may attempt to find and interact with whale sharks in the immediate vicinity.
Predicted outcome	Page 146	"It is CCMD's view that State controls on commercial operators, research and public education will reduce foreseen impacts resulting from additional pressures brought about by implementation of the proposed action …" These State controls are largely undefined, especially in the area of research and education.

Dugong

Dugongs (or sea cows) are specialised marine mammals that feed on seagrasses. They have a very low reproductive rate. The maximum likely rate of increase of a dugong population is estimated at 5 per cent per year, if all the females in the population are breeding at their maximum potential. Thus, in order for numbers to be maintained, adult survivorship must be higher than 95 per cent each year. The maximum possible sustainable mortality rate of adult females killed by human activities is around 1 or 2 per cent (Great Barrier Reef Marine Park Authority, 2002).

On a global scale, the dugong is listed as 'vulnerable' on the *1996 IUCN Red List of Threatened Animals*. This means that this species is at 'high risk of extinction in the medium-term future'. Under the Queensland *Nature Conservation Act 1992* the dugong is also listed as 'vulnerable'.

There are several sources of pressure on dugong populations from human activities. These include mesh nets, shark nets, traditional hunting, boat strike, and habitat loss and degradation.

Habitat loss and degradation is an impact that can have disastrous effects on dugong populations. In particular, seagrass habitat is important as seagrasses are a primary food source for dugongs. Boat strike is considered to be a potential source of dugong mortality.

The dugong in Australia is listed in Appendix II of the Convention on International Trade in Endangered Species, whereas the dugong in the rest of the world is listed in Appendix I. While the restrictions on trade for species in Appendix II are not as strong as those for species in Appendix I, this listing does recognise the vulnerable status of the dugong.

The PER provides insufficient baseline data on dugong, including detailed information on populations, habitat and movements. Mitigation strategies are not described in detail and we believe it fails by a significant margin to reach the standards set by section 6 of the guidelines.

Dugong (Migratory)		
Issue	**PER Reference**	**Issue with respect to adequacy of the PER**
Uncertainty of dugong population status	page 6, para. 1 and Table 20, section 4.4.12 page 148 (Dugong/Ecological Value)	It is apparently not clear to which population(s) the dugong occuring in or transiting the potential impact area belong. This information is essential in assessing the importance of any adverse impacts (direct and indirect eg increased boating activity over time) of the proposed action on dugong. This is critical information given that only about 1, 000 occur in the area generally, and particularly as it is apparent from Table 20 that a number of "Small and scattered populations [of dugong] exist within state waters of the NMP"

		within state waters of the NMP".
Uncertainty of dugong movements	page 66, para 3	Data on movement of dugong in the vicinity of the proposed action is not presented. In addition, claims about movement of dugong generally in the Exmouth/Ningaloo area are based on unpublished data (Bowman, Bishaw and Gorham 1995). These data, essential in confirming population dynamics and hence identifying critical feeding habitats and behaviour in the vicinity of the proposed action, were not made available in accordance with EPBC Act guidelines. Hence it is not possible to assess their value and consequently the need for, nature and effectiveness of any mitigating strategies.
Residence of dugong in Bateman Bay	page 6, para. 2	"Dugong are generally not resident…" It is apparent therefore that dugong can be resident within Bateman Bay although no information is presented on their occurrence as residents (numbers, time and seasonality of occurrence, frequencies, residence times). This information is essential in assessing the importance of any adverse impacts from the proposed action on dugong.
	page 6, para. 6	"…dugong present are considered to be in transit…" Contradicts the above statement. Additionally, it appears that it is not known with certainty that the dugong are indeed in transit, and if so the extent of their migration. This information is essential in assessing the importance of any adverse impacts from the proposed action on dugong.
	page 62, para 6	Statements as to the "… the dugong's seasonal and itinerant nature…" in the vicinity of Maud's Landing are not established by any data or references presented in the PER yet is essential in assessing the importance of any adverse impacts from the action on dugong.
Reproductive importance of Bateman’s Bay habitat		The habitat requirements for Dugongs in Bateman Bay may include ecological factors (e.g. breeding and calving) other than the availability of seagrass. The habitat characteristics of Bateman’s Bay and the reproductive behaviour suggest that dugongs may utilise the area for breeding and calving purposes. Dugongs are known to seek shallow waters, estuaries, and reef tops for calving (Marsh et al. 1984). A dugong lek site is located along the Wooramel Bank in Shark Bay, a habitat similar to that of

		Bateman Bay. (Anderson 1997). Bateman's Bay is the only location where a shallow and sandy substrate occurs within a protected bay along this stretch of the Ningaloo Reef Tract. The female raises a calf only every 3-5 years. In a related situation (i.e. southern GBRMP), recent studies have shown that dugong numbers are declining. This has been "attributed to unsustainable mortality from human-related causes". With the proposed CCR, this will be even more likely to occur near Maud's.
Habitat requirements of dugong occurring in or transiting Bateman Bay	page 56 and Table 6 page 58 ("Sand")	Occurrence of seagrass habitat in Bateman Bay, including it's spatial extent as well as seasonal and long-term spatial and temporal variability is not able to be assessed, as adequate information is (i) apparently not available (eg no references were given as to long-term temporal variability), (ii) was not adequately presented even if available (eg Table 6 notes the potential for seasonal vegetation variability on sand substrates but provides no further assessable information), or (iii) relies on unpublished and therefore unassessable information (ATA Environmental 2000a, Bowman Bishaw Gorham 1995) or on publications of questionable scientific merit (eg CALM 1997, which far from being a scientific document on seagrass distribution is a checklist of birds for birdwatchers!). The occurrence, including seasonal and temporal, of seagrass habitat for dugong is critical in assessing the importance of Bateman Bay for this species and hence the importance of any adverse impacts from the action on dugong. The crucial importance of seagrasses for listed species is described in a separate section of this submission, entitled "Marine Flora."
	Table 20, section 4.4.12 page 148 (Dugong/ Background)	Only an assumption, and no evidence, is provided as to the relative importance to dugong of Bateman Bay seagrasses and "meadows to the north and south".
	page 6, para 2	Reference to the low spatial spread and biomass of seagrass in Bateman Bay is not backed by any data or published references and hence cannot be assessed for veracity. The occurrence and biomass,

		including seasonal and temporal, of seagrass habitat for dugong is clearly critical in assessing the importance of Bateman Bay for this species and hence the importance of any adverse impacts from the action on dugong.
	page 6, para 2	The spatial extent, density and biomass of seagrass necessary to support dugong, including on temporal and seasonal scales, is not provided. Such information is essential if the claim that Bateman's Bay is not important, apparently because it is below some threshold density of importance, is to be adequately assessed.
	page 62, paras. 5&6, page 65 para. 7 and page 6 para. 6	Halophila is considered important for dugong and is noted as present in seagrass communities in Bateman Bay, but no referenced indication of its extent or seasonal and temporal variability is provided or an indication of whether such information is available. As a potentially significant resource for dugong, access to information on the occurrence, including seasonal and temporal, of Halophila is essential in critically assessing the potential importance of Bateman Bay for dugong and their management. The crucial importance of seagrasses for listed species is also described in a separate section of this submission, entitled "Marine Flora."
Boatstrike	Table 20, section 4.4.12, p 149., page 6, para. 2	Verifiable data on boatstrikes on dugong is not provided (see "Background") and the reference (FWA 2000) provided in the PER to support the statement that boat collisions are "rare and unlikely" does not appear to comment on this issue. The PER thus fails to adequately assess boatstrike as a significant dugong impact, and in particular to consider the increased commercial and recreational boating activities associated with the proposed action in this regard (see Evaluation). This is particularly significant given the small dugong numbers known to occur in the marine park, and the possibility that more than one population "…exist within state waters of the NMP." No data or references are presented to substantiate frequency of ecotourism encounters with dugong in the lagoon, or to indicate frequency of boatstrikes (present or projected) with any increase in vessel activity arising as a consequence of the action. Both may be significant impacts on dugong

		arising as a consequence of the proposed action. Shark Bay is likely the only location in Western Australia where large numbers of dugongs interact with significant recreational and commercial vessel traffic. Although most interactions (e.g. collisions) are not recorded, anecdotal evidence from Shark Bay suggests that interactions in shallow waters (>10m) are relatively common, particularly over seagrass meadows (P. Anderson, personal communication). Dugong mortalities from boat strikes have occurred in many areas (Preen 1992). Dugongs appear to be very sensitive to disturbance from vessel traffic--they have been observed to swim rapidly away from approaching vessels when the vessels were 1 km away (Preen 1992). Manatees in Florida are struck with considerable frequency by recreational vessels, often fatally (Ackerman et al. 1995). Boating traffic in these areas is of a comparable intensity to that predicted for Batemans Bay. Management efforts for the dugong have recognised that management action focused on public education alone was insufficient to reduce the occurrence of boat strikes (Reynolds 2000). At present, there are few vessels operating in the region utilised by the dugong. However, with such an increase of vessels in the area this will be severely altered. Unfortunately, it cannot be ruled out that many recreational boat owners will 'chase' the elusive dugong – even if it is simply to catch a glimpse of this species in the wild. This will surely result in the dugongs leaving this important habitat. The proponent is missing the point that there will be a lower number of dugongs in the area as a result of the proposed CCR because these individuals will be 'scared' from the area. It will then be impossible to determine "IMPACTS". Again, reference is given to cetaceans and turtles, when in fact dugongs are being discussed. Fisheries WA is not the management agency responsible for assessing threats to marine mammals—CALM is. "The possibility of vessel strikes and harassment may increase as a result of the operation of

		additional boats". Based on experiences of similar places, quoted elsewhere, "may" should be replaced with "will." Furthermore, there is no evidence to support the following statement: "…this will be mitigated by a reduction in larger commercial vessels and potentially private vessels passing along the sensitive backreef areas between Point Maud and the barrier reef. "No significant disturbance to cetaceans in the park from human activities". In the first instance, a dugong is not a cetacean. Secondly, it is totally unachievable for the proponent to state that there will not be a significant disturbance to dugongs (as it should be) from an increase of 120 vessels in the dugong habitat per day. Finally, Mitigation strategies are inadequate, being dependent largely on education and record keeping of interactions. In addition, the performance measures are reliant on records of interactions with no assessment of the unreliability of such information, no short or long-term targets or indication of how any decline in dugong numbers would be associated in management terms with any activity associated with the action.
Regional significance of seagrass communities in the vicinity of Maud's Landing for dugong	Table 20, section 4.4.5, pages 130-133.	There is no basis for the conclusion (see "Background") that seagrass habitat in Bateman Bay is "…of limited regional significance…" for dugong, as this conclusion is based on assumptions and conclusions not substantiated (see above) in the PER ie (i) absence of reliable and verifiable data concerning the occurrence and occurrence variability of dugong in Bateman Bay, (ii) absence of certainty with respect to the status of populations of dugong occurring in Bateman Bay and their migration patterns, and (iii) absence of certainty about the occurrence, variability and importance of seagrass habitat for dugong in Bateman Bay

Potential indirect impacts of the action on dugong through impact on water quality and seagrass communities:		The PER is deficient in that the potential impact of increased or altered sedimentation associated with construction/maintenance activities and changed hydrology and coastal geomorphology is not considered as to its impact on potentially significant seagrass habitat for dugong. Consequently, no mitigation strategies are proposed. It is interesting to note that GBRMPA stated that "In the event of a significant die-off of seagrass on the Great Barrier Reef, whether from disease or any other factor, there is no apparent management action which could redress the situation." (GBRMPA, 2002).
Sedimentation		The problem of sedimentation for dugong habitats has been identified on other reef systems, such as the Great Barrier Reef. GBRMPA (2002) stated that the "actual or potential loss of the dugong's seagrass feeding habitat is potentially the most significant issue for the long-term survival prospects of dugongs in the southern Great Barrier Reef." Furthermore, "Dugongs are important in maintaining the health of seagrass meadows." (GBRMPA, 2002).
Potential indirect impacts of the action on dugong through impact on water quality and seagrass communities: groundwater	Sections 3.1.5 "Hydrology"	Although groundwater is identified as a potential impact on seagrasses and may result from the action (see "Existing and Potential Pressures ", Table 20, section 4.4.5, page 131), it is noted that "…a detailed hydrological study has never been undertaken in the site area…" (see page 44) and that information referenced with respect to groundwater quality and movement in the Maud's Landing vicinity is contained in unpublished reports (Rockwater 1994, 2000; Woodward-Clyde 1993) unavailable for scrutiny. Consequently it is impossible to adequately assess the potential impact of "groundwater discharges of nutrients and pesticides" on lagoonal water quality and hence seagrass habitat important, or potentially important, for dugong in Bateman Bay.
	page 37 (Wastewater treatment and disposal). page 38 (Refuse disposal) and page 39 (Stormwater	Potential for groundwater contamination from wastewater ponds, landfill and stormwater runoff - and hence impact on coastal water quality and seagrass habitat for dugong - is not adequately addressed or able to be assessed in light of the absence of detailed information on the hydrology of the area (see page 44) and unavailability of any published reports on groundwater quality and movement in the Maud's Landing vicinity (i.e. contained only in unpublished reports by Rockwater [1994, 2000] and Woodward-Clyde [1993])

	(Stormwater management)	In this regard it is also not clear whether treatment facilities will contain sealers to act as physical barriers to movement to groundwater. If so the PER should consider the risk of sealer breach.
	Table 20, section 4.4.5	Although identified as a potential impact on seagrasses resulting from the action (see " Existing and Potential Pressures"), groundwater discharges of nutrients and pesticides are not evaluated (see "Evaluation) in terms of potential impacts on lagoonal water quality and hence seagrass habitat important, or potentially important, for dugong in Bateman Bay. Additionally, no mitigation strategies for such an occurrence are identified in terms of achieving the stated performance indicator. It is also not stated how any link between loss of seagrass and groundwater quality would be established in terms of acting as a management trigger.
	Table 20, section 4.4.4	Groundwater contamination is not considered in relation to water quality and hence to matters of national environmental significance such as dugong habitat in Bateman Bay. Issues regarding groundwater are discussed in a separate section.
	Appendix 10	No risk analysis of the potential for groundwater pollution impacts on seagrass habitat is presented. This appears to be based on some unsubstantiated assumption that strategies to be put in place will be satisfactory. In fact the risk analysis acknowledges that superficial groundwater quality is not known and that monitoring for this purpose is only now to begin.
Threats from the marina environment, including shark netting		There have been many cases in Florida of manatees travelling great distances up channels and getting beached. If dugongs were to enter the proposed marina, they could be affected by polluted water, boat traffic and the shark netting. GRMPA (2002) identifies "…shark nets set for bather protection…" as one of the leading causes of factors causing decline in numbers, contributing to the unsustainable level of mortality. These issues have not been addressed in the PER.

Personal communication. from local tour operator

Peter Shaw, Melissa Zerbe (Tour Operators)

I've seen large numbers dugongs , up to 20 at one particular time in the one are, just inside the north passage on the south side. We visit this area frequently on tours to observe the turtles of the area. It appears that the dugongs enter the bay when the temperature drops down to 19degrees and they remain in the area up to 3 months. In eight years of operation I have witnessed at least 4 seasons in which the dugongs present in such numbers, however they are observed on a yearly basis throughout Bateman Bay. Another particular area in which these mammals are observed is just south of Oyser Bridge. The sightings here are consistant indication the presence of a feeding ground. On one particular tour I took out Banksia productions who were looking for footage of dugongs in clear waters. Footage of the dugongs were obtained for this production company and used in the documentary 'Sirens of the Sea'. The production crew pointed out to me that the dugongs that they had observed at this particular location were extremely skinny in comparison to those in which they had encountered on the East coast. On closer observation I realised that the backbone of these mammals were clearly obvious. These dugongs were witnessed to be feeding on halophila ovalis, a type of seagrass which is frequently observed within the bay.

The uniqueness of Coral bay is really based on the diversity of creatures that we have here We haven't got a lot of one species but what we have got needs to really be looked after as each one makes up the system in which the continuation of this reef depends on.

Ningaloo Experience References

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Birds

Matter of National Significance: Migratory species subject to the JAMBA CAMBA Agreement and/or the Bonn Convention.

Asiatic Common Tern, Sterna hirundo longipennis

The Common Tern (as *Sterna hirundo*) is listed in the Annexes of all three treaties.

Plate 1 Mixed tern flock dominated by *Sterna hirundo longipennis*. Bateman's Bay in background

Baseline Data

The proponent has apparently done no work on the migratory birds that utilize the sandy beach and spit habitat of Bill's Bay, Point Maud and Bateman's Bay. These seems to be a negligent approach given that these habitats are not replicated anywhere else in the southern sector of Ningaloo Reef and were likely to be of regional significance to some migratory seabirds or shorebirds. A number of statements and omissions in relation to migratory birds may warrant attention under Division 17, Section 489 of the EPBC Act 1999.

The proponents reproduce some data in Table 5 that appears to have been collected by the Exmouth District Office of CALM (however Meyer 2001 was, along with all other unpublished sources, not available to the public at the DEP library).

On 12 December the sandy shoreline, between the Coral Bay settlement and Maud's Landing was surveyed by marine ornithologist Dr J.N. Dunlop. This survey located very large, mixed flocks of terns (Plate 1). One single flock north of Point Maud was estimated at around 3000 individuals, with as many as 5000 between Bill's Bay and 200m north of the old Maud's Landing jetty posts (Plate 2). Close examination of these flocks using a spotting telescope indicated that about 90 % were Asiatic Common Terns (*Sterna hirundo longipennis*). The remainder, in order of abundance, were Roseate Terns (*Sterna dougallii*),

Lesser Crested Terns (*Sterna bengalensis*), Capian Terns (*Sterna caspia)* and Crested Terns (*Sterna bergii).*

Plate 2 Common Tern flock with Maud's Landing jetty posts in background.

Some sandy shoreline shorebirds that were not recorded in the CALM data were also present, these included Red-capped Plovers (about 30), Red-necked Stints *Calidris ruficollis* (29), Grey Plover *Pluvialis squatarola* (1) Large Sand Plovers *Charadrius leshenaultii* (5) and Mongolian Plovers *Charadrius mongolus* (2).

The CALM data presented by the consultant's Shows counts of 3000– 4000 Common Terns in Feb and March 2001. The 1710 "Lesser Crested Terns" reported for February 2000 may also have been misidentified Common Terns as the small breeding population of Lesser Crested Terns in WA are unlikely to account for aggregations of this size. In February 1991 there was another significant count of 800 Common Terns. The recent observations in mid-December suggest that large numbers of Common Terns utilize the area over most of the summer period. Some Coral Bay charter operators also mentioned that the tern aggregations were present all summer and were at their largest during periods of persistent strong winds.

The proponent does not comment on the size of these migratory flocks and has made no attempt to ascertain their significance in terms of the population of Asiatic Common Terns. The respondents have searched the literature (Johnstone & Storr 1998, Serventy & Whittell 1976, Burbidge, Johnstone & Fuller 1996) and made various enquiries to the WA Museum (R.E. Johnstone pers.comm.) and Birds Australia (Dr Mike Bamford of WA Wader Study Group personal communication., Chris Hassell of Broome Bird Observatory) in an attempt to get an appropriate perspective. These enquiries suggest that the aggregations recorded at Point Maud and in Bateman's Bay are the largest and most persistent in Western Australia. Other very large flocks (e.g., Cargill Salt Ponds in Port Hedland, Broome area) of up to 3000 have only been recorded at the beginning and end of summer and are thought to be arrival and pre-exodus amalgamations of migrating flocks. Elsewhere the largest flocks tend to be of 200-300 individuals roosting on sheltered beaches, mud-banks or salt bonds close to sheltered marine habitats.

Flocks of up to 400 have been observed feeding over Mackerel Tuna in sheltered waters of Nickol Bay and within the Dampier Archipelago (J.N. Dunlop pers.obs.).

It is highly probable that the sandy beaches of the project area are a central roost / loafing area for a large aggregation of Common Terns utilizing the sheltered lagoon waters available in the southern part of Ningaloo Reef. Wintering aggregations of the size observed are likely to be of significance to the world population of Asiatic Common Terns.

Impacts & Interactions

The Point Maud spit and the sandy beaches of Bateman's Bay are the main sandy shorelines in the southern sector of Ningaloo Reef. These areas appear to be of minor importance to migratory shorebirds but are probably a key wintering roost habitat for the Asiatic Common Tern. The foraging opportunities and energetics of the wintering area may be crucial in the maintenance of migratory bird populations.

The two most likely impacts on wintering Common Terns in the area would be:

(a) **Substantial habitat modification** due to interference with the local sand cycle from the construction of the marina breakwater and,

(b) **Disruption of feeding, resting and migratory (energetic) components of the lifecycle** from increased public use of the beach between Point Maud and Maud's Landing.

The proponent has done no investigations of long-shore currents or sand movement in the Point Maud – Bateman's Bay system, relying entirely on extrapolation from other studies and models (see Section xx of this submission). The history of engineering predictions with respect to groynes and other rock-wall structures in WA are such that one can have little confidence in this proponent's assertions about changes in coastal processes.

In north-western Australia extreme events (i.e. Tropical Cyclones) have a significant role in shaping shorelines. The major impacts on the sand cycle are likely to occur under summer (north-easterly or cyclonic) conditions. The erosion of the beach west of the break-walls and of Point Maud itself remains a distinct possibility. This is the major habitat area utilized by the wintering flocks of Common Terns.

The beach from the break-wall to Point Maud will effectively become the main beach for a new town with up to 2500 live in residents plus day visitors. The situation will change from intermittent disturbance to a situation where people will be disturbing resting flocks more or less continuously. This may have serious implications for the energetics of the wintering terns and reduce survival rates particularly on the return migration.

Proponent's Management Responses

The proponent claims that the development will shift human activity away from Point Maud and therefore reduce disturbance to the roosting birds. However our survey suggests that the preferred roost area extends well into Bateman's Bay and includes the beach at Maud's landing. This beach will be the main front beach for the resort as it is more sheltered from the strong southerlies. The development will almost certainly increase the number of people using the beaches including those around Point Maud. The only measure that may be effective in reducing these increased disturbance impacts would be the seasonal closure of the beach from Point Maud to Maud's Landing between November and April. Closure's of this nature would make the resort fairly unattractive to its potential clientele.

The proponent does not acknowledge that the shoreline south of the marina could be extensively modified by the breakwaters constructed to protect the entrance.

References

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EPBC listed migratory birds		
Issue	**PER Reference**	**Issue with respect to adequacy of the PER**
Occurrence of listed species in the vicinity of the action (marine and terrestrial)	page 50, last para.; Table 4; list provided page 53; page 44, last para.; Table 9; Table 20, section 4.4.6	Occurrence (abundance, distribution, frequency) of listed species is unassessable as it is based on either unpublished information (ecologia1994) or personnal communications (Meyer 2001) and not on peer reviewed or generally available information open to scrutiny for validity, scientific credibility and experimental design. It is not possible on this basis to exclude the occurrence of any listed bird species or to have confidence in estimates of numbers occurring in the vicinity of the action at any particular time. Some uncertainty about identification of some species is apparent, but its relevance not discusssed.

	page 53, last para.	Data proposed to be provided in the final PER is unassessable now, and will be unlikely to contribute substantially to the dearth of information on listed bird occurrence particularly with respect to the seasonal and temporal variability. Such information is essential in assessing the importance of the area and hence importance of impacts of the proposed development on these EPBC matters of significance.
	Table 5	The accuracy of the data provided is unassessable as it is based on a personal communication (Meyer 2001) and not supported by any objective measure of how the information was collected and how comprehensive the data is in terms of reflecting occurrence, distribution and abundance. This failing is exemplified in the data which is presented, which shows marked temporal variability for some species despite the limited and inadequate survey described.
Impacts and mitigation	Table 20, section 4.4.6	The PER does not provide an adequate assessment of the importance, known or potential, of the site in terms of EPBC considerations of migratory birds. Hence it is not possible to adequately assess the impact of the action on migratory birds or the potential effectiveness of mitigation strategies.
Bird disturbance	Table 20, section 4.4.6	The PER seems to rely on public education to mitigate any impacts from increasing human disturbance in the area on roosting/loafing sites in the vicinity of the action. There is no evidence provided that this will be effective.
		Given that occurrence data for listed migratory birds in the vicinity of the action is essentially absent in any meaningful way, it is not clear how the stated performance measures can be used to correlate the impact of the proposed development on bird occurrence in terms of deciding responsibility and triggering management actions.
Pollution impacts on habitat	page 51	The importance of hypersaline soaks for listed birds, including the diversity and abundance of species using such sites, is not supported by any rigorous published and available report. Hence the potential impact on habitat of listed birds of any surface water and groundwater contamination, resulting from the action, cannot be established from the PER.

Seabird Species Observed In Commonwealth Waters And EEZ Off Ningaloo Reef

Information from the Murdoch University Seabird Research Group pelagic database

Species Probable	**Local Status**
Yellow-nosed Albatross	Uncommon winter visitor
Streaked Shearwater*	Common summer visitor
Hutton's Shearwater	Common passage migrant
Wedge-tailed Shearwater*	Abundant summer breeding species
Bulwer's Petrel	Scarce summer visitor
Wilson's Storm Petrel*	Common passage migrant
White-tailed Tropicbird*	(including *fulvus* form) Scarce summer visitor
White-winged Tern*	Uncommon summer visitor
Asiatic Common Tern*	Common summer visitor
Roseate Tern	Uncommon breeding resident
Sooty Tern	Uncommon breeding passage migrant
Bridled Tern*	Common breeding passage migrant
Crested Tern	Common breeding resident
Lesser Crested Tern*	Uncommon breeding resident

Fairy Tern#	Uncommon breeding resident
Common Noddy*	Common breeding passage migrant

*Listed under migratory birds agreement or Bonn Convention

Listed as Threatened Species (EPBC Act)

Manta Rays

Manta rays are not listed vulnerable and threatened species, however they are very important to the ecology and economy of the area and should, we argue, be considered in any development assessments in the area.

The occurrence of manta rays in southern Bateman Bay is well documented and although no research of manta rays has been carried out for this PER, it is evident that these species is integral to the immediate area. In the vicinity all year round, mantas are associated with the southern Bateman Bay lagoon by local Aboriginal people (Preest, Personal Communication 2002)

> "I have been leading Manta Ray swims in Coral Bay for the past 3 years for Coral Bay Dive Centre.
>
> I have found that 70-80% of the time they travel up and down close to the waters edge along the beach between Point Maud and The Lagoon and quite often near the Pilons. They are usually just below the surface or on the surface swimming slowly looking for plankton rich areas to feed.
>
> It is common to see them feeding in this area either in pods up to 5 or 6 or on their own.
>
> I have recognised seeing the same Manta rays time and time again (from different markings).
>
> I have also seen a few Dugongs along this stretch of beach in my time, so I feel that an increase in boats etc. would be a huge threat to these animals and have devastating consequences." (Pers. Comm Karina Mitchell 11-01-02)

These manta rays are known to be feeding and mating inn this area and there is strong likelihood of females pupping here also. Mantas are highly vulnerable to changes in habitat and food supply. They are also highly vulnerable to disturbance by boasting traffic.

> In September 2000 after 6 years of swimming with Manta Rays witnessing their courting, I finally got to see them mate. There was two males after one female. Finally one of the males overpowered the female placed it's mouth around her left wing and closed its mouth to hold her in place joint together their bellies came together, She could not swim away and it all happened with photo evidence and all if the customers witnessing. Today they still court. We have seen some very strong

> activity 2 weeks ago to suggest it happened again. Will be forwarding the photos on to all those making decisions. (Hunt, Personal Communication,2002)

The Public Environment Review incorrectly states that "manta rays are most often encountered immediately outside Ningaloo reef"(p 75 Nov 2001, PER). This is an obvious error because local eco-tour operators, who are reliant on the occurrence of manta rays, have mapped the regular occurrence of manta rays, finding them to be most common in the lagoon formed by Ningaloo reef and notably close to the proposed Coral Coast Resort (CCR). (Norman, Personal Communication 2002). This information is contrary to the PER’s cited but limited aerial surveys of Bateman Bay.

It is inevitable that if the proposed CCR development goes ahead it would be detrimental to the valuable manta ray population in the area. While manta rays exist in healthy numbers worldwide they are noted for their tendency to disappear from areas which are impacted by boating fishing etc (Brad Norman Personal Communication, 2002). The increased boating numbers within the coastal waters of Bateman Bay will cause the greatest contraindication to this population due to boat strikes and avoidance behaviour. The behaviour displayed by this species whilst feeding and migrating is on the surface of the water, making them vulnerable to propeller injuries and resultant mortalities.

This surface dwelling behaviour will result in increased interactions with swimmers due to the number of recreational vessels having ‘chance encounters’. At present this disturbance is minimal due to the control of commercial operators holding licences to undertake Manta ray swim interaction. It would be impossible for the management agency to adequately manage human interactions with the Manta ray population. (Brad Norman, Personal Communication, 2002). There is currently no management plan for human/Manta interactions.

The State PER itself reports that Manta rays are known to move away from vessels. With the increase of 120 vessels per day in the area used by the manta rays for feeding and possible breeding the local manta ray population could decrease dramatically over a very short time.(Brad Norman, pers.com, 2002.) This vulnerability is due to their large size, reliance on small planktonic animals for food, their low birth rate and small litter size. (Rubin 2002)

The manta rays that frequent southern Bateman Bay are likely to be attracted to the increased productivity of this particular lagoon which is directly resultant upon the organisms which inhabit the reef structure. A direct loss in localised coral reefs, seagrasses and other organisms due to sedimentation and other anthropogenic stresses brought about by the proposed development may therefore result in a decline in the numbers of Rays which frequent this location.

Although the Manta ray species is not a threatened species it is evident that it is a valuable species to the Ningaloo area in an economic as well as an environmental sense. The eco-tourism industry which has developed around ‘Manta swims’ has become an important element of the local economy. The loss of the Manta ray population in this area would not only decrease the economic benefits from eco-tourism in the area but also reduce the potential for knowledge to be gained in regards to their population ecology,

use of critical habitats, their reproduction and their migratory movements.

> My concern is that the increased boating traffic will result in damage to the reef due to the impacts due to prop scour.
>
> I have worked as the skipper for a tour company in Coral Bay now since 1997 and have been a part of numerous Manta tours. Already the effects of increased boating pressures have been seen resulting in timid behaviours of the rays. I believe with further boating pressures, the manta rays will vacate the bay. The majority of the Rays in which our tours used were just south of the pylons or out the front of the old ruins which are maked with the palm tree.
>
> (Hill, Glenn ,Personal Communication, 2002,Tour Operator and Commercial Fisherman)

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Hill, Glenn ,Personal Communication, 2002 Tour Operator and Commercial Fisherman

Hunt, Yasmin Personal Communication, 2002 ,Coral Bay eco-tour operator

Norman, Brad, Personal Communication, 2002, Whale shark expert who has highly detailed understanding of the area,

Preest, Ann, Personal Communication, 2002

Dr. Robert D Rubin, Department of Biology, Santa Rosa Jr. College, USA, Accessed on the World Wild Web, 02/01/02

http://www.on-the-edge.com/MantaNet/manta_research.html)

Corals

The PER has identified two regions of significant coral diversity at both Bills Bay and Stanley Pool. Although these areas are not within Commonwealth waters, the impact upon these communities by the proposed development must be considered. The feeding behaviours of *Rhincodon typus* and the maintainence of the biodiversity of this region.

Rhincodon typus are attracted to the NMP between the months of Feb-July due to the increased planktonic productivity within this area. (Norman, 1999).

This increased planktonic productivity is resultant of abundant food sources becoming available due to numerous reef inhabitants undergoing a synchronised spawning for example polycheate worms, alcyonarians, various species of mollusca, Echinodermata and possibly krill (Marsh 1998, Simpson 1991, Taylor, 1994).

The coral species within the identified areas provide the framework for the habitat of such reef inhabitants. Anthropogenic pressures could decrease the fecundity of the spawning species, which could ultimately result in a decline in planktonic productivity. Therefore loss of corals due to anthropogenic pressures could ultimately result in a decline in the productivity of this localised area due to the decreased fecundity of the spawning species.

R.typus have been directly observed suction feeding on coral spawn and is considered to provide a concentrated source of protein (Norman, 1999). Therefor a decline in coral spawn will result in the loss of feeding opportunities for *R. typus*.

In addition to the disruption of feeding behaviours the impacts of such stress may result in a localised decline of which ultimately will affect ecotourism opportunities as well as a loss of local species diversity.

Gilmour (1999) undertook an investigation on suspended sediments on fertilisation, larval survival and settlement on corals of this area in 1997 in Coral Bay. The levels of suspended sediments in this investigation were to mirror those typical of dredging activities. It was found that in regard to the sclerectian corals that occur in Coral Bay that:

* Both high and low sediment treatments significantly decreased fertilisation

* Larval survival and larval settlement were significantly reduced in high and low sediment treatments.

* Given that many coral communities are open reproductive systems the consequence of disturbance events are not likely to be restricted to the impact area.

* Recruitment to a population may be reduced significantly in the presence of high levels of suspended sediments because of effects on larval survival and settlement.

* Recruitment of larvae to adjacent populations may also be affected due to a decreased fertilisation success and potential increases in mortality of larvae passing through the affected site

* Increased sedimentation has been found to affect growth, metabolism and fecundity in experiments on individual colonies

(Bak 1978; Rice and Hunter 1992, Miller and Cruise 1995; Gilmour 1999).

* Decreased coral growth rates have been found to result from decreased light levels available to corals due to sedimentation from dredging. (Bak 1978, Howard 1985, Rogers 1990). It would seem appropriate that more detailed and accurate data be obtained for the oceanographic characteristics of this region.

Coral Communities: Other Issues		
Issue	**PER Reference**	**Issue with respect to adequacy of the PER**
Biodiversity	Page 61 ….This community is the largest lagoonal coral assemblage along the Ningaloo Reef tract…(BBG 1995)	Ecological Value: The dominant species within Bills Bay and Acropora and Montipora, both of which are considered to tbe the most important for the structural framework of the reef itself (Veron 2000). The importance of these species from within Bills Bay recruiting other areas along the Ningaloo Tract cannot be overlooked and as little is known of the distribution of spawn from Bills Bay, and increased pressure on the community may result in a decline in population both at Bills Bay and surrounding regions.
	Page 61 …The coral reef on the inner edge of Stanley Pool…is possibly unique on the Ningaloo Reef Tract….highly diverse coral fauna..	Ecological Value: The coral colony at Stanley Pool shows the greatest diversity of corals per unit area surveyed to date on the Ningaloo Tract. As the importance of this area in regards to recruitment to surrounding areas as well as the fact that the rate of recruitment survival at this site is unknown it would be inappropriate to expose such a fragile habitat to potential risk of species loss without further baseline data of the
Sedimentation	Page 136 Disturbance to coral reef systems range from trivial…to significant regional and global scale episodes caused by..large scale sedimentation…	The dredging activities, which are required to maintain the marina, will result in the resuspension of sediments into the water column. This sediment plume , according to the proponent, will reach a distance of 5km north of the marina. As the oceanographic surveys for this development are limited and what data is available has been derived from poor survey techniques (2 surface drogues), it cannot be assured that this plume will not reach the coral community at Stanley Pool (9km north) Should the plume ever reach this region the effects upon this community would be devastating.
	Page 137 'Larger boats may increase	The PER has failed to address a proposed management strategies for dealing with the consequence of sediments brought about by large commercial vessels visiting the coral communities at both Bills Bay and Stanley Pool

	suspended sediments..'	Bay and Stanley Pool.
Heavy metals within sediments	Page 50 The results of heavy metal and organotim analyses indicated elevated levels of arsenic, chromium, iron, manganese and zinc relative to other sites at Maud's Landing..	The concentrations of the heavy metals within the sediments of Maud's have been somewhat underplayed by the Proponents of the Development. The sediment survey from which baseline data was obtained stated, ' The two control sites off Maud's Landing provided some interesting results in that the concentrations of arsenic, chromium, iron, manganese and zinc were considerably higher than most other comparable sites. These results are surprising in that this area is probably the most 'exposed' of all the sites and, as such, the sediment is likely to be more mobile and therefore less likely to accumulate heavy metals.'(DEP 1995) The proponents have failed to undertake the recommendation put forward by the Department of Environmental Protection by conducting a brief survey and by omitting the results of the heavy metal concentrations at the sites identified by the DEP (M23). This is of great concern due to the possibility of the resuspension of sediments containing heavy metals into the surrounding waters resulting from dredging activities with the risks of such substances being accumulated in benthic organisms. The reasoning for the omission of sediment samples closest to the marina should be brought to the public's attention.
Eutrophication	Page 137 Potential uses and or pressures: 4. Diffuse and point source pollution such as nutrient discharges.	There is potential for eutrophication of coastal waters surrounding the marina due to seepage from ground water (resultant from storm runoff into salt lakes behind proposed development), sewage leakage, and mixing with nutrient rich marina waters. An increase in nutrients within the water column will enhance the growth of other reef organisms such an macro algae and sponges these may out compete the corals for space on crowded reefs. An increased turbidity resultant of increased eutrophication decreases the amounts of light reaching corals and may cause bleaching or mortality of affected communities (Brown and Ogden, 1993)
Increased Maritime activities	Page 137 The action (development) will result in both an increase in the number of people in Coral Bay…and	ANCHOR DAMAGE: An increase in recreational boat usage with the proposed development will ultimately lead to an increase in anchor damage to coral communities. The development will open up coastal areas to the north which have up until now not had the impacts of recreational divers and fishers due to the isolation. The areas (ie. Stanley Pool) would become targeted by such users due to the calm inshore waters and the variability in topography making ideal fishing and diving areas. Should anchorage be allowed within this area a loss of species diversity would be experienced due to

	accordingly those wishing to recreate within the shallow lagoonal areas…	the presence of fine branching species. This community should be granted maximum protection to prevent any damage from occurring. The PER has failed to identify this risk which ultimately undermines the stated management objective.
	Page 140 The major potential pressures on the diversity and abundance of non – target finfish in the NMT are incidental extraction by commercial and recreational fishing activities	The depletion of grazing fish due to increased recreational fishing pressures may lead to a phase shift to an algal dominated reef system which will eventually out compete existing coral for light resulting in the mortality of the coral communities.

Summary

- Changes in the environment which affect the symbiotic association (nutrient levels, light and sediments) will affect coral nutrition, metabolism and calcification, and hence, the entire reef community
- Coral reef organisms are considered stenotypic exhibiting a relatively narrow range of tolerances to environmental condition. Therefor small changes in environmental quality can affect critical biological processes.
- While levels of stress may be sublethal to adult coral colonies they may be sufficient to cause reproductive and recruitment failure on nearby and distant reefs.
- Tumors, bacterial attack and parasitic worms have been observed in areas where corals have been stressed by sediment, sewage, pesticides heavy metals and other human impacts.(Mitchell and Chet 1975, Brown and Howard 1985, Glynn *etal* 1975)

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Fish

It has been identified that the regional waters in which the proposed marina development is to occur includes an interesting mix of tropical, and sub-tropical species (PER 2001). The PER further states that the impacts arising from implementation of the proposed action may impact on Commonwealth marine waters , by increasing the fishing pressure on bottom dwelling species of ecological importance to species of National Ecological Significance that occur within the area of potential impact.

The PER however fails to recognise this importance in both the management objective as well as the short and long term targets, which have been aimed at non target fish species and protection of the sanctuary fish habitat. This management outlook clearly leaves the targeted fish species vulnerable to stock depletion due to the projected increase in recreational fishing pressures associated with the proposed development.

There has already been a significant reduction in the catch per unit effort for the most targeted recreational fish species in the Coral Bay Region and will continue as the number of fishers increases to the point where it is no-longer worthwhile for most fishers (Jim Penn, Fisheries WA). Education will play a minor role in securing present fish stocks due to the effort increase to obtain determined bag limits. Only further local closures (expanded sanctuary zones) could counteract these impacts. The resort is likely to establish a new base to exploit pelagic gamefish stocks in both the State and Commonwealth Areas. AFMA does not at present regulate the take of tuna and billfish by recreational fishers.

As the recreational fishing pressure jumps to a new level there will be a commensurate bycatch of non-target and protected fish species including the potato cod *Epinephelus tukula*. This mega-predator feeds on a wide variety of reef dwellers, such as small rays, crabs, fish and spiny lobsters. Its large size and inquisitive behaviour towards intruders have meant that this territorial fish is an easy quarry for spear and line fishers (Fisheries WA).

Fisheries WA state that other species of cod are similarly vulnerable when they reach a large size. They also statethat these fish are the most important to the breeding population.

The PER states that there 'will be no significant impacts on Commonwealth marine area. This contradicts its self in the following phrase by stating that increased fishing will occur in this region. It is the increased fishing activites that will directly be responsible for the significant impacts in this area.

Public Education will not prevent the loss of fish stocks should the proposed development go ahead. Loss of fish stocks will occur despite enforced bag limits due to an overall increase in the recreational fishing effort. Increased fishing technology resulting in increased catch efficiency will lead to reduction in fish stock numbers.

Other issues in regards to the management of the fish stocks located within the regional waters of Coral bay which we believe the PER does not adequately address or address at include the following:

- Increased fishing technology will lead to increased catch efficiency and the ability to increase overall fishing effort.
- The ramp to be installed by the proponents will make recreational fishing more accesable to the general public and difficult to monitor total catches from recreational vessels.
- Importance of the seagrass meadows in Bateman Bay as a recruitment habitat for juveniles
- Removal of fish species which prey on coral predators example (*Drupella cornus*)
- Increased wastes entering waters (bait bags), resulting in increased ingestion from turtles and other such organisms.
- Increased shore based pressures resulting in increased 4wd tracks resulting in dune degradation
- Increase in demand for fishing charters (resulting in the loss of prized fish from commonwealth waters).
- Entanglement in fishing line and tackle for seabirds.
- Loss of feeding resources for seabirds.
- Loss of trophic level due to targeting of particular species.
- Local depletion of certain prize fish.
- Loss of fish = decline in water quality.
- Management procedures not made clear.
- Implementing moorings may result in localised depletion of stock however anchorage will result in potential harm to benthic organisms.

Terrestrial Fauna

The fauna habitats and species assessment for the Maud's Landing proposal area have drawn on the ecologia (1994) public document. This document has serious scientific short comings. The report notes that no field work was undertaken and hence no site specific information exists for the project area (ecologia, 1994).

We note that fauna survey was limited to a literature review, the extent of this literature review was extremely limited. Misleadingly the proponent claims "…fauna habitats and species likely to occur have been assessed during preparation of a Western Australian public assessment document (ecologia, 1994)," (p 50 Commonwealth, PER document). Close analysis of the information provided by ecologia indicates that their work was based solely on a literature review.

It is essential that a full fauna survey be conducted. This survey needs to be conducted to recognised fauna survey standards. This information should seek to develop baseline data that can be used for a series of fauna surveys that would be conducted following a succession of seasonal changes, climatic events and fire events.

In view of the fauna values of the Cape Range area, which include the stygofauna of the area, it is essential that all surveys encompass soil micro-organisms and invertebrate species and be carried out on the proposal site.

Given the presence of saline ecosystems in the proposal area it is essential that this type of ecosystem be given special attention in any future survey work. In Western Australia it is frequently the case that salina have high levels of aquatic invertebrate endemnism.

The proponent claims that the project area is unlikely to contain regional endemics or locally restricted species (p12, ecologia, 1994). Given the absence of real survey data this is an unrealistic claim. No approval should be given to this proposal until adequate surveys have been undertaken.

The proponents attention is drawn to the letter that the Department of Conservation and Land Mangement's Daryl Moncrieff sent to the CCMD's Shaun Grein (Appendix 15 of WA PER). This letter highlighted that it would be inappropriate to draw any concrete conclusions about the mamal fauna from this limited data.

Management Of Fauna Issues

Introduced Species

Feral animals such as cats, foxes, house mice and rabbits are attracted to disturbed environments, such as a resort development. It is essential that a management plan be in place to address this potential problem. Without such a plan the intrusion of the resort could add further pressure to native species occuring in the area. This pressure would be in the form of predation, competition and other habitat constraints.

Native Species

Native populations currently in the area would be severly impacted upon through the presence of the resort and marina. Given the nature of the proposed resort and its emphasis on ecotourism it would seem appropriate that native species be managed to ensure a harmonious interaction between animals and humans. For this reason it is essential that a management plan be devised for all native species found to be in the area following adequate surveying.

Such a management plan for native species should detail how aspects of the resort, such as lawns, vehicle traffic, litter and additional water points, will be designed to reduce negative impact.

Vegetation And Flora

Terrestrial Environment

Background

The vegetation of the Ningaloo area is a unique mix of Western Australia's tropical and temperate floras. It is to be noted that 630 taxa of vascular plants have been recorded in the area. The flora is dominated by desertic elements of both a temperate and tropical nature (Keighery and Gibson 1993).

Inadequate Survey Of Annual Species

The principal flora families in the area are rich in annual species. Annuals are a major component of the flora of most arid areas. It is of particular concern that the consultant botanist has reported that the brief survey of the area was undertaken at a time that was not conducive to the presence of annual species. The consultant botanist has reported that "…the number of annual species recorded was low due to a lack of sufficient rain prior to the survey to promote growth of these species," (Trudgen 1994, p 9).

It is important to compare the survey results produced by the proponents with survey results produced by other botanists who have worked in the area. While it is acknowledged that the Keighery & Gibson survey (1993) was done over a larger area, which included a greater range of habitat types, this does not satisfactorily explain why the Trudgen survey only found 17 % of the species found by Keighery and Gibson.

Family	Keighery & Gibson	Trudgen	Percentage of species found by Trudgen relative to Keighery & Gibson
Amaranthaceae	21		0 %
Asteraceae	51	12	24 %
Chenopodiaceae	26	15	58 %
Goodeniaceae	26	8	31 %
Malvaceae	31	5	16 %
Myrtacea	24		0 %

Papilionaceae	47		0 %
Poaceae	75	12	16 %
	301	**52**	17 %
	630	**106**	17 %

Table Showing the relative species identification success rates of surveys by Keighery & Gibson and by Trudgen.

Lack of representation in conservation reserves

According to vegetation mapping by J S Beard (1975) the vegetation type for the proposal area is 'Hummock grasslands, shrub-steppe; kanji over *Triodia pungens* and *Triodia basedowii'*. Analysis by Hopkins *et al* (1996) indicates that only 1.2% of the original areal extent of this vegetation type is contained in IUCN reserves, categories I – IV (In Western Australia IUCN recognised reserves in categories I – IV are National Parks, Nature Reserves, Conservation Parks, Marine Nature Reserves).

Given the exceptionally low level of representation of 'Hummock grasslands, shrub-steppe; kanji over *Triodia pungens* and *Triodia basedowii'* in conservation reserves, it is unacceptable that a proposal that involves the destruction of this vegetation type be allowed.

Native vegetation should be retained if it includes vegetation communities not well conserved in the region compared with the original cover as represented in the Interim Biographical Representation in Australia (IBRA).

It should be noted that any destruction of native vegetation in this area for the development of a marina is likely to have a negative impact on nature conservation (biodiversity) values.

Survey methodology

It is to be expected that a comprehensive floristic survey would indicate that there is a high turnover of species across the landscape in the proposed development area. A thorough survey should be conducted following a range of climatic and fire events. Such a survey is likely to show that survey points across the landscape will have a high level of turnover. It is to be expected that survey points 0.5 km apart would have a minimum of 30 % turnover. This issue has not been discussed in the survey report.

It is acknowledged that no known threatened terrestrial ecological communities have been recorded as occurring on the proposed development site. It is also noted that no known flora species presently listed as 'Threatened' under the EPBC Act are known to occur in the proposal area. But it is our contention that these survey results are inconclusive. The proponent's botanist has stated that the survey was carried out during one site visit of three days in October. Furthermore, the botanist states that the preceding season had been fairly dry resulting in very few annual

species being available for collection. Such a survey is unacceptable, as it will have missed a significant number of annual species.

Local knowledge of this area recommends that any biological survey work should be obligatorily conducted over a number of years following a variety of climate patterns and fire events. An extended ecological survey is the only means of generating scientifically reliable flora survey information. An extended survey is essential to the comprehensive and accurate surveying of the area’s full floristic and ecological diversity.

A lack of historical information for this region in regards to fire history has contributed to the inconclusive nature of the survey results. Any environmental impact assessment of the proposal must reject the proposal because of the inadequacy of existing flora and vegetation information.

Marine Environment

A factual account of the extent of seagrass coverage within the study area encompassing Maud's Landing and Bateman's bay is lacking in the PER. It is apparent that no surveys have been conducted to determine the true extent of seagrass coverage. This is evident by the flippant terminology used to describe seagrass coverage in the bay, quote: '*low* abundance of seagrass within Bateman's Bay', 'there are a *few* sites north of Maud's Landing with *Amphibolis antarctica'*, '*Posidonia coriacea* is present in *low* densities over parts of Bateman's Bay', 'the *sparse* occurrence of *Halophila ovalis* near Maud's Landing', 'reef platform *may* be covered with seagrass' and 'sand habitat *may* have patches of seagrass'. All of which provide a personal account and not a true and quantitative representation of what is in the bay.

The study area encompasses a large area, of approximately 90km^2, with depths of between 5 to 7m and up to 16m in places. If these observations of seagrass coverage were made from aerial photographs then coverage by *H. ovalis*, would have gone unnoticed in these images. In addition, *H. ovalis* was referred to as 'Visually Unimpressive' in the PER (BBG, 1995), and as such might have been overlooked, in a field survey, if one was conducted in the area. *Halophila ovalis* is a colonising species, that has been known to form dense stands when not in competition with other seagrass (Cambridge, 1999). Due to the lack of knowledge surrounding seagrass within the study area and visitation by dugong to the study area to feed, a proper survey is required to map these benthic habitats. This will require the use of appropriate aerial photography and also ground-truthing of benthic habitat by SCUBA or video transects.

The Department of Environmental Protection has produced a Position Statement on Benthic Primary Producer Habitat Protection, in accordance with the Environmental Protection Act (1986). In this document reference is given to the intrinsic value of *H. ovalis* in terms of it's role as a primary producer and as a carbohydrate rich food source for dugong, emphasising that the protection of such habitat must be considered in Environmental Impact Assessment.

The relevance of *P. coriacea* to the area should not be underestimated. The PER has acknowledged *P. coriacea* occurs in the study area whilst emphasising its poor coverage. *P. coriacea* exists naturally as a patchy meadow, unlike others in the genus that form dense meadows. This is not to say the seagrass has little ecological significance. It is found growing on sand ripples in areas exposed to ocean swell (Cambridge, 1999). The seagrass is very deep rooted with long underground leaf sheaths, which assist in stabilising sediments. *Halophila ovalis* Is often found amongst *P. coriacea* where it is afforded some protection in exposed areas (Cambridge, 1999). Further more, *P. coriacea* is a temperate species that has its northern limits of distribution within the study area, and is therefore regionally significant.

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Karsts and Subterranean Fauna

The PER completely fails to address the issue of possible karstic limestone formations, in the area of the proposal that might be detrimentally impacted by the proposal. There have been little or no exploration for caves or karst features undertaken in the area of the proposed CCR.

However, as the PER notes: "The coast from North West Cape in the north to Gnarraloo Bay in the south is formed mostly of Pliestocene (1.5 million to 10000 years ago) limestone and Holocene (since the end of the last Ice Age about 1000 years ago) sands. These overlie the margin of a Miocene (from 26 to 7 million years ago) limestone anticline (broad, raised stratified rock crest)."

The reef itself and the lagoon behind it have limestone associated with them. This suggests there is a reasonable possibility that cave and karstic formations associated with limestone formations may exist within the area of influence of the CCR proposal. Further on the 1:100 000 topographic map sinkholes have been identified and marked in areas north of Coral Bay (and Maud's Landing) and on Waroora Station, which is south of Coral bay (Personal Communication Darren Brooks).

Very often areas of terrestial limestone formations in the region that has been adequately surveyed are found to have stygofauna (Personal Communication Darren Brooks).

Before any further approvals are given a speleologist should be engaged to examine and report on the limestone deposit for possible caves and/or karst features. If any are located then fauna surveys should also be undertaken. Specifically, as part of an adequate environmental impact assessment of the area the following measures need to be taken:

1. An extensive inventory of the caves and karst features of the area is undertaken by experienced speleologists.
2. An extensive investigation and inventory of the troglobitic fauna of any caves/karst features within the area be undertaken by experienced biospeleologists.
3. The hydrology of the area is examined by an experienced karst geomorphologist in conjunction with the investigation of the caves and karst features of the area.
4. Reliable predictions on the impact the proposal on the groundwater regime associated with any caves of karst features identified.

In addition, prior to any development on limestone, holes should be drilled and fauna surveys should be undertaken to determine what fauna exists within the meso and micro caverns of the limestone. These surveys need to be reported and assessed before any development is allowed to proceed.

There is a lack of sufficient data to be able to assess the possible environmental impacts of the CCR proposal on possible cave and karstic features and any associated subterranean fauna of the area the proposal could impact if it were to go ahead. It is quite possible that once investigations were done for these features and subterranean fauna, the conservation value of these aspects of the area could be found to be of national significance, as is the case further north just south of Cape Range National Park. If this were

found to be the case, these values alone may make the CCR proposal environmentally unacceptable.

CONSOLIDATED LIST OF COMMITMENTS

Commitment	PER Reference	Issue with respect to adequacy of the PER
General	Vol 1, 5. p 155–163	• The type of research, information gathering & plans proposed will take considerable time to collate and develop and by far the majority of these should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin. Much of this should have been completed for this PER, as required in the guidelines. The fact that this has not been undertaken prevents the public from having the ability to comment, as required under the EPBC Act 1999. The Minister and the proponent should note that other industries, including the mining and offshore oil & gas industries, must have fully comprehensive environmental management/review plans to fulfil a PER. It would show considerable discrimination to allow the coastal development industry and this proposal to be approved on the basis of such insufficient information. • The proponent states "start of construction to commence September 2002" (FAQ, proponent website). When will ground breaking and other site activities begin, and how will the proponent fulfil all these commitments before such a time? • Does "construction completion" mean completion of Stage 1 construction or all Stages construction completion? • The proponent has not completed the surveys, baseline data and management plan requirements stipulated in the guidelines for the PER. This allows little confidence that such commitment would be sufficiently fulfilled. For example, Sections 5 and 6 of the guidelines are quite explicit
10, 32	Vol 1, 3.1, 5.10, 5.32	• There has been no satisfactory terrestrial fauna survey undertaken. The proponent quotes the Ecologia 1994 survey. However, in the State PER, Appendix 15 shows CALM correspondence, which highlights that this limited survey does not allow any concrete conclusions to be drawn about the fauna. It is inadequate to commit to a survey, when this information was required for the

		PER, with associated impacts and mitigation measures. • Any approval of this development and its proposed management plan is premature. First, Western Australian Ningaloo Marine Park Plan is to be reviewed in 2002. Any development should be compatible with the reviewed plan. Further, the Commonwealth and State plans are fundamentally intertwined. This development should not be considered until the broader planning framework for the Western Australian and Commonwealth Ningaloo Marine Parks are reviewed and implemented.
2	Vol 1, 5.2.& 5.10 pp 155, 158 & App 5	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin, which the proponent states to be September 2002 (FAQ, proponent website). • It states in regard to Marine Parks and Reserves Authority, in which the area is vested, that "the initial version of the Specific Area Marine Management Plan will be approved by the Marine Parks Management Authority(sic) prior to the completion of Stage 1". How can the proponent guarantee that the Marine Parks and Reserves Authority will approve a plan? What happens if approval is not obtained before construction completion (supposedly 2004 for stage one, FAQ, proponent website)? • Does "construction completion" mean completion of Stage 1 construction or all stages construction • There is no mention of Environment Australia, which holds responsibility for listed species of national environmental significance, or co-ordination with any national plans, e.g., turtles, dugong, and whales. • The type of research, information gathering & plans proposed will take considerable time to collate and develop and this should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin. The proponent states "start of construction to commence September 2002" (FAQ, proponent website). When will ground breaking and other site activities begin, and how will the proponent fulfill all

		these commitments before such a time?
3	Vol 1, 5.3. p 155 & App 7	• The draft agreement proposed between CALM, Fisheries WA (now Dept of Fisheries, WA since July 2001) and the proponent is arguably legally unenforceable and lacks commercial efficacy. These concerns were given to the proponent through the State EIA process and have not been addressed by the proponent. • There is no binding commitment by the State or Federal governments to ensure adequate resourcing of management and protection of the area if the Development is approved. Such an agreement would almost certainly cost the Department of Conservation & Land Management and the Department Fisheries, WA considerable money. To date, since the announcement of the Ningaloo Marine Park the Department of Conservation & Land Management has not be able to fulfil requirements and ensure proper management due to lack of resources. The Department's budget has been recently further restricted, with no State government commitment to change this in any way.
4	Vol 1, 5.4. p 157	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin.
5	Vol 1, 5.5. p 157	• The impacts and mitigation measures were insufficiently dealt with in this PER: The proponent has not completed the surveys, baseline data and management plan requirements stipulated in the guidelines for the PER. This allows little confidence that such commitment would be sufficiently fulfilled. The type of research, information gathering & plans proposed will take considerable time to collate and develop and this should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin.
7	Vol 1, 5. 7. p 157	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin
8	Vol 1, 5. 8. p 157–8	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin.

9, 11	Vol 1, 5. 9. & 5.11 p 158–9	• The proponent has not carried an adequate terrestrial & Marine flora survey, with associated management plans, which should have been completed for this PER to allow public comment. This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin
12, 13	Vol 1, 5. 12. & 5.13 p 159	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin.
27	Vol 1, 5.27. p 162	• This should all be completed satisfactorily before approval is given and any ground breaking/construction or any site activities/disturbance whatsoever begin
40, 41	Vol 1, 5.24 &5.41. p 164	• There is much controversy surrounding the upgrading of a road to Yardie Creek. The are many environmental impacts which have not been assessed, including road-kill impacts.
Limestone, Quarrying	5.23,	• Potential damage to ecological community, vague as to source and quantity of limestone and associated environmental impacts. There is lack of clarity of tonnage and location of quarries The initial idea of obtaining the limestone from quarrying near Exmouth has been stopped in a court action due to environmental problems and potential impact on listed species of national environmental significance.

ECOLOGICALLY SUSTAINABLE DEVELOPMENT ANALYSIS OF THE CORAL COAST MARINA DEVELOPMENT

Section 11 of the guidelines for the PER requires the proponent to discuss the project in relation to compliance with the "principles of ESD and the objectives and requirements of the EPBC Act".

There are a large number of definitions of the concept of ESD.

The National Strategy for Ecological Sustainable Development (Dec 1992) defines ESD as "development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The Western Australian Government has committed WA to the development of a Sustainability Strategy and recently released for public comment a consultation paper *Focus on the Future: Opportunities for Sustainability in Western Australia* on the issue.

In the paper the State Government has adopted the following definition:

"Sustainability is the simultaneous achievement of environment, economic and social goals".

Whatever definition is used, ESD means that we do not erode our resource base as this reduces the resources available to future generations.

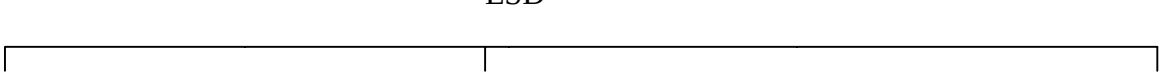
The proponent makes no attempt to examine the project with respect to ESD. The proponent does not outline how the project achieves environment, economic and social goals. There is no attempt to assess the impact the proposed development would have on the resource base. Indeed this is a task that has to be looked at in a regional perspective and from a public interest perspective and would be beyond a developer anyway. However such an assessment must be done.

A number of framework methodologies are being developed to examine actions from an ESD rather than environmental assessment standpoint. One of the most recent is that devised by the Bureau of Rural Sciences for assessment, reporting and evaluation of wild fisheries (BRS 1998). Similar approaches could be developed for any renewable resource, including the nature-based tourism resources that are to be exploited by the Coral Coast Marina Resort.

Whilst it is not the role of respondents to undertake analyses neglected by the proponent (and by the State Government as co-proponent) **we would like to identify the key components of an ESD assessment using nature- based tourism as an exampl**e. The nature-based tourism resource could be divided into a set of key sub-components (attractions). In the context of Ningaloo Reef these are:

- Hard Coral Reef
- Recreational Fishing
- Wildlife: whale sharks, large fish including manta rays and black-tip sharks, humpback whales, dugongs, marine turtles, seabirds and shorebirds.
- Clean Beaches
- Clean Water
- Wilderness

The ESD approach requires the integrated consideration of the environmental, economic and social impacts from the utilization of resource. The first task is to determine the level of extraction / utilization that is both fully renewable and has no irreversible impacts on other components of the supporting ecosystem. Once this sustainable level of utilization has been determined (either by scientific measurement or the application of the precautionary principle) then the resource can be allocated to meet pre-determined economic and social objectives. Economic efficiency and social / community development objectives are frequently contradictory and objectives may have to be determined through the political process.



The tables below provide a checklist of interactions and potential consequences that should have been considered in assessing the environmental /ecological implications of the Coral Coast Resort Development.

The checklist is are not intended to be exhaustive. Please refer to species-specific sections of the submission for a more detailed consideration of species and impacts.

Nature-Based Tourism Resource: Hard Coral Reef

Issue	**Interactions**	**Consequences**
Nutrients	• Run-off from marina catchment • Leaching/groundwater • Boat sullage	• Change in reef structure –algae • decline in hard corals • Change in phytoplankton and light attenuation.

Sedimentation	• Turbidity from marina construction. • Run-off from, resort waterways • Dredging channels	• Chemical- contaminants in sediment • Turbidity- clogging polyps
Mechanical Damage, e.g. Prop and anchor damage	• Recreation boats • Charter boats • Reef walking • Collecting • Diving	• Coral breakdown • Change in reef structure
Recreational Fishing (overfishing)	• • Removal of large reef fish	• Change in reef community structure • Increase in coral reef predators (drupella)

Nature-based Resource: Recreational Fishing

Issue	**Interactions**	**Consequences**
Increased Removal Of Fish	• Local depletion of Lethrinid and Lutjanid stocks	• Change in fish community structure
Fishing Waste, bait bags, line	• Fishing and boating activities of increased recreational fishing	• Wildlife hazard

	• Fish Cleaning	• Loss of aesthetic value • Change in wildlife behaviour

Nature-based Resource: Wildlife

The large, charismatic wildlife that it is attractive to tourists is generally characterized with high natural survival rates, low reproductive output and avoidance of disturbance.

Nature-based Resource: Whale Sharks

Issue	**Interactions**	**Consequences**
Boat Strikes	• Resort increases boat traffic	• Injured and lost animals • Reduced survival
Disturbance	• Vessel and tourist presence	• Animals moving away from Bateman's Bay
Failure of Coral Spawning	• Decrease in corals- food chain, nutrient sedimentation and other effects	• Local failure of planktonic food chain. Animals move elsewhere • Animals unable to utilize habitat
Solid Waste Pollution	• Resort solid wastes	• Ingestion of foreign materials eg. plastics

Nature-based Resource: Manta Rays

Issue	Interactions	Consequences
Boat Strikes	• Resorts increased boat traffic.	• Injured and lost animals • death
Disturbance	• Resort and tourist presence • increased boats	• Animals moving away, break up of aggregation
Loss of feeding habitats and locations due to changes in plankton distribution	• Resort run-off • Nutrient level changes • Changes in coastal hydrodynamics	• Animals move away. Break up of aggregation

Nature-Based Resource: Humpack Whales And Other Cetaceans

Issue	Interactions	Consequences
Boat Strikes	• Resorts increased boat traffic	• Injured and lost animals • death
Disturbance	• Resort and tourist presence • increased boats	• Increase in calf mortality • Animals moving away

Nature-Based Resource: Dugong

Issue	Interactions	Consequences
Boat Strikes	• Resorts increased boat traffic	• Injured and lost animals • death
Disturbance	• Resort and tourist presence • increased boats	• Increase in calf mortality • Animals moving away
Loss of Seagrass	• Turbidity • Disturbance	• Animals move away • decrease in feeding habitat size • decrease in numbers

Nature-Based Resource: Marine Turtles

Issue	Interactions	Consequences
Nesting habitat, loss or change	• Marina entrance, change in shoreline from interference to coastal processes	• Reduced nesting space for Loggerheads, loss of nests
Light pollution	• Light halo from town-site, navigation and vessel lights	• Disorientation of hatching loggerheads. Reduced hatchling survival
Boat Strike	• Increased boat traffic particularly at pre-breeding aggregations (locations currently unknown)	• Reduced survival, reduced breeding success

	(locations currently unknown)	
Land-based predators	• Increased nest predation from foxes attracted to settlement. Increased limitations on baiting programs	• Reduced nest success
Increased Silver Gull predation	• More gulls attracted to settlement rubbish and light.	• Reduced nesting success.
Disturbance on nesting beaches	• Increased public-use of beaches, particularly at night	• Reduced nesting success, aborted breeding attempts

Nature-Based Resource: Other Sharks And Rays

Issue	**Interactions**	**Consequences**
Increase in recreational fishing – catch numbers	• Increased take of sharks as by catch by recreational fishers	• reduced survival leads to decrease population size
Decrease in reef fish stocks	• Increased recreational fishing pressure	• Decrease in shark populations due to reduced prey abundance.
Disturbance in pupping areas	• People wading with sharks in shallows	• Decreased breeding success

Boat strikes in shallow water	• Increased boat traffic in Bill's Bay from the resort	• Increased mortality
Fishing waste hazards	• Entanglement / ingestion of plastics	• increased mortality

e.g., Black Tip in Scully Bay breeding area – diving entry point and potential boat hits and people wading effects population numbers and breeding systems.

Nature-Based Resource: Sea And Shore Birds

Issue	**Interactions**	**Consequences**
Change in Point Maud to Maud's Landing shoreline	• Breakwalls at marina entrance	• Loss of roosting habitat for terns • And waders
Human disturbance on beach	• Increased visitor numbers from the resort	• Increased energetic stress on wintering migrants. Desertion of area.

Nature-Based Resource: Clean Water

Issue	Interactions	Consequences
Quality	• Increased nutrients, litter and turbidity	• Less attractive to visitors
Clarity	• Nutrients • Dredging	• Less attractive to visitors
Safe- for coastal recreation and seafood consumption	• Bacteriological contamination from boat sullage ,stormwater drains. Toxic blooms in marina	• Restricted use
Solid pollution	• Fishing line • Plastic bags	• Less attractive to visitors
Flowing water	• Low flushing of marina, reduced flushing of inshore area.	• Less attractive to visitors

Nature-Based Resource: Clean Beaches

Issue	Interactions	Consequences
SAND – stability	• Change in coastal processes from marina and breakwater	• Less attractive to visitors
Litter and polution	• From increased number of visitors and proximity of sources.	• Less attractive to visitors
4wd – tracks	• Disturbance to beach users, safety hazards, dune erosion	• Less attractive to visitors
Space	• Loss of seclusion	• Less attractive to visitors
Dune habitat	• Erosion, increased sand mobility from increased mechanical damage	• Less attractive to visitors, restrictions to access.

Nature-Based Resource: Resource: Wilderness

Wilderness (category 1b of IUCN Guidelines for Protected Areas)

A "large area of unmodified or slightly modified land /or sea, retaining its natural character and influence, without permanent or significant habitation".

Issue	Interactions	Consequences
Loss of wilderness values of Bateman'.s Bay	• Construction of marina, town and other infrastructure	• Loss of wilderness
World Heritage Values	• Construction of resort	• Loss of World Heritage potential for the region due to inappropriate development

Economic and Social Sub-components

The proponent has also made no attempt at a defendable analysis of the economic and social implications of the project in the context of ESD. At a minimum the following issues needed to be evaluated

The value of project to the state:

The short and long term cost of the project to the state

Net Economic Value

Long-Term Economic Value

Cost/Benefit to the:

- Shire of Canarvon
- Coral Bay Community
- Exmouth Community

…in terms of impacts on income, services and community development

The Costs/Benefits of opting for a "resort" market rather than an ecotourism market.

The cost of losing of World Heritage / Wilderness reputation for the region.

Social Component

Including, the equity considerations in reducing access to the local (WA) informal working/middle class people in favour of wealthy and overseas visitors.

The alternative to the proposal for Coral Bay and the Cape Region.

Reference

Bureau of Resources & Science (1998). A framework for assessing fisheries with respect to ecologically sustainable development. Bureau of Rural Sciences: Commonwealth of Australia of Australia, Canberra.

SUMMARY OF ELECTRONIC SUBMISSIONS

Analysis of Coral Coast Resort online EPBC submissions 20 December 2001 to 11 January 2002

The Save Ningaloo campaign through its website at www.saveningaloo.org has facilitated public comment (via email) during the Coral Coast PER processes. The emails were collected by the campaign and relayed to ATA Environmental on 11 January 2002. The format in which the emails arrived can be seen in the arbitrary sample included here. The letter/submission which the respondents 'signed' can be viewed at .http://www.save-ningaloo.org/submission2.htm A hard copy is also appended here.

Respondents had the choice to send the pro-forma submission as is, or to add their own comments.

In broad summary, the comments made by respondents cover:

- Expressions of high value and uniqueness of the Ningaloo Reef/Cape Range region
- Parallels drawn between high current levels of environmental destruction on the Great Barrier Reef and likely impacts of the resort on Ningaloo Reef
- Warnings of the fragility of the area (specific and general)
- Appeals for consideration of intergenerational issues
- Warnings that the area will lose its wilderness appeal with this type of development
- Concerns about equity of access to the area
- Disinclination to continue travelling to the area or promote the destination if the resort goes ahead
- Concerns that the world has few wilderness areas left

❖ Note: some comments also contain specific concerns about the resort impacts

The following tables are a breakdown of the geographical origins of the emails received during the EPBC PER process.

Code	Country	Number of Emails	Number of Persons Represented by Email
AS	Australia	1728	5728
BE	Belgium	2	3
CA	Canada	21	157
CH	China	5	8
DA	Denmark	3	4
EI	Ireland	11	47
EZ	Czech	1	4
FR	France	5	8
GM	Germany	62	483
GR	Greece	3	4
IN	India	4	6
IS	Israel	1	1
IT	Italy	1	50
JA	Japan	2	3
KS	South Korea	1	1

MP	Mauritius	1	5
MY	Malaysia	2	2
NL	Holland	7	17
NO	Norway	2	3
NP	Nepal	1	1
NZ	New Zealand	6	7
PO	Poland	4	9
SF	South Africa	1	4
SN	Singapore	1	2
SW	Sweden	6	6
SZ	Switzerland	23	45
TC	UA Emirates	1	4
TH	Thailand	2	2
TW	Taiwan	1	1
UK	United Kingdom	173	350
US	United States	54	111
TOTAL		**2135**	**7076**

State	Number of Emails	Number of Persons Represented by Email
ACT	21	38
NSW	219	1407
NT	11	15
Qld	136	638
SA	33	128
Tas	33	46
Vic	131	270
WA	1010	2769
Unstated	114	432
Total	**1708**	**5743**

TO:

THE HON DR GEOFF I GALLOP BEc MA MPhil DPhil MLA
Premier; Minister for Public Sector Management; Federal Affairs; Science; Citizenship and Multicultural Interests

THE HON A MacTIERNAN BA LLB BJuris JP MLA
Minister for Planning and Infrastructure

THE HON Dr J M EDWARDS MB BS MLA
Minister for the Environment and Heritage

THE HON C M BROWN MLA
Minister for State Development; Tourism; Small Business

THE HON T G STEPHENS BA MLC
Minister for Housing and Works; Local Government and Regional Development; the Kimberley, Pilbara and Gascoyne

THE HON KIM M CHANCE MLC
Minister for Agriculture; Forestry and Fisheries; The Midwest, Wheatbelt and Great Southern

Coral Coast Marina Development (CCMD) Pty Ltd

C/- 21 Howard St

Perth WA 6000

CC TO:

THE HON C J BARNETT MEC MLA
Leader of the Opposition

The HON Dr DAVID KEMP MP
Federal Minister for the Environment and Heritage

THE HON KELVIN THOMSON MP
Federal shadow Minister for the Environment and Heritage

Dear Premier, Ministers and CCMD,

Protecting Ningaloo Reef

I write to express my concern over the marina resort development proposed for Maud’s Landing on the boundary of Ningaloo Marine Park.

Ningaloo Reef is the longest and most spectacular fringing coral reef in the world and an area of unparalleled biodiversity. If allowed to proceed, the proposed development will severely impact upon the astonishing and unique environmental values of Bateman Bay and surrounding areas.

The marina is designed to attract private boats. Increased boating traffic in this area will deter, injure and kill dugongs, manta rays, whale sharks, whales and turtles. Already depleted fish stocks in this section of the Ningaloo Marine Park will be further reduced.

It is unthinkable to build a resort across a nesting ground of the endangered loggerhead turtle.

I do not accept that the baseline studies of the southern Bateman Bay lagoon are comprehensive or adequate. Nor do I accept that the proposed plans for managing the development's (self-confessed) impacts demonstrate a realistic capacity for mitigating against them.

This is simply an inappropriate type of development for the heart of the Ningaloo Reef.

Ningaloo Reef is part of our irreplaceable Western Australian heritage. I strongly urge that this area by protected by rejecting the proposed development.

I encourage the Western Australian Government to work with the community to develop a plan for genuine sustainability for the entire Ningaloo region. I further encourage this Government to proceed rapidly with its election promise to nominate Ningaloo and the Cape Range area for World Heritage listing and to develop a planning framework that protects these World Heritage values.

Please keep me informed of your decisions.

Yours sincerely,