Summary of marine research and monitoring applicable to the management of Jurien Bay Marine Park: 2000 to June 2008

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Cover photographs: (small images, L to R) Australian sea lions *Neophoca cinerea*; Researcher sorting samples; *Pentagonaster dubeni* sea star; University of Tasmania research team; and (large image) Water quality monitoring, (Photos-Department of Environment and Conservation /Marine Science Program).

SUMMARY

A listing of recent and current ecological and social research and monitoring studies undertaken at the Jurien Bay Marine Park (JBMP) is presented in this report. A total of 61 recent or current ecological and social research or monitoring studies were identified and metadata regarding these projects were formulated. Social and ecological values and management strategies identified in the JBMP management plan are determined for each of the projects listed.

This review identified sources of quantitative data, describing the condition and/or pressure relative to many of ecological values of the JBMP, that are suitable to feed into the marine park management reporting framework for delivery to the Marine Parks and Reserves Authority audit process. However, it also identified problems with being able to fully assess the relevance of many of these studies to conservation management, due to three main reasons. Firstly, the majority of studies were not explicitly designed to support management objectives identified in the JBMP management plan. Secondly, some studies have a broader spatial focus, and thirdly, publications for some studies are yet to be released.

Key findings include the identification of 17 studies relating to water and sediment quality that contribute to monitoring the condition of this ecological value, seven studies that contribute to the understanding the effectiveness of management zoning in JBMP, and 11 studies that can contribute information related to examining the impacts of the rock lobster fishing on the biodiversity of the marine park.

Generally, the state of knowledge on the ecological and socioeconomic values of JBMP appears to be advanced. However, some clear gaps remain particularly in human usage, such as catch/effort of commercial and recreational fishing, the ecological significance of seabirds and the characterisation of the flora and fauna of selected intertidal reef platforms.

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1 INTRODUCTION

Jurien Bay Marine Park (JBMP) is located on the central west coast of Western Australia, approximately 200 km north of Perth (Figure 1). JBMP was gazetted on 26 August 2003. The marine park is adjacent to the townships of Jurien Bay and Cervantes, and the localities of Grey and Wedge. There are many islands and exposed rocks in the park which covers an area of approximately 824 km^2 (Department of Conservation and Land Management 2005).

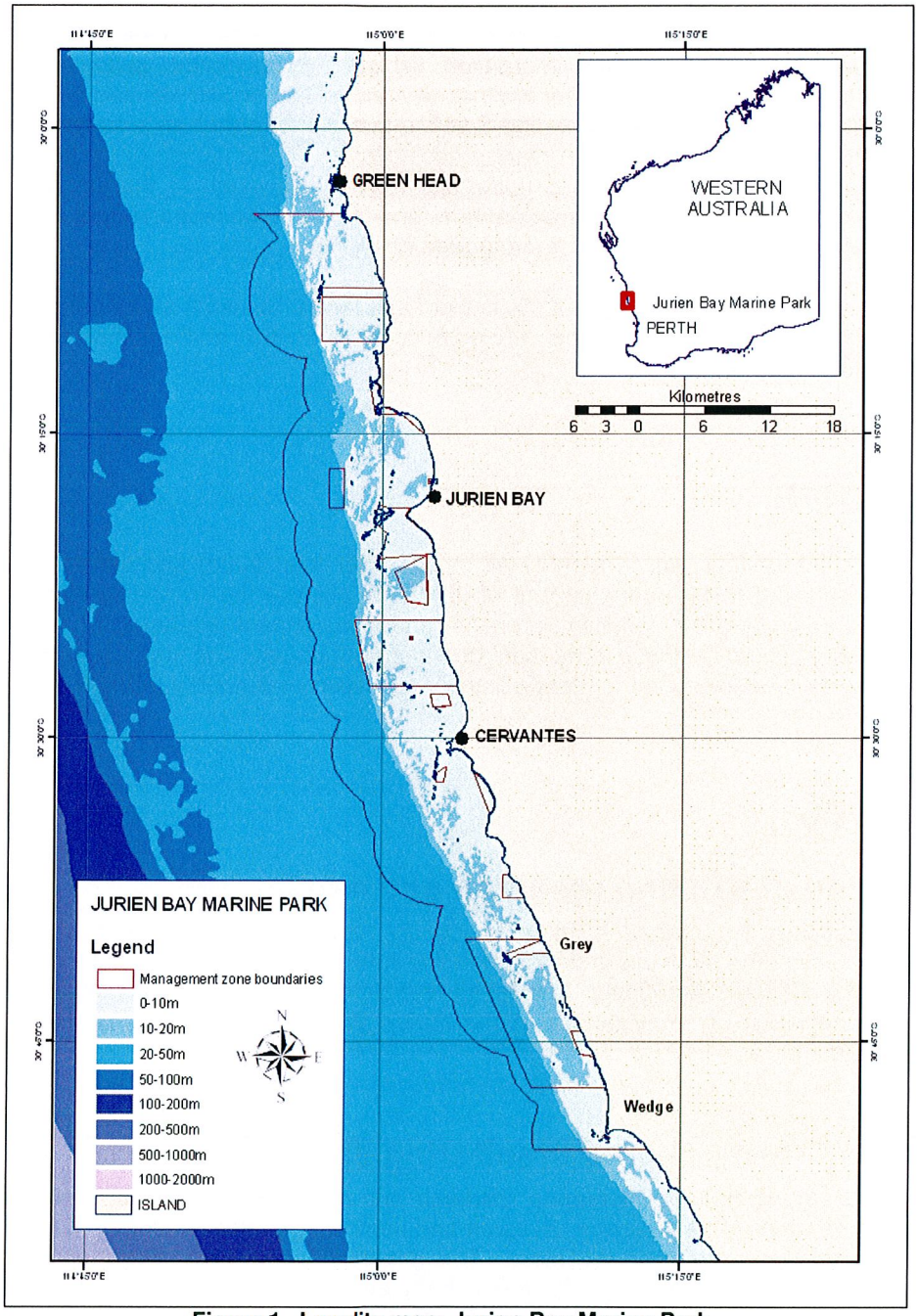

Figure 1. Locality map: Jurien Bay Marine Park.

JBMP has many ecological and social values for which management objectives, targets and strategies have been developed (Department of Conservation and Land Management 2005). The ecological values include geomorphology, intertidal reef platforms, water and sediment quality, seagrass meadows, macroalgal communities, seabirds, invertebrate communities, finfish, sea lions, cetaceans

and turtles, and the socioeconomic values include Indigenous and maritime heritage, commercial fishing, aquaculture, coastal use, seascapes, recreational fishing, water sports, marine nature-based tourism, oil and mineral development and scientific research.

Since the reserve planning process and its subsequent gazettal, there has been a significant number of research and monitoring studies related to the park's values that have been undertaken by State and Commonwealth government departments (WA Museum, Department of Fisheries, Department of Environment and Conservation, Department of Environment, Water, Heritage and the Arts) or agencies (CSIRO, Australian Institute of Marine Science) and several tertiary institutions (University of Tasmania, University of Western Australia, Edith Cowan University, Murdoch University, Curtin University of Technology). A $10 million joint State Government and CSIRO initiative, the *Strategic Research for the Marine Environment* (SRFME) involved research that investigated fauna and flora distributions, coastal processes, physical and biological oceanography, nearshore water quality, benthic communities, commercial and recreation fishing impacts/trends, passive human usage patterns and effectiveness of management zoning. A continuation of SRFME has been incorporated into the $21 million Western Australian Marine Science Institute (WAMSI) as a component of Node 1 *Strategic research on Western Australian marine ecosystems.* At the launch of the park in 2005, the State Government made commitments to undertake research to examine the impacts of the rock lobster fishing on the biodiversity of the marine park, and to undertake research that would contribute to an understanding of the effectiveness of management zoning.

In 2007/2008, a compilation and review of the current and recent research and monitoring relevant to the values of JBMP was undertaken. This report provides the context and a summary analysis of the reviewed research.

2 OBJECTIVE

The objective of this review was to identify all recent (later than 2000) and current ecological and social research relevant to the management of JBMP, to analyse these, and to identify sources of quantitative data describing the condition, pressure and management response relative to the values of the JBMP. If applicable, these data can be used to populate the marine park management reporting framework for delivery to the Marine Parks and Reserves Authority (MPRA) audit process.

3 METHODS

3.1 Collation of existing research and monitoring

This section describes the approach taken to identify research and monitoring studies that have recently been or are currently being undertaken in the Jurien Bay Marine Park. The process involved three major tasks: (1) the interrogation of existing research databases; (2) identification of additional studies; and compilation of study details in the Jurien Bay Marine Park research and monitoring metadata database.

3.2 Existing research and monitoring databases search

An initial list of current and recent marine research and monitoring studies was sourced from the Marine Science Program (MSP) current research and monitoring project inventory database, titled the Western Australian Marine Science Inventory. This database focuses mainly on research relevant to marine reserves throughout Western Australia, both existing and proposed. While much of the information sourced from the database was outside the planning region, a study was included if found to be of interest to the ecological or social values of the Jurien Bay Marine Park, for example, water and sediment quality, pinnipeds, and intertidal communities. Other DEC databases such as the compilation of research and monitoring permit holders via the Wildlife Branch Licensing database, the Marine Science Program Library and Science Division Library, were searched.

BlueNet, the Australian Marine Science Data Network, aims to provide a virtual data centre to support long-term curation and management of data for Australia's marine science researchers. BlueNet links vast data repositories and marine resources that currently reside in academic and government institutions both in Australia and overseas. The BlueNet MEST provides a tool to search for metadata records describing marine data sets submitted for curation and allows users to search for data and assess its quality through a metadata description. The MEST tool was utilised and the BlueNet database was interrogated for relevant research and monitoring studies.

All studies registered in the Western Australian Marine Science Inventory had been granted a DEC licence to conduct their research. Therefore, before a study was listed in the JBMP research and monitoring metadata database, updated project details, contact details, and reports were able to be sourced from licence applications.

3.3 Identification of additional studies

The search for additional research and monitoring studies targeted recent and present studies in the JBMP region, as well as potentially related research occurring outside the marine park and relevant research being conducted on a State wide level. The key sources used to identify new research and monitoring studies included: *Conservation and Land Management (CALM) Act 1984* and *Wildlife Conservation Act 1950* permits; universities; State and Commonwealth government agencies; and Internet search.

3.3.1 CALM Act and Wildlife Conservation Act Permits

DEC Wildlife Licensing System manages all wildlife (fauna and flora) licensing requirements including the issuing of *CALM Act* Regulation 4 (entry into *CALM Act* estate), and *Wildlife Conservation Act* Section 23 (taking of flora) and Regulation 17 (taking of fauna) permits. Details of new licence applications granted to researchers in the Jurien Bay Marine Park region were identified through the Jurien Bay Marine Park management team.

3.3.2 Universities

A selection of staff, PhD candidates and undergraduate (Honours) students at Western Australian universities including Curtin University, Edith Cowan University, Murdoch University, University of Notre Dame and University of Western Australia, known to MSP for undertaking research in JBMP, were contacted, to obtain information on their respective studies. Interstate universities such as James Cook University were also contacted where prior knowledge of research activities existed.

3.3.3 State and Commonwealth government agencies

Staff from various Government organisations including DEC, Department of Fisheries, CSIRO, Australian Institute of Marine Science, Department of Environment and Heritage, Department of Planning and Infrastructure, and various councils in the Central West Coast region, were contacted to obtain further information on their respective studies.

3.3.4 Internet search

Internet searches using keywords were also conducted to obtain information on studies. Internet searches targeting specific researchers proved to be a useful means of acquiring information on studies where attempts to contact the researchers were unsuccessful.

3.4 Compilation of study details

The JBMP research and monitoring metadata database was created using Microsoft EXCEL© software. All information collected was entered under the field headings described in a metadata proforma (Table 1) which is ISO 19115 marine profile compliant for geographic metadata as utilised by the BlueNet MEST version 1.1 (http://bluenet.org.au). In addition, details of each individual contacted

throughout the reference search were entered into a contact database. It is intended for the database to be maintained and regularly updated by the MSP as a key resource of contact and studies details for future research and monitoring in the region.

Table 1. Information fields incorporated in the metadata proforma.

INFORMATION FIELD	FIELD DESCRIPTION
Generic information	
Contact Person/Principal Investigator	The Principal investigator or a contact for further information about the project, study or publications
Contact Organisation	Name of organisation or associated organisation
Study Title	Title of project, program, study or publication
Abstract	Summary of study or publication findings
Study Objectives	Study objectives, hypotheses or outcomes
Geographic Position	
Region Name	Location of study e.g. Jurien Bay, Central West Coast, West coast, State-wide
Extents (N,E,S,W)	Lat/longs or geographical locations e.g. Kalbarri to Augusta
Other information	
Keywords	List of search words
Contributors	Names of other contributors to project, study or publication
Study Start Date	The date when the study started, if known
Study End Date	The date when the study finished, if known
Hyperlink	Publicly available web address
References	Citation of publications produced in association with the study
Supplementary Information	Any additional information, parameters measured, monitored or researched
Ecological or Social Value	Relevant ecological or social value as identified in the JBMP management plan (Department of Conservation and Land Management 2005)
JBMP Management Strategy	Relevant JBMP management strategy (Department of Conservation and Land Management 2005)

3.5 Assessment of existing research and monitoring

An assessment of the current and recent research and monitoring was undertaken to identify quantitative data and information relevant to the management of JBMP. The objectives, methods, parameters measured, and the relevance to the JBMP ecological and socioeconomic values and management strategies (Department of Conservation and Land Management 2005) of each study, were analysed.

4 DATA MANAGEMENT

4.1 Metadata database

Metadata from the recent and current research and monitoring relevant to the management of JBMP is stored in a Microsoft EXCEL© database entitled "JBMP_metadata.xls" which has been stored at the following on the MSP server at Kensington. To obtain access to this metadata database, please phone the Science Division (08) 9334 0299.

4.2 Report archival

Hard copies of this report will be held at the following locations:

1. Marine Science Program, Science Division, Department of Environment and Conservation, 17 Dick Perry Avenue, Western Australia, 6152. Ph: (08) 9334 0333.

2. Woodvale Library, Science Division, Department of Environment and Conservation, Ocean Reef Road, Woodvale, Western Australia, 6026. Ph: (08) 9405 5100 Fax: (08) 9306 1641.

3. Archives, Woodvale Library, Science Division, Department of Environment and Conservation, Ocean Reef Road, Woodvale, Western Australia, 6026. Ph: (08) 9405 5100 Fax: (08) 9306 1641 (CD also attached).

4. Mid West Region, Department of Environment and Conservation, 1st Floor, The Foreshore Centre, 201 Foreshore Drive, Geraldton, Western Australia, 6531. Ph: (08) 9921 5955 Fax: (08) 9921 5713.

5. Moora District, Department of Environment and Conservation, Lot 124 Bashford Street, Jurien Bay, Western Australia, 6516. Ph: (08) 9652 1911 Fax: (08) 9652 1922.

6. Serials Section, State Library of Western Australia. Alexander Library Building, Perth Cultural Centre, Perth, Western Australia, 6000.

Digital copies of this report will be held on the Science Division server at Kensington. To obtain copies, please phone the Science Division (08) 9334 0299.

5 KEY FINDINGS AND SUMMARY

In summarising the relevance of the compiled recent and current research and monitoring studies to JBMP's ecological and social values and the JBMP management strategies (Appendix I. List of marine park values and associated management strategies), two figures were prepared. Figure 2 illustrates the number of studies addressing the various values of the JBMP and Figure 3 highlights the number of studies that have some relevance to the JBMP management plan. This study was undertaken to review recent and current research and monitoring that was relevant to the management of JBMP.

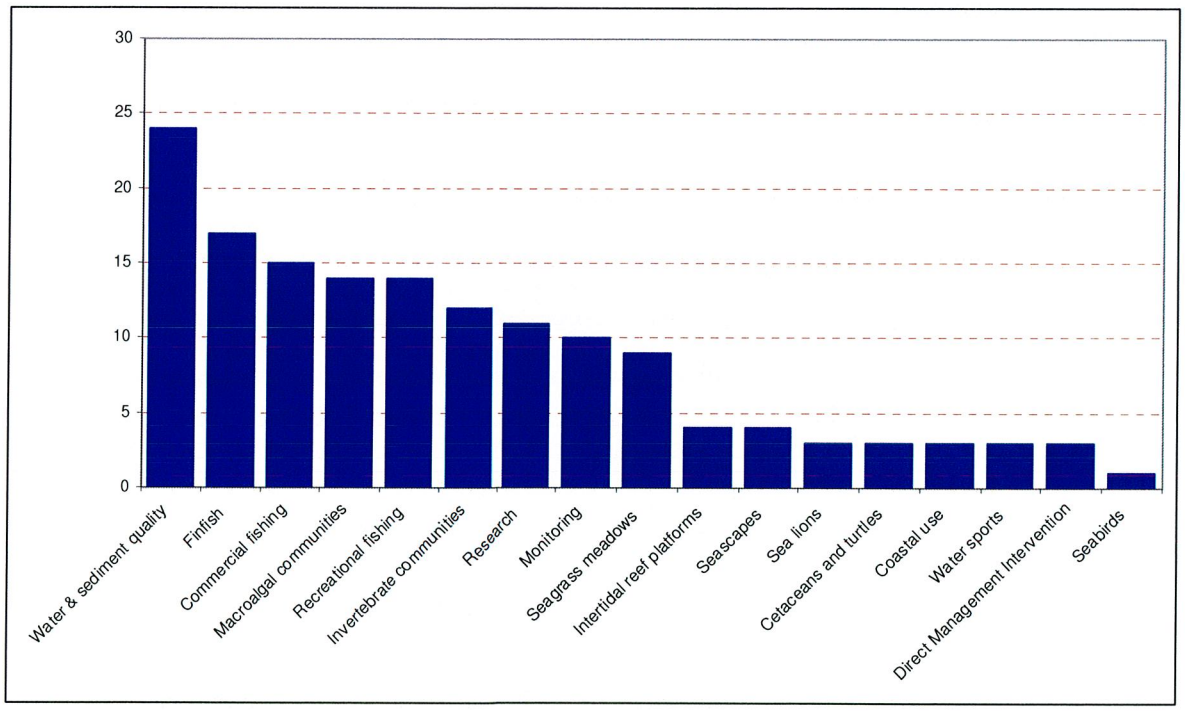

Figure 2. The number of studies addressing various values of the Jurien Bay Marine Park.

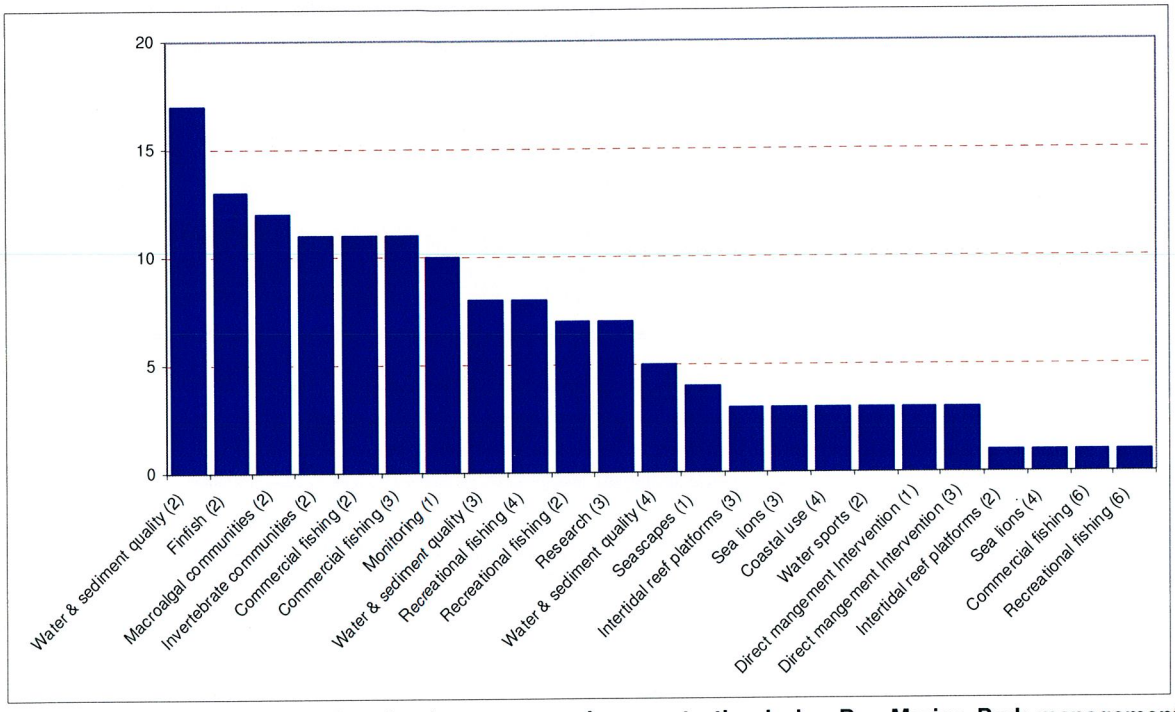

Figure 3. The number of studies that have some relevance to the Jurien Bay Marine Park management strategies.

A total of 61 recent or current ecological and social research or monitoring studies were identified and metadata regarding these studies were formulated (see Section 6: Metadata). This review identified sources of quantitative data, describing the condition and/or pressure relative to many of ecological values of the JBMP, that are suitable to feed into the marine park management reporting framework for delivery to the Marine Parks and Reserves Authority audit process. However, also identified were problems with being able to fully assess the relevance of many of these studies to conservation management, due to three main reasons:

1. the majority of studies were not explicitly designed to support management objectives identified in the JBMP management plan;
2. some studies have a broader spatial focus (for example Muhling et al. 2008; Wise et al. 2007); and
3. publications for some studies are yet to be released (For example Tuya et al. in press-a; Vanderklift & Wernberg in prep).

Of the 61 studies, a total of 24 were relevant to water and/or sediment quality and 16 relevant to finfish (Figure 2). Seventeen studies may have information that can contribute to addressing Management Strategy (MS) 7.1.2 Water & sediment quality (3) *Establish baseline water quality monitoring programs in relation to nutrient enrichment* and five may address MS 7.1.2 Water & sediment quality (4) *Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution* (Figure 3). Only one recent or current study was relevant to seabirds, and less than five studies addressed each of the following values: intertidal platforms, seascapes, sea lions, cetaceans and marine turtles, coastal use, water sports and direct management intervention.

Only one study addressed each of the following strategies (Figure 3):

- MS 7.1.3 Intertidal reef platforms (2) *Initiate research programs to characterise the flora and fauna of selected intertidal reef platforms within the marine park in relation to establishing management targets*;

- MS 7.1.9 Sea lions (4) *Quantify the level of sea lion entrapment and drowning in commercial fishing gear and, investigate ways to reduce this, through the development of a By-catch Action plan by DoF and in collaboration with the commercial fishing industry*;
- MS 7.2.3 Commercial fishing (6) *Monitor commercial fishing catch/effort within the marine park*; and
- MS 7.2.7 Recreational fishing (6) *Monitor recreational fishing catch/effort within the marine park.*

At the launch of the JBMP (26 August 2003) the Minister for the Environment also announced the Government's commitment to undertake research to examine the impacts of the rock lobster fishing on the biodiversity of the marine park and undertake research that would contribute to an understanding of the effectiveness of management zoning. Consequently, of key importance and interest are 11 studies that can contribute information related to MS 7.2.3 Commercial Fishing (2) *Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park* and the seven studies that can contribute to MS 8.4 Research (3) *Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.*

Generally, the state of knowledge on the ecological and socioeconomic values of JBMP appears to be advanced. However, some clear gaps remain particularly in human usage, such as catch/effort of commercial and recreational fishing, the ecological significance of seabirds and the characterisation of the flora and fauna of selected intertidal reef platforms.

6 METADATA

The following tables were extracted from the JBMP metadata database.

Metadata ID 1

Generic Information

Contact Person/Principal Investigator	Astill, Helen
Contact Organisation	DAL Science & Engineering P/L.
Study Title	Jurien Boat Harbour water quality issues
Abstract	The Jurien Boat Harbour occasionally experiences conditions during winter in which wrack material accumulates within the harbour basin and is associated with rotten egg gas odour and occasional fish kills. The present study of water quality conditions in the harbour was undertaken to establish the mechanism(s) responsible for these poor water quality conditions and fish kills and examination of potential management options. A series of detailed water/sediment quality surveys were undertaken during conditions of good and poor water quality within the Jurien Boat Harbour. These were complemented by pseudo-regular profiles of dissolved oxygen at several points throughout the harbour basin.
Study Objectives	(1) To undertake a study of the water conditions in the Jurien Boat Harbour, to establish the mechanism(s) responsible for the current poor water quality and fish kills; and (2) to present potential management options to alleviate the current situation and to prevent future repetition of poor water quality within the harbour.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Boat Harbour

Other information

Keywords	WQ; pollutants; nutrients; eutrophication
Contributors	Bruce Hegge (DALSE)
Study Start Date	N/a
Study End Date	01-Jan-03
Hyperlink	N/a
References	DAL Science & Engineering Pty Ltd (2003) Jurien Boat Harbour water quality issues. Prepared for the Department of Planning and Infrastructure by DAL Science and Engineering Pty Ltd, Perth, Western Australia, Report 205/1. 24 p. (DAL Science & Engineering Pty Ltd 2003).

Supplementary Information	NOx, NH3, TOC, SRP, TP, TN, TKN, COD, DO
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment.

Metadata ID **2**

Generic Information

Contact Person/Principal Investigator	Babcock, Russ
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic ecosystem structure: Spatial and temporal variability in animal and plant diversity
Abstract	The SRFME study found a strong seasonal signal in algal biomass in all regions, however processes underlying this pattern varied for different locations, or for particular sites within locations depending on the dominant algal habitat type. Most locations showed lowest biomass in winter (e.g. Jurien, Marmion, Two Rocks and Bunbury) but others showed summer minima where the majority of sites were dominated by *Sargassum*. The proximal factors that drive these variations also differ among locations. Erosion of biomass is most likely to be the factor driving changes in *Ecklonia* dominated sites (Marmion, Two Rocks, Perth) while light limitation is likely to be a major factor at Bunbury. Where *Sargassum* dominates sites (Green Head) algal phenology can explain changes in biomass. In contrast to the pattern for biomass, algal community structure showed no seasonal trend which was also the case for invertebrates.
Study Objectives	(a) Characterise and quantify seasonal-scale temporal variation in algal and invertebrate assemblages. (b) Characterise and quantify region-, location- and site-level variation in algal, fish and invertebrate assemblages. (c) Characterise algal and invertebrate biodiversity and define identifiable algal community types. (d) Explore and identify environmental factors correlated with algal community structure variation at cross-shore, within location and within site levels. (e) Characterise and quantify correlations between algal community type and invertebrate assemblage structure and abundance. (f) Evaluate the use of remote sensing approaches for the mapping of shallow water habitats.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Fifty one sites were studied in the SRFME study; 9 sites from Green Head, 19 from Jurien Bay, 2 from Two Rocks, 9 from Marmion, 10 from Bunbury and 2 from Cape Naturaliste.

Other information

Keywords	Water quality; NH4; NOx; SRP; OP; nutrients; TSS; LOI; turbidity; LAC; Chlorophyll a; JBMP; macroalgae; seagrass; invertebrates; finfish.
Contributors	Geordie Clapin (CSIRO); Phillip England (CSIRO); Nicole Murphy (CSIRO); Julia Phillips (CSIRO); Alison Sampey (CSIRO); Mat Vanderklift (EZCU); Mark Westera (UWA).
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Babcock R, Clapin G, England P, Murphy N, Phillips J, Sampey A, Vanderklift MA, Westera M (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 187-196. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Babcock et al. 2006).
Supplementary Information	WQ; Nutrients; macroalgae; invertebrates; finfish.

Ecological or Social Value	7.1.2 Water & sediment quality 7.1.4 Seagrass meadows 7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish 8.4 Research
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment. 7.1.2 Water & sediment quality (4) Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution. 7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.

Metadata ID 3

Generic Information

Contact Person/Principal Investigator	Bancroft, Kevin
Contact Organisation	Department of Environment and Conservation
Study Title	Baseline water quality monitoring in the coastal waters of the Northern Agricultural Region
Abstract	In 2004, the Department of Conservation and Land Management (CALM) was awarded a Natural Heritage Trust grant to undertake a 12-month water quality survey of the Jurien Bay Marine Park (JBMP). The waters of JBMP are representative of the coastal waters of the Central West Coast (CWC) marine bioregion. The CWC marine bioregion encompasses the marine component of the Northern Agricultural Region (NAR). The Natural Heritage Trust grant was awarded by the Northern Agricultural Catchment Council (NACC) which identified the need for baseline water quality data to help manage water quality issues in the future. The waters of JBMP were chosen as the study location because they coincide with the West Midlands Sub-region of the NAR, they are within a gazetted marine park (i.e. are part of a formal management framework) and because further water quality surveys are to be undertaken in the future as part of the management of the marine park. These additional marine water quality data are needed, in addition to the intensive 12-month study funded by the NACC, to develop the required baseline (i.e. multiple years) data. The broad objective of the water quality survey was to characterise background water quality conditions for this locality over a 12-month period. To facilitate this objective, the project was separated into several components: 1. a review of existing water quality information (DAL Science & Engineering Pty Ltd 2004); 2. a risk assessment to identify: • current and potential anthropogenic threats to water quality in the NAR; • appropriate water quality parameters to measure; and • information gaps (Bancroft 2004); 3. a toxicant survey of water quality focussing on pesticides, hydrocarbons and heavy metals described in McAlpine et al. (2004); and 4. a 12-month marine water survey (February 2004 to January 2005) of selected nutrients and biophysical water quality parameters.

Study Objectives	The objective of the broad scale baseline water quality survey was to characterise the natural (i.e. background) spatial and temporal variability in water quality based on key biostimulant and physical indicators in the coastal waters of the Northern Agricultural Region, focusing on the West Midlands Sub-region, which is represented by JBMP. To achieve this, specific objectives in regards to the spatial and temporal variation in key chemical/biological and physical parameters were formulated. In the study area, there are spatial differences in physical characteristics (coastal morphology, depth gradients, barrier reef) and physical drivers (wave exposure, regional and local scale currents). These characteristics are expected to influence water quality. Data were collected to address the following four specific objectives for the broad scale baseline water quality survey: Objective 1. Characterise offshore/onshore (west to east) spatial variation in the background conditions for selected water quality parameters for the central west coast. Objective 2. Characterise the long-shore (north to south) spatial variation in the background conditions for selected water quality parameters for the central west coast. Objective 3. Characterise the medium-term (approximately monthly) temporal variation in the background conditions for selected water quality parameters for the central west coast. Objective 4. Characterise the short-term (approximately weekly) variation in the background conditions for selected water quality parameters for the Central West Coast.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park; Hill River; Fishermans Islands; Nambung Bay

Other information

Keywords	WQ; pollutants; nutrients; point sources; diffuse sources; Water quality; NH4; NOx; SRP; OP; nutrients; TSS; LOI; turbidity; LAC; Chlorophyll a; JBMP
Contributors	Kevin Crane (DEC); Lee Butcher (DEC); Tim Daly (DEC); Bruce Hegge (DALSE); Helen Astill
Study Start Date	1/1/2004
Study End Date	01-Feb-05
Hyperlink	T:\529-CALMscience\Shared Data\Marine Science Program\MSP_REPORTS\MCB reports\mms
References	Bancroft KP (2004) Central West Coast marine biodiversity and conservation program: Baseline water quality monitoring in the coastal waters of the central west coast focussing on Jurien Bay Marine Park. Field surveys 2004. Marine Conservation Branch, Department of Conservation and Land Management, Perth, Western Australia, Field Programme Report MMS/CWC/JBMP-80/2004. 32 p. (Bancroft 2004); Bancroft KP (2005) Central West Coast marine biodiversity and conservation program: Baseline water quality monitoring in the coastal waters of the Northern Agricultural Region, focussing on the West Midlands Sub-region. Field surveys 2004-2005. Marine Conservation Branch, Department of Conservation and Land Management, Perth, Western Australia, Data Report MMS/CWC/JBMP-83/2005. 153 p. (Bancroft 2005); DAL Science & Engineering Pty Ltd (2004) Review of water quality information for nearshore waters of the Dongara-Lancelin region, Western Australia. Report prepared for the Marine Conservation Branch, Department of Conservation and Land Management by DAL Science and Engineering Pty Ltd, Perth, Western Australia, Report 374/1 (DAL Science & Engineering Pty Ltd 2004).
Supplementary Information	Water quality, NH4, NOx, SRP, OP, nutrients, TSS, LOI, turbidity, LAC, Chlorophyll a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID 4

Generic Information

Contact Person/Principal Investigator	Bellchambers, Lynda
Contact Organisation	Department of Fisheries
Study Title	Effects of western rock lobster fishing on the deepwater ecosystems of the west coast of Western Australia
Abstract	N/a
Study Objectives	1. To identify gradients in the density/size distribution of western rock lobster to enable selection of representative areas. 2. To assess the catchability of western rock lobster and its relationship with population abundance and size structure. 3. To identify the relationship between the deep-water habitat and the density/size distribution of western rock lobster to enable a preliminary evaluation of the impact of lobster biomass removal in the deep-water.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Offshore

Other information

Keywords	Crayfish; WRL; Jurien Bay
Contributors	Lindsay Joll (DoF); Nick Caputi (DoF); Ian Wright (DoF); Roy Melville-Smith (DoF)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	N/a
Supplementary Information	Crayfish; WRL; Western rock lobster
Ecological or Social Value	7.2.3 Commercial fishing
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required.

Metadata ID 5

Generic Information

Contact Person/Principal Investigator	Berthot, Alexis
Contact Organisation	University of Western Australia
Study Title	Understanding the natural variability of currents along the Western Australian coastline: Inter-annual variability of the Leeuwin Current
Abstract	N/a
Study Objectives	1) To develop an enhanced understanding of the natural variability of the nearshore and continental shelf current systems off Western Australia. 2) To develop an advanced statistical methods to detect climate change signals. 3) To develop a regional climate change scenarios for circulation off Western Australia.

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	WA west coast

Other information

Keywords	N/a
Contributors	Charitha Pattiaratchi (UWA); Ming Feng (CSIRO); Gary Meyers (CSIRO); Yun Li (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a

References	Berthot A, Pattiaratchi C, Feng M, Meyers G, Li Y, Campbell E (2006) Understanding the natural variability of currents along the Western Australian coastline. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 117-131. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Berthot et al. 2006).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **6**

Generic Information

Contact Person/Principal Investigator	Bivoltsis, Alexia
Contact Organisation	Murdoch University
Study Title	A baited video study of fish faunas in the main habitat types and management zones of the Jurien Bay Marine Park
Abstract	The present study used a non-destructive and non-extractive baited remote underwater video system to determine the numbers of each fish species in samples obtained over two years from three main habitat types and three management zones in the Jurien Bay Marine Park (JBMP). Sampling, which was undertaken in summer and autumn of 2005/2006 and 2006/2007, was designed to produce data that could be used to test the following hypotheses. The number of species, number of individuals and species compositions of fishes each differ among (1) the three main and very different habitat types, i.e. reefs, seagrass and unvegetated sand, and (2) inner, mid and outer reefs, because these locations differ in such factors as their degree of exposure, distance from shore, depth and algal compositions. In contrast, it is hypothesised that, because the JBMP has only been established since 2003, the above three biotic variables for fishes in corresponding habitats do not differ among management zones, i.e. fished vs non-fished. Attention was also paid to determining whether, in any habitat or zone, the number of species, number of individuals and species compositions changed with season and/or differed between the two main regions, i.e. Green Head and Jurien Bay. A total of 86 fish species were recorded in the JBMP, with 72 being observed in reefs, 33 in seagrass and 20 over unvegetated sand. Forty-six species were observed only in reefs, eight only in seagrass and five only over sand. Twenty-three species were found in both reefs and seagrass, 13 species in reefs and sand, and two species were in both seagrass and sand habitats. The Western King Wrasse *Coris auricularis* accounted for as much as 60% of the number of fish observed over reefs, and no other species accounted for more than 5% of the total seen in this habitat type. The three most abundant species in seagrass were the Weeping Toadfish *Torquigener pleurogramma*, the Western Butterfish *Pentapodus vitta* and the Sea Trumpeter *Pelsartia humeralis*, with percentage contributions of ca 22, 17 and 11%, respectively. The most abundant species over sand were the Western Butterfish *Pentapodus vitta* (35%) and the Southern Eagle Ray *Myliobatis australis* (16%). The number of species and number of individuals were both significantly greater over reefs than in seagrass, which, in turn were greater than over sand. The species compositions in each of the three main habitat types were significantly different from each other. The most important typifying species for reefs was *C. auricularis*, while for seagrass it was the Brown-spotted Wrasse *Notolabrus parilus* and for sand it was *M. australis*. In the case of reef habitats, neither the number of species nor the number of individuals differed significantly between inner, mid and outer reefs. In contrast, the species compositions differed among each of those reef locations. The fauna in inner reefs was distinguished from that in outer reefs, i.e. the two reef locations that were most divergent in composition, by a relatively greater number and frequency of occurrence of the Lined Dottyback *Labracinus lineatus* and by the reverse situation for the Southern Maori Wrasse *Ophthalmolepis lineolatus*, the Red-banded Wrasse *Pseudolabrus biserialis* and the Breaksea Cod *Epinephelides armatus*. Furthermore, significantly greater numbers of *O. lineolatus* were recorded on outer reefs than on mid reefs.

Abstract (cont)	There were no indications that either the number of species, number of individuals or the species compositions differed among management zones, i.e. between those in which fishing is prohibited, partially prohibited and not prohibited. This finding is not surprising in view of the fact that the JBMP was only established in 2003. Although season did not influence conspicuously either the number of species, number of individuals or the species composition in the three habitats, it must be recognised that the seasonal data were restricted to two consecutive seasons (summer and autumn) in two consecutive years. The number of species and number of individuals were greater in Jurien Bay than in Green Head. Furthermore, the species composition in reefs and to a greater extent in seagrass differed markedly between these two regions. The regional difference in seagrass is almost certainly due to the fact that, in comparison with Jurien Bay, the seagrass meadows sampled at Green Head were denser and consisted predominantly of *Posidonia sinuosa* rather than a mixture of this species with Amphibolis spp. and interspersed sand patches. The algal composition of reef sites also differed between Green Head and Jurien Bay. Differences in length-frequency data for *C. auricularis* in different reef locations may reflect a slower rate of growth of this species in the outer than inner and mid reefs, which in turn may thus reflect an inhibitory influence of the harsher environment of outer reefs. Length-frequency data also demonstrated that the proportion of larger individuals of *N. parilus* was not as great in seagrass as over reefs, which is presumably due to a greater inhibitory effect of seagrass on colonisation by larger fish.
Study Objectives	A number of hypotheses were tested: (1) The number of species, the number of individuals and species compositions in reefs, seagrass and sand habitats are different, due predominantly to the fact that those habitats differ in structural complexity and each fish species is to some degree morphologically and/or behaviourally adapted to a certain habitat characteristic. Furthermore, number of species and number of individuals will be greatest in those habitats which are the most structurally complex, i.e. reefs, followed by seagrass and then sand. (2) The composition of fish communities on inner, mid and outer reefs are different due to those reefs occurring along a gradient of increasing distance from shore and thus experiencing changes in depth, degree of exposure and composition of their algal communities. (3) The number of species, the number of individuals and species composition of fish communities among and within management zones do not differ because fishing restrictions have not been in force for a long enough period of time and available data only spans two years. (4) The composition, diversity and abundance of the fish communities do not differ between seasons, because the chosen sampling method, i.e. BRUVs, records larger, more aggressive fish and not the smaller juveniles that appear seasonally due to recruitment pulses, as in the case with other sampling methods e.g. line fishing. (5) As the outer reef habitat is exposed to heavier wave action than the inner and mid reef habitats, and thus represents a harsher environment, this will be reflected in a difference in length compositions of fish in those environments. Furthermore as seagrass restricts occupancy by large fish more than do reefs, this will be reflected in the structure of the length-frequency distributions of species in those habitat types and specifically so in the case of *Notolabrus parilus*, which is found in both seagrass and reef.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	Finfish; BRUVs; MPA zones; CSIRO; fish community; zone effects; No take; MPA; effect of management zoning
Contributors	Ian Potter (MDU); David Fairclough (DoF)
Study Start Date	N/a
Study End Date	01-Nov-07
Hyperlink	N/a
References	Bivoltsis AK (2007) A baited video study of fish faunas in the main habitat types and management zones of the Jurien Bay Marine Park. Thesis (Honours), Murdoch University, Perth, Western Australia. 127 p. (Bivoltsis 2007).
Supplementary Information	N/a

Ecological or Social Value	7.1.8 Finfish 7.2.3 Commercial fishing 7.2.7 Recreational fishing 8.4 Research
JBMP Management Strategy	7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.

Metadata ID **7**

Generic Information

Contact Person/Principal Investigator	Brown, Sharon
Contact Organisation	Murdoch University
Study Title	The ecology of *Campanile symbolicum*, in the proposed Jurien Bay Marine Park
Abstract	N/a
Study Objectives	1) To determine the habitats where *C. symbolicum* occurs within the proposed JBMP. 2) To measure the abundance of *C. symbolicum* and to observe any patterns in population structure, and dispersion, for continued monitoring in relation to the stated objectives in the marine park plan. 3) To establish the diet of this mollusc, observing differences between sites and individuals. 4) To examine the relationship between *C. symbolicum* and the limpet *Hipponix conicus*, based on habitat and size of the host shell.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	invertebrate; molluscs
Contributors	Michael Borowitzka (MDU)
Study Start Date	N/a
Study End Date	30/10/2002
Hyperlink	N/a
References	Brown SL (2002) The ecology of *Campanile symbolicum*, in the proposed Jurien Bay Marine Park. Thesis (Honours), Murdoch University, Perth, Western Australia. 87 p. (Brown 2002)
Supplementary Information	This study suggest that the strong seasonal features seen in the climatology and oceanography.
Ecological or Social Value	7.1.7 Invertebrate communities
JBMP Management Strategy	7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park.

Metadata ID **8**

Generic Information

Contact Person/Principal Investigator	Buxton, Colin
Contact Organisation	Tasmanian Aquaculture and Fisheries Institute/University of Tasmania
Study Title	Evaluating the effectiveness of marine protected areas as a fisheries management tool
Abstract	Marine Protected Areas (MPAs) are being proclaimed around the world with the stated primary purposes of enhancing fisheries stocks and/or conserving marine biodiversity. In Australia, in response to a joint State/Commonwealth agreement to establish a National Representative System of MPAs (NRSMPA) to protect marine biodiversity, the focus is on their conservation role. However, fisheries enhancement is often suggested as an additional benefit of protection, potentially offsetting the cost of area closure in some cases. This study aimed to contribute to the debate on the positive and negative effects of the establishment of MPAs, documenting changes that have occurred in reserves following establishment, and particularly, attempting to understand more about their role as a fisheries management tool. It builds on a program initiated following the establishment of Tasmania's first 'no-take' MPAs a decade ago.

Study Objectives	1) To model the effects of closure on the rock lobster and abalone fisheries, with particular reference to: the redirection of effort; potential benefit in terms of additional biomass and as a recruitment source; and location, size and number of the MPAs. 2) To quantify relative abundance of selected fish, invertebrates and plant populations at representative sites prior to establishment of MPAs, and to identify changes in relative abundance following reserve establishment. This will be achieved by: a) Continuing the study of the effects of closure on the populations of exploited species inside and adjacent to MPAs, and (b) Establishing baseline surveys of proposed temperate MPA sites in southern Australia (e.g. Jervis Bay, NSW; Kent Group of Islands, Tas.; Wilsons Promontory, Vic.; Jurien Bay, W.A.) to evaluate before and after effects of closure. 3) To develop National guidelines for the assessment of MPAs in Australia, with particular reference to exploited species. 4) To provide specific management recommendations on the appropriate location, configuration and size of MPAs that will provide effective enhancement for coastal fisheries, and, to quantify the impacts of MPAs on local fisheries where they are proposed for reasons other than enhancing the fishery.

Geographic Position

Region Name	Temperate Australia
Extents (N,E,S,W)	Jervis Bay to Jurien Bay

Other information

Keywords	fish; mobile macroinvertebrates; macroalgae; iconic sessile invertebrates
Contributors	Neville Barrett (Utas); Malcolm Haddon (Utas); Caleb Gardner (Utas); Graham Edgar (Utas)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Buxton C, Barrett N, Haddon M, Gardner C, Edgar G (2006) Evaluating the effectiveness of marine protected areas as a fisheries management tool. Tasmanian Aquaculture and Fisheries Institutes. 1-391 p. (Buxton et al. 2006)
Supplementary Information	N/a
Ecological or Social Value	7.1.4 Seagrass meadows 7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish 8.4 Research 8.5 Monitoring
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID 9

Generic Information

Contact Person/Principal Investigator	Campbell, Richard
Contact Organisation	Department of Environment and Conservation
Study Title	Australian sea lion pup production
Abstract	Annual monitoring of sea lion pup production in the Central West Coast
Study Objectives	N/a

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	ASL; sea lion; pup production; fertility
Contributors	Kevin Crane (DEC); Lee Butcher (DEC)
Study Start Date	1/1/1988
Study End Date	1/12/2008
Hyperlink	N/a
References	N/a
Supplementary Information	number of sea lion pups
Ecological or Social Value	7.1.9 Sea lions 8.5 Monitoring
JBMP Management Strategy	7.1.9 Sea lions (3) Monitor trends in sea lion pup production each breeding season. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **10**

Generic Information

Contact Person/Principal Investigator	Campbell, Richard
Contact Organisation	Department of Fisheries
Study Title	Foraging ecology of Australian sea lions
Abstract	The foraging behaviour of pup, juvenile and adult female cohorts of the Australian sea lion was investigated on the mid-west coast of Western Australia by the use of satellite linked and archival microprocessor instruments. This population of Australian sea lions displayed typical benthic foraging behaviour as demonstrated previously for this species. All cohorts spent a majority of their time at sea diving in shallow water (0-20 m). All cohorts foraged in relatively close proximity (~30 km) to their tagging site, though occasional long foraging trips (>100 km) were recorded. Most indicators of diving performance were positively correlated with the size of animals and there were significant differences in mean dive depth and dive duration between cohorts, indicating that diving performance and capability increased with size and age. Pups were restricted to very shallow water foraging (<5 m) though a maximum depth of 16 m was recorded. Juveniles and adult females recorded maximum depths of around 50 m. Mean and maximum depths recorded for this population were well below that seen in other populations of this species, highlighting that there are large differences in foraging behaviour across the range of this species. Juvenile sea lions showed a strong preference to forage at night almost exclusively. Foraging trip lengths for this cohort were mostly between 12-15 hours long with animals departing around sunset and returning around sunrise. It is supposed that this behaviour is a specialisation to forage for nocturnally active prey items, octopus sp. and rock lobster, believed to be two of the major prey items for Australian sea lions. Adult females showed no such diel foraging preferences as they conducted longer foraging trips of at least 24 hours duration. Foraging range and diving behaviour of the sea lions in this study suggests that the current configuration of the mandatory SLED zone for the west coast rock lobster fishery covers over 95% of the foraging activity of vulnerable sized animals (pups and young juveniles). This suggests that the SLED zone is appropriately configured to significantly reduce the potential for incidental mortality of this threatened species in the rock lobster fishery. There appears to be considerable overlap of demersal gillnetting activity within the foraging range of the sea lion population around the mid-west coast of WA, though the fine-scale patterns of habitat use of sea lions and fishing effort is not presented in this study. Further study in this area is required to provide a thorough understanding of the nature of this interaction. There were no patterns evident in the foraging range and habitat use by sea lions in relation to the zones of the Jurien Bay Marine Park. These data should be considered as a baseline study as the recent formation of the park has not allowed for significant changes in species abundance and distribution to have accrued. Further studies of foraging behaviour over time will allow for the assessment of the role of MPAs and marine parks in the conservation management of pinnipeds in Australia.

Study Objectives	1) To understand the role of the Australian sea lion in the trophodynamics of the western continental shelf marine ecosystem. 2) To understand the foraging behaviour and dietary components of the Australian sea lion.

Geographic Position

Region Name	Southwest WA
Extents (N,E,S,W)	Abrolhos islands; Jurien Bay Marine Park; south coast

Other information

Keywords	ASL; Australian sea lion; Jurien Bay Marine Park; satellite tagging
Contributors	Glenn Hyndes (ECU)
Study Start Date	1/1/2006
Study End Date	01-Dec-08
Hyperlink	N/a
References	Campbell R (2005) Historical distribution and abundance of the Australian sea lion (*Neophoca cinerea*) on the west coast of Western Australia. Department of Fisheries, Perth, Western Australia, Fisheries Research 148. 42 p. (Campbell 2005); Campbell CA, Holley D (2007) Foraging ecology of Australian sea lions and the relationship with commercial fishing and marine protected areas. Draft final report to the Northern Agriculture Catchment Council. Department of Fisheries, Perth, Western Australia. 29 p. (Campbell & Holley 2007); Campbell RA, Gales NJ, Lento GM, Baker CS (2008) Islands in the sea: extreme female natal site fidelity in the Australian sea lion, *Neophoca cinerea*. Biology Letters. 4, 139-142 (Campbell et al. 2008).
Supplementary Information	Australian sea lion pup counts, Number of Adult ASL, Females, Males, Sub Adult males.
Ecological or Social Value	7.1.9 Sea lions
JBMP Management Strategy	7.1.9 Sea lions (3) Monitor trends in sea lion pup production each breeding season. 7.1.9 Sea lions (4) Quantify the level of sea lion entrapment and drowning in commercial fishing gear and, investigate ways to reduce this, through the development of a By-catch Action plan by DoF and in collaboration with the commercial fishing industry.

Metadata ID **11**

Generic Information

Contact Person/Principal Investigator	Campbell, Richard
Contact Organisation	Department of Fisheries
Study Title	Sea lion behaviour around lobster pots
Abstract	N/a
Study Objectives	To trial sea lion exclusion devices to determine the most effective means of eliminating sea lion mortality in rock lobster pots.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	ASL
Contributors	N/a
Study Start Date	9/23/2003
Study End Date	completed
Hyperlink	N/a
References	Department of Fisheries (2005) Proposed implementation of sea lion exclusion devices in the Western Rock Lobster Fishery. Department of Fisheries, Perth, Western Australia, Fisheries Management Paper 197. 9 p. (Campbell 2005).
Supplementary Information	N/a
Ecological or Social Value	7.1.9 Sea lions
JBMP Management Strategy	7.1.9 Sea lions (3) Quantify the level of sea lion entrapment and drowning in commercial fishing gear and, investigate ways to reduce this, through the development of a By-catch Action Plan by DoF and in collaboration with the commercial fishing industry.

Metadata ID 12

Generic Information

Contact Person/Principal Investigator	Chua, James
Contact Organisation	University of Western Australia
Study Title	Oceanographic modelling of Jurien Bay, Western Australia
Abstract	N/a
Study Objectives	To develop a three-dimensional oceanographic model to assist in the determination of: (a) The flushing characteristics in the vicinity of Jurien Bay with particular regard to the exchange of coastal waters with offshore waters for each season; (b) The particle movements on the surface under certain wind conditions typical to each season; and (c) The incorporation of groundwater flows for a baseline and post development scenario to assess the effects of an increase in nutrient influxes on the water quality

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay marine Park

Other information

Keywords	oceanographic modelling; physical processes
Contributors	Charitha Pattiaratchi (UWA)
Study Start Date	N/a
Study End Date	01-Nov-02
Hyperlink	N/a
References	Chua J (2002) Oceanographic modelling of Jurien Bay, Western Australia. Thesis (Honours), University of Western Australia, Perth, Western Australia. 100 p. (Chua 2002).
Supplementary Information	3D modelling, Hill R discharge
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID 13

Generic Information

Contact Person/Principal Investigator	Clementson, Lesley
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Bio-optics and remote sensing.
Abstract	Water Colour library, Coastal areas of southern Western Australia are unlike many other Australian coastal areas in which the absorbance and scattering properties can be dominated by high sediment loadings or by high concentrations of CDOM. By comparison, the coastal waters of Western Australia have very low absorption properties. The phytoplankton community composition appears to remain stable throughout the year, however there is a significant increase in phytoplankton biomass at all locations during the winter months (May – October) (Clementson et al. 2004). Results from this study suggest that the strong seasonal features seen in the climatology and oceanography of this region are not reflected in the bio-optical characteristics of the coastal waters inshore of the 50 m contour. The standard ocean colour algorithms used by sensors such as SeaWiFS and MODIS appear to produce accurate estimates of chlorophyll a, and hence phytoplankton biomass, most of the time. Although the absorption properties of the different in-water components are all considered low for coastal waters, at times, there is a higher contribution of CDOM than phytoplankton to the total absorption which results in the retrieved chl-a estimate to be an over-estimate of the in situ chlorophyll a as has been observed on occasion. This study has provided one of the most detailed spatial and temporal studies of bi-optical parameters for any area in Australia. The results suggest that standard ocean colour algorithms and the resulting ocean colour products can be used within the coastal region from Bunbury to Jurien Bay, providing an important tool for scientists and managers of this marine environment. Whether the standard algorithms can provide accurate results beyond the regional extent of this study will be determined by future work in areas to the north and south of this study area.

Study Objectives	1) To determine if and/or how the strong seasonal features observed in the climatology and oceanography off Western Australia affect the bio-optical characteristics of the shelf waters in this region. 2) To determine the validity of the standard algorithms used by the SeaWiFS, MODIS and MERIS ocean colour sensors for Western Australian waters. 3) To provide a strong base for developing an algorithm that captures the particular features of this region water column profiles.

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	three locations (transects) Bunbury, Jurien and Two Rocks; 6 sites along each transect

Other information

Keywords	water colour; remote sensing; SeaWiFS; nearshore to offshore; phytoplankton, water column profiles Temp; depth; conductivity; Chlorophyll a; water pigments
Contributors	Peter Fearns (CUT); Tim Harriden (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	www.srfme.org.au
References	Clementson L, Fearns P, Harriden T (2006) Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Biooptics and remote sensing. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 80-88. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Clementson et al. 2006).
Supplementary Information	Coastal areas of southern Western Australia are unlike many other Australian coastal areas in which the absorbance and scattering properties can be dominated by high sediment loadings or by high concentrations of CDOM. By comparison, the coastal waters of Western Australia have very low absorption properties. The phytoplankton community composition appears to remain stable throughout the year, however there is a significant increase in phytoplankton biomass at all locations during the winter months (May – October) (Clementson et al. 2004). Results from this study suggest that the strong seasonal features seen in the climatology and oceanography of this region are not reflected in the bio-optical characteristics of the coastal waters inshore of the 50 m contour. The standard ocean colour algorithms used by sensors such as SeaWiFS and MODIS appear to produce accurate estimates of chlorophyll a, and hence phytoplankton biomass, most of the time. Although the absorption properties of the different in-water components are all considered low for coastal waters, at times, there is a higher contribution of CDOM than phytoplankton to the total absorption which results in the retrieved chl a estimate to be an over-estimate of the in situ chlorophyll a as has been observed on occasion. This study has provided one of the most detailed spatial and temporal studies of bi-optical parameters for any area in Australia. The results suggest that standard ocean colour algorithms and the resulting ocean colour products can be used within the coastal region from Bunbury to Jurien Bay, providing an important tool for scientists and managers of this marine environment. Whether the standard algorithms can provide accurate results beyond the regional extent of this study will be determined by future work in areas to the North and south of this study area.
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **14**

Generic Information

Contact Person/Principal Investigator	Crane, Kevin
Contact Organisation	Department of Environment and Conservation
Study Title	Annual water quality monitoring of potential impact sites in JBMP
Abstract	Annual water quality monitoring.
Study Objectives	To monitor the water quality at representative reference and potential impact sites in the JBMP.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	Water quality; NH4; NOx; SRP; OP; nutrients; TSS; LOI; turbidity; LAC; Chlorophyll a; JBMP
Contributors	Kevin Bancroft (DEC); Lee Butcher (DEC)
Study Start Date	2/1/2004
Study End Date	ongoing monitoring
Hyperlink	T:\529-CALMscience\Shared Data\Marine Science Program\MSP_REPORTS\MCB reports\mms
References	N/a
Supplementary Information	Water quality, NH4, NOx, SRP, OP, nutrients, TSS, LOI, turbidity, LAC, Chlorophyll a
Ecological or Social Value	7.1.2 Water & sediment quality 8.5 Monitoring
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **15**

Generic Information

Contact Person/Principal Investigator	Crane, Kevin
Contact Organisation	Department of Environment and Conservation
Study Title	Annual human use monitoring in JBMP
Abstract	Annual survey of human activities on select peak dates to investigate spatial and temporal trends of different activities within different zone.
Study Objectives	to monitor human activities on select peak dates to investigate spatial and temporal trends of different activities within different zones.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	Human use; Metro counters; aerial surveys; sea rescue surveys; pressures
Contributors	Tim Grubba (DEC)
Study Start Date	3/1/2004
Study End Date	ongoing monitoring
Hyperlink	N/a
References	N/a
Supplementary Information	cray pots, cray boats, recreational boats, activity
Ecological or Social Value	7.1.3 Intertidal reef platforms 7.2.3 Commercial fishing 7.2.5 Coastal use 7.2.6 Seascapes 7.2.7 Recreational fishing 7.2.8 Water sports 8.5 Monitoring

JBMP Management Strategy	7.1.3 Intertidal reef platforms (3) Assess the nature, level and potential impacts of human activities on intertidal reef platforms within the marine park. 7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.5 Coastal use (4) Identify popular beaches in the marine park and beaches that are potentially environmentally sensitive to RV use. 7.2.6 Seascapes (1) Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required. 7.2.8 Water sports (2) Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing water sports in the marine park. 8.5 Monitoring (3) Ensure that proponents of development proposals or activities with the potential to impact on the marine park's values conduct appropriate compliance monitoring programs. 8.7 Direct Management Intervention (1) Identify areas of existing human impacts in the marine park. 8.7 Direct Management Intervention (3) Monitor human usage (visitor numbers and high use areas) and, consistent with available resources, provide visitor facilities where appropriate.

Metadata ID 16

Generic Information

Contact Person/Principal Investigator	de Lestang, Simon
Contact Organisation	Department of Fisheries
Study Title	The effects of management zoning (Sanctuary Zone) on populations of Western Rock Lobsters.
Abstract	Assessing the population abundance and demographic of western rock lobsters inside and outside of no-take areas. With the implementation of Jurien Bay Marine Park in 2003, various management zones were established. Fisheries notices were published in the WA Govt Gazette in 2005 and are now enforceable. Lobster data was collected inside (n=65) and outside (n=65) the Boullanger Island Sanctuary Zone and the Special Purpose (Puerulus) Zone. The objectives of the project are: Monitor the growth of a large size range of female and male WRL in an un-fished location; Assess relative pot catchability of a large size range of WRL; Compare catch rates of WRL in sanctuary zones with those in adjacent areas; Compare emigration rates of WRL from sanctuary zones with those determined for adjacent areas. Sampling consists of setting commercial WRL pots with closed escape gaps and SLEDS fitted, fished for 24 h. 100 pots are fished over two days. Fishing will be restricted to the 2.5 km north and south of the Boullanger Island Sanctuary Zone. A record of carapace length, sex, moult stage, reproductive stage, limb and antenna condition will be made. All lobsters captured within 1km of the Boullanger Island sanctuary zone will be ventrally tagged with plastic T-bar tags before being released at the capture location.
Study Objectives	To assess the population abundance and demographic of western rock lobsters inside and outside of no-take areas by: (a) monitoring the growth of a large size range of female and male WRL in an un-fished location. (b) assessing relative pot catchability of a large size range of WRL. (c) comparing catch rates of WRL in sanctuary zones with those in adjacent areas. (d) comparing emigration rates of WRL from sanctuary zones with those determined for adjacent areas.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park; Boullanger Island Sanctuary Zone; and ; Special Purpose (Puerulus) Zone. 30°18.66'; 115°01.00'; 30°21.17'; 114°59.67'

Other information

Keywords	WRL; Jurien Bay Marine Park; crayfish; sanctuary zone; no-take areas; NTA; populations
Contributors	N/a
Study Start Date	10/1/2005

Study End Date	(planned to be) ongoing
Hyperlink	N/a
References	N/a
Supplementary Information	crayfish; pots
Ecological or Social Value	7.2.3 Commercial fishing 7.2.7 Recreational fishing 8.4 Research
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.

Metadata ID **17**

Generic Information

Contact Person/Principal Investigator	Edgar, Graham
Contact Organisation	University of Tasmania
Study Title	Ecosystem monitoring in different management zones within Jurien Bay Marine Park
Abstract	The objective of the project is to provide baseline data on the biodiversity of marine habitats within various management zones in the proposed Jurien Bay Marine Park. Quantitative data are now available on densities of fishes, macroinvertebrates and plants on lagoonal reefs in the Jurien Bay Marine Park. Relative to variation between sites, the flora and fauna at different sites generally exhibited a low level of change between years for sites with data collected previously. With the exception of somewhat anomalous sites in the north near Fishermans Island, the biotic composition of sites was interspersed with respect to the three major MPA management zones – sanctuary, scientific reference and general use, with no zone possessing a predominance of one particular biotic assemblage type. Thus, data collected encompassed the range of variability within zones, allowing rigorous comparative analysis of change through time. Because a wide range of species have been examined, ecosystem shifts as well as changes in the abundance of target species should be detectable following the protection of areas from fishing. Analysis of the baseline data set indicated no significant differences between zones in number of fishes, macro-invertebrate or plant taxa per 50 m transect. Once fishing restrictions pertaining to different management zones are adequately enforced, surveys should be repeated on an annual basis until differences between zones stabilise. Such a monitoring scheme would provide time-series information on trends in the abundance of species of interest in different management zones, information on indirect impacts of both rock lobster fishing and general recreational and commercial fishing on ecosystems, and regional changes associated with such factors as climate change.
Study Objectives	To investigate the effectiveness of management zoning in the JBMP by: (a) collecting baseline biodiversity data in different management zones prior park gazettal; and (b) continuing long term monitoring of biodiversity in the different management zones after park gazettal.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	42 sites within JBMP

Other information

Keywords	effectiveness of zones; MPA effectiveness; effects of fishing
Contributors	Neville Barrett (Utas); Kevin Bancroft (MSP DEC); Kevin Crane (DEC)
Study Start Date	9/1/1999
Study End Date	ongoing monitoring
Hyperlink	N/a

References	Barrett N (2000) Jurien Bay MPA survey data report. Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart, Tasmania (Barrett 2000); Barrett N, Edgar G, Morton A (2002) A baseline survey for ecosystem monitoring within the Jurien Bay marine protected area. Tasmanian Aquaculture & Fisheries Institute, University of Tasmania, Hobart, Tasmania. 33 p. (Barrett et al. 2002); Edgar G, Barrett N, Bancroft KP (2003) Baseline surveys for ecosystem monitoring within Jurien Bay Marine Park 1999-2003. Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart, Tasmania, Internal Report. 28 p. (Edgar et al. 2003); Edgar G, Barrett N, Bancroft KP, Brook J, Crane K (2005) Ecosystem monitoring in different management zones within Jurien Bay Marine Park - Results of 2004 surveys. Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart, Tasmania, Internal Report. 33 p. (Edgar et al. 2005); Edgar G, Barrett N, Bancroft KP, Babcock R (2006) Baseline biodiversity monitoring in the proposed Jurien Bay Marine Park, survey 3. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing , J Heine), pp. 219-221. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Edgar et al. 2006); Edgar G, Barrett BJ, Lenel D, Crane K, Bancroft KP (in prep) Ecosystem monitoring of subtidal reefs in different management zones in the Jurien Bay Marine Park 1999–2007. Tasmanian Aquaculture and Fisheries Institute , University of Tasmania, Hobart, Tasmania (Edgar et al. in prep).
Supplementary Information	macroalgae cover & biomass, fish communities, large mobile invertebrates, management zoning
Ecological or Social Value	7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish 8.4 Research 8.5 Monitoring
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **18**

Generic Information

Contact Person/Principal Investigator	Fearns, Peter
Contact Organisation	Curtin University of Technology
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Shallow water habitat mapping
Abstract	In SRFME we aimed to advance the science of hyperspectral remote sensing for application as a mapping and monitoring tool in shallow Western Australian coastal environments. Here we describe initial efforts to map benthic habitat in the Jurien Bay region using the airborne sensor, HyMap (HyVista Corporation, Sydney). We present results of analysis of the northern section of one of the HyMap strips; chosen because it had good representation of each habitat type. The remote sensing-derived results are validated by comparison with video based ground truthing information. This work represents the first of its kind undertaken in WA.
Study Objectives	To develop the use of hyperspectral remote sensing for application as a mapping and monitoring tool in shallow Western Australian coastal environments.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Two Rocks; Jurien Bay

Other information

Keywords	habitat mapping; autoclassification; HyVista; HyMap
Contributors	Dirk Slawinski (CSIRO); Phillip England (CSIRO); Geordie Clapin (CSIRO); Julia Phillips (CSIRO); Russ Babcock (CSIRO); Wojciech Klonowski (CUT)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Fearns P, Slawinski D, England P, Clapin G, Phillips J, Babcock R, Klonowski W (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Shallow water habitat mapping. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 231-238. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Fearns et al. 2006).
Supplementary Information	Seagrass; brown algae; sand; brown algae
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.4 Seagrass meadows 7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.2 Water & sediment quality (4) Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution.

Metadata ID **19**

Generic Information

Contact Person/Principal Investigator	Fromont, Jane
Contact Organisation	Western Australian Museum
Study Title	Biodiversity of Marine Fauna on the Central West Coast
Abstract	This is the final milestone report for the Central West Coast project undertaken by the Western Australian Museum (WAM) and funded by SRFME. The fieldwork component of this study was completed in two phases, Jurien Bay and Green Head in 2005 and Cervantes and Dongara in 2006. The identification stage of this project is almost complete with some invertebrate specimens from quadrat sampling remaining to be identified. This study reported 128 species of fish, 124 species of molluscs, 185 species of sponges and 14 species of Cnidaria. With Museum records and data from previous studies also included, the total number of echinoderm species for the region is now 76 and for the crustacea is 145 species. This gives a total of 544 invertebrate species in five phyla recorded from the region. Results from the identification of crustacea, fish, echinoderm and mollusc specimens suggest that the shallow water marine fauna of the region has a greater component of warm temperate (51-66%) than tropical species (31-46%). Some taxa also had a notable number of endemic species. Fifteen percent of the crustacean species recorded were Western Australian endemic species, suggesting that the Central West Coast could be an endemic species hotspot for crustacea. The number of echinoderm endemic species (27%) was higher than that recorded from the Houtman Abrolhos (21%). This was the same situation for the molluscs with 13% on the Central West Coast and 12% at the Houtman Abrolhos. The fish endemic species component amounted to 23% of the total fish fauna reported. There were also a considerable number of range extensions for some of the species found. This occurred in the Crustacea, Echinodermata, Mollusca, and Cnidaria. Only two of the isopod species identified in this study had previously been recorded from the Central West Coast, making 18 of the species new records for the region. This study reports the incidence of the introduced isopod species, *Sphaeroma serratum*, from the Jurien Bay marina in high density. All specimens 5 mm or greater in size collected from this fieldwork have been fine sorted to species level for identification. All specimens less than 5mm in size have been fine sorted for weight determinations and storage in the Museum collections. All identified specimens have been entered into the WA Museum collections database and lodged in the Museum collections.

Study Objectives	(1) To investigate benthic community biodiversity on the Central West Coast of Australia. (2) To quantitatively document the fishes, molluscs, crustaceans, echinoderms, scleractinian corals and sponges of the region. (3) To determine if the biota present in the Jurien Bay Marine Park is representative of the region. (4) To determine the proportions of tropical, temperate and endemic biota in the region.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Green Head; Jurien Bay; Cervantes Dongara; 31 sites

Other information

Keywords	biodiversity survey; faun & flora surveys; molluscs; corals; echinoderms; fishes; sponges; decapod crustaceans
Contributors	C Haas (WAM); Loisette Marsh (WAM); Glen Moore (WAM); Mark Salotti (WAM); M Titelius (WAM); C Whisson (WAM)
Study Start Date	N/a
Study End Date	01-Sep-06
Hyperlink	http://www.srfme.org.au/documents/SRFME_Wells.pdf
References	Fromont J, Hass C, Marsh L, Moore G, Salotti M, Titelius M, Whisson C (2006) Biodiversity of marine fauna on the Central West Coast. Western Australian Museum, Perth, Western Australia, SRFME Final Milestone Report. 86 p. (Fromont et al. 2006a); Fromont J, Marsh L, Moore G, Salotti M, Titelius M, Whisson C (2006) Biodiversity of marine fauna on the Central West Coast. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 169-180. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Fromont et al. 2006b).
Supplementary Information	molluscs, corals, echinoderms, fishes; sponges, decapod crustaceans
Ecological or Social Value	7.1.7 Invertebrate communities 7.1.8 Finfish
JBMP Management Strategy	7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.

Metadata ID **20**

Generic Information

Contact Person/Principal Investigator	Grubba, Tim
Contact Organisation	Department of Environment and Conservation
Study Title	Human usage monitoring in the marine and coastal areas of the northern Agricultural Region focusing on the West Midland sub-region
Abstract	The Central West Coast (CWC) marine bioregion (IMCRA, 1997) extends for about 600 kilometres, from Trigg Island to Kalbarri. The CWC marine bioregion is a zone of biogeographical overlap between the warm tropical waters of northwest Australia and the cool, temperate waters off the south coast of Western Australia. The marine and coastal environs of the CWC marine bioregion comprise a unique combination of offshore reefs, islands and sheltered lagoons. The marine biota of the bioregion comprises of an unusual mix of tropical and temperate species and includes many endemic species. The CWC marine bioregion contains more seagrass species than any other marine bioregion in Australia (Larkum & Hartog, 1989). Located within the CWC marine bioregion, the Jurien Bay with its pleasant Mediterranean climate, ease of accessibility from the Perth metropolitan area, sheltered lagoonal waters, natural sites and diverse and abundant fauna and flora make it a popular destination for people who use the area primarily for recreational fishing-based activities but also a variety of water-based activities (e.g. SCUBA diving, surfing, snorkelling) and coastal and island based activities (e.g. beach activities and camping). The region is also becoming increasingly urbanised with planned residential infrastructure development.

Abstract continued	The region maintains a commercial importance as a focal point for commercial western rock lobster fishing, which has the highest economic value of any single species commercial fishery in Australia. The State Government under the 1998 policy document New Horizons The Way Ahead In Marine Conservation and Management (Government of Western Australia, 1998) and the report of the Marine Parks and Reserves Selection Working Group, A Representative Marine Reserve System for Western Australia (MPRSWG, 1994) identified the need to adequately represent the CWC marine bioregion limestone reef system a major ecosystem with the bioregion through the creation of the Jurien Bay Marine Park in 2003. The Park is located 200 kilometres north of Perth and extends from Wedge Island to Green Head. The JBMP was created as a multiple use marine park to primarily ensure conservation of the area's biodiversity while managing the area for recreational and commercial activities. The JBMP is the State's first marine conservation reserve to adopt a best practice outcome-based marine management system built around a number of key overarching management strategies as defined in the Jurien Bay Marine Park Management Plan (2004 – 2014) (CALM, 2005), annual work plans, and a performance assessment framework (MPRA, 2002 and CALM, 2005 - draft). The data presented in this report were collected as part of the JBMP Human Usage Monitoring Program which is being developed and implemented to meet the social information requirements of the performance assessment reporting framework, as identified in the Jurien Bay Marine Park Management Plan (2004 – 2014) (CALM, 2005) and summarised in Tables 1 and 2. The collection of this data has also assisted in the development of monitoring procedures that will be included in the draft Manual of Standard Operations Procedures (SOP) (Grubba et. al., 2005). While this report reviews a number of programs that currently collect social data relevant to the Jurien region, the acquisition of much of the data is pending the development of formal agreements being made in regards to program integration with the various custodians of the data. Surveys conducted during 2004 indicate that the Jurien Bay area has a peak in human usage during the Easter long-weekend. Usage tends to be highest in camping areas, day use sites and in the vicinity of boat launching areas. However, nearly all marine park waters and adjacent coastline are subject to some level of usage. Activities in and adjacent to the park tend to be primarily extractive with high levels of commercial and recreational fishing for western rock lobster (using pots and taking by hand) and recreational fishing (beach and boat based). Recreational beach fishing is a major coastal activity and boat based fishing tends to focus on the deeper waters west of the park. Surveys conducted during Easter indicate that while fishing effort was high, the actual take of target fish (e.g. Dhufish) was relatively low. Surveys identified that the majority of park visitors, particularly during Easter are from Perth and camp locally or stay in the Jurien or Cervantes town sites. Awareness of the park and multiple-use management is high among visitors, although the majority had limited knowledge of the park boundaries and location of zones. Most visitors had a high level of awareness of the park's ecological values and the potential threats to them, and typically had gained this level of awareness and knowledge through brochures and other generic information sources.
Study Objectives	To develop a better understanding of the nature, level and spatial and temporal patterns of human usage and how these potentially impact the ecological and social values of the JBMP.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	indigenous heritage; maritime heritage; aquaculture; coastal use; seascapes; recreational fishing; water sports; marine nature-based tourism; petroleum; scientific research; education
Contributors	Suzanne Gattrell (DEC); Lee Butcher (DEC); Kate Fitzgerald (DEC)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a

References	Grubba T, Butcher L, Fitzgerald K (2004) Human Usage Monitoring Program (HUMP): Jurien Bay Marine Park aerial survey, observation surveys and visitor questionnaire (Easter 9-12 April 2004). Department of Conservation and Land Management: Marine Conservation Branch, Perth, Western Australia, Field Program Report MMS/CWC/JBMP-76/2004. 64 p. (Grubba et al. 2004); Grubba T, Butcher L, Fitzgerald K (2005) Central West Coast Marine Biodiversity and Conservation Programme: Human usage monitoring in marine and coastal areas of the Northern Agricultural Region, focussing on the West Midlands Sub-region: Manual of standard operations procedures. Marine Conservation Branch, Department of Conservation and Land Management, Perth, Western Australia, Report. 89 p. (Grubba et al. 2005a); Grubba T, Butcher L, Fitzgerald K (2005) Human Usage Monitoring Program: Jurien Bay Marine Park: Human Usage Data 2004. Marine Conservation Branch, Department of Conservation and Land Management, Perth, Western Australia, Data Report MMS/CWC/JBMP- 85/2005. 96 p. (Grubba et al. 2005b).
Supplementary Information	human activity, social and ecological values, passive activities, extractive activities, management zoning
Ecological or Social Value	7.1.3 Intertidal reef platforms 7.2.3 Commercial fishing 7.2.5 Coastal use 7.2.6 Seascapes 7.2.7 Recreational fishing 7.2.8 Water sports 8.5 Monitoring 8.7 Direct management intervention
JBMP Management Strategy	7.1.3 Intertidal reef platforms (3) Assess the nature, level and potential impacts of human activities on intertidal reef platforms within the marine park. 7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.5 Coastal use (4) Identify popular beaches in the marine park and beaches that are potentially environmentally sensitive to RV use. 7.2.6 Seascapes (1) Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required. 7.2.8 Water sports (2) Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing water sports in the marine park. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs. 8.7 Direct Management Intervention (1) Identify areas of existing human impacts in the marine park. 8.7 Direct Management Intervention (3) Monitor human usage (visitor numbers and high use areas) and, consistent with available resources, provide visitor facilities where appropriate.

Metadata ID **21**

Generic Information

Contact Person/Principal Investigator	Hanson, Christine
Contact Organisation	University of Western Australia
Study Title	Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Phytoplankton Community Structure

Abstract	Assessment of phytoplankton species composition is of high importance in studies of pelagic ecology. Standard methods for identification and enumeration of phytoplankton have primarily involved light microscopic examination of preserved cells (Utermohl, 1958; Willen, 1976), with the picoplanktonic fraction (cells < 3 µm) analysed using epi-fluorescence microscopy (Murphy and Haugen, 1985) and/or flow cytometry (Olson et al. 1985; Simon et al. 1994). These are often one of the more time consuming data sets to obtain and can have a high coefficient of variation associated with the cells counted. Pigment analysis (via High Performance Liquid Chromatography or HPLC) and diagnostic pigments are also used to estimate community composition and concentration with a higher degree of reproducibility than microscopic methods. Pigments which relate specifically to an algal class are termed marker or diagnostic pigments (Jeffrey and Vesk, 1997; Jeffrey and Wright, 2006) and some of these diagnostic pigments are found exclusively in one algal class (e.g. prasinoxanthin which is only found in prasinophytes) while others are the principal pigments of one class but are also found in other classes (e.g. fucoxanthin in diatoms and some haptophytes; 19'-butanoyloxyfucoxanthin (19BF) in chrysophytes and some haptophytes). The presence or absence of these diagnostic pigments can provide a crude guide to the composition of a phytoplankton community including identifying classes of small flagellates that cannot be determined by light microscopy techniques, and drastically reduce sample processing time compared to microscopic methods (as discussed in Hill et al. 2005; Wanstrand and Snoeijs, 2006).
Study Objectives	To assessment spatial and temporal phytoplankton community composition and distributions off the west coast of Western Australia.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Two Rocks

Other information

Keywords	phytoplankton; biological oceanography
Contributors	Lesley Clementson (CSIRO); Peter Thompson (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	www.srfme.org.au
References	Hanson C, Clementson L, Thompson PA (2006) Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Phytoplankton community structure. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 71-80. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Hanson et al. 2006); Hanson CE, Waite AM, Thompson PA, Pattiaratchi CB (2007) Phytoplankton community structure and nitrogen nutrition in Leeuwin Current and coastal waters off the Gascoyne region of Western Australia. Deep-Sea Research Part II. 54, 902-924 (Hanson et al. 2007b).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **22**

Generic Information

Contact Person/Principal Investigator	Holloway, Kellie
Contact Organisation	University of Western Australia
Study Title	Characterising the hydrodynamics of Jurien Bay, Western Australia

Abstract	Jurien Bay is a small town on the Central West Coast of Western Australia. With an expanding economy based on fishing, aquaculture and tourism and proximity to Perth, Jurien Bay is expected to grow rapidly over the coming years. Increasing anthropogenic pressure has the potential to compromise the currently pristine natural environment. The livelihood of the town and the economy relies on the quality of the marine environment in particular; hence it is important to understand the dynamics of the system. This study investigates the characteristics of circulation in Essex Lagoon, a deep basin to the south of the main Jurien Bay settlement. This area is a particularly important for investigation due to the future impact of the adjacent Ardross Estates development and the aquaculture zone located within Essex Lagoon. An Acoustic Doppler Current Profiler (ADCP) was deployed in summer 2006 to obtain profiles of current velocity and magnitude over three weeks in Essex Lagoon. This data complemented similar data collected during winter 2002 in Essex Lagoon and was used to carry out a seasonal comparison of currents, to characterise circulation patterns and to examine the potential for outside forcing such as atmospheric pressure systems and the Leeuwin Current to influence circulation. A distinct seasonality was found in the circulation characteristics between summer and winter and this was primarily influenced by seasonality in the wind field. Circulation in summer is dominated by the effect of the diurnal sea breeze, while circulation in winter is influenced by the passing of winter storms. Other mechanisms found to affect currents and circulation were seiching, tides to a small extent and meteorology. It is thought that under extended periods of calm winds, flushing and mixing may become restricted. The influence of the Leeuwin Current was also detected in the nearshore waters by advection. The incursion of Leeuwin Current waters into Jurien Bay is thought to be linked to the wind field and to characteristic meanders and eddies to the north, near the Abrolhos Islands. Future directions for this work include linking the known circulation characteristics with density characteristics (salinity, temperature) in order to better understand the stratification and mixing and the influence of the Leeuwin Current. Also, determining the annual frequency and duration of events that may lead to periods of limited flushing would be a useful exercise.
Study Objectives	1) To investigate the characteristics of circulation in Essex Lagoon, a deep basin south of the main Jurien Bay. 2) To examine the seasonality of currents in Jurien Bay. 3) To characterise the water circulation patterns in Essex Lagoon. 4) To examine the potential for outside influences such as weather systems and the Leeuwin Current to affect the circulation in Jurien Bay.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay

Other information

Keywords	physical oceanography oceanography; Leeuwin Current
Contributors	Charitha Pattiaratchi (UWA)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Holloway K (2006) Characterizing the hydrodynamics of Jurien Bay, Western Australia. Thesis (Honours), University of Western Australia, Perth, Western Australia. 102 p. (Holloway 2006);
Supplementary Information	current velocity and direction, sea temperature, Wind velocity and direction
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID 23

Generic Information

Contact Person/Principal Investigator	Huisman, John
Contact Organisation	Murdoch University
Study Title	Providing marine algal taxonomic expertise to coastal ecosystem and biodiversity in Western Australia, a core CSIRO work priority area, and preparation of an interactive key to the seagrass epiphytes
Abstract	This project has several objectives. The first is to provide taxonomic expertise to SRFME core research projects, the results of which will enhance our knowledge of Western Australia's marine flora and will be used to provide information to establish and update CALM's 'Florabase', the web-based repository of information pertaining to Western Australia's plants. The second objective is to construct an interactive key to the algal epiphytes occurring on seagrasses. This key will use the program LUCID and will be an extremely valuable resource for monitoring the health of Western Australia's seagrasses, as epiphyte composition and load is regarded as a key indicator of ecosystem health.
Study Objectives	1) To provide taxonomic expertise to SRFME core research projects, the results of which will enhance our knowledge of Western Australia's marine flora. 2) To provide information to establish and update CALM's 'FloraBase', the web-based repository of information pertaining to Western Australia's plants. 3) To construct an interactive key to the algal epiphytes occurring on seagrasses.

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	Jurien Bay; Two Rocks; Marmion; Rottnest; Geographe Bay

Other information

Keywords	taxonomy; macroalgae; WA Herbarium
Contributors	Russ Babcock (CSIRO); Julia Phillips (CSIRO); Chris Simpson (DEC); Neville Marchant (DEC)
Study Start Date	N/a
Study End Date	completed
Hyperlink	http://florabase.dec.wa.gov.au/
References	Huisman J, Babcock R, Phillips J, Simpson C, Marchant N (2006) Providing marine algal taxonomic expertise to coastal ecosystem and biodiversity in Western Australia, a core CSIRO work priority area, and preparation of an interactive key to the seagrass epiphytes. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 222-224. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Huisman et al. 2006).
Supplementary Information	taxonomy of macroalgae
Ecological or Social Value	7.1.4 Seagrass meadows 7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID 24

Generic Information

Contact Person/Principal Investigator	Hyndes, Glenn
Contact Organisation	Edith Cowan University
Study Title	Ecological Interactions in Coastal Marine Ecosystems: Trophodynamics
Abstract	N/a
Study Objectives	To determine the trophic linkages of different habitats within a coastal marine environment: (a) to determine the source of primary production that drives the food web for major consumers in a coastal marine environment using biomarker techniques; (b) to determine the spatial and temporal variability in the source of production for major consumers in a coastal marine environment; and (c) to determine the movement patterns of detached reef algae and seagrass into adjacent coastal marine habitats.

Geographic Position

Region Name	Jurien Bay Marine Park
Extents (N,E,S,W)	JBMP; Fishermans Island; Boullanger Island

Other information

Keywords	finfish; crayfish; commercial fishing; MPA; WRL
Contributors	Christine Hanson (ECU); Emily Gates (ECU); Mat Vanderklift (CSIRO); Russ Babcock (CSIRO)
Study Start Date	5/31/2005
Study End Date	30-Nov-07
Hyperlink	www.srfme.org.au
References	Hanson C, Pattiaratchi C, Waite A (2005) Seasonal production regimes off south-western Australia: influence of the Capes and Leeuwin Currents on phytoplankton dynamics. Marine and Freshwater Research. 56, 1011-1026 (Hanson et al. 2005); Hyndes G, Hanson C, Gates E, Vanderklift MA, Babcock R (2006) Ecological interactions in coastal marine ecosystems: Trophodynamics. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 131-143. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Hyndes et al. 2006a); Hanson CE, Pesant S, Waite AM, Pattiaratchi CB (2007) Assessing the magnitude and significance of deep chlorophyll maxima of the coastal eastern Indian Ocean. Deep-Sea Research Part II. 54, 884-901 (Hanson et al. 2007a).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.4 Seagrass meadows 7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID 25

Generic Information

Contact Person/Principal Investigator	Hyndes, Glenn
Contact Organisation	Edith Cowan University
Study Title	Ecological Interactions in Coastal Marine Ecosystems: Rock Lobster
Abstract	N/a
Study Objectives	The broad aim of this study is to determine the habitat use and trophic links of western rock lobster in the mid-west region. This broad aim will be achieved through investigating the following specific objectives: (a) to determine the densities and size structure of western rock lobster in a range of different benthic habitats; (b) to determine the movement patterns of western rock lobster between reefs and foraging habitats; (c) to investigate dietary changes of western rock lobster with changes in size, habitat use and season; and (d) to provide baseline data that will allow the success of sanctuary zones in terms of increasing lobster abundance to be assessed in the future.

Geographic Position

Region Name	Jurien Bay Marine Park
Extents (N,E,S,W)	JBMP; Fishermans Island; Boullanger Island

Other information

Keywords	WRL; crayfish; JBMP
Contributors	Lachlan MacArthur (ECU); Russ Babcock (CSIRO); Mat Vanderklift (CSIRO)
Study Start Date	N/a
Study End Date	01-Nov-07
Hyperlink	http://www.srfme.org.au/collab/collab.htm

References	Hyndes G, MacAurthur L, Babcock R, Vanderklift MA (2006) Ecological interactions in coastal marine ecosystems: Rock lobster. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 143-154. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Hyndes et al. 2006b); MacArthur LD, Babcock RC, Hyndes GA (2008) Movements of the western rock lobster (*Panulirus cygnus*) within shallow coastal waters using acoustic telemetry. Marine and Freshwater Research. 59, 603-613 (MacArthur et al. 2008).
Supplementary Information	western rock lobster
Ecological or Social Value	7.2.3 Commercial fishing 7.2.7 Recreational fishing 8.4 Research
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.

Metadata ID 26

Generic Information

Contact Person/Principal Investigator	King, Saxon
Contact Organisation	University of Western Australia
Study Title	Variability in settlement of western rock lobster (*Panulirus cygnus* George) pueruli within Jurien Bay Marine Park, WA
Abstract	N/a
Study Objectives	To assess puerulus settlement at two sites in close proximity to each other where oceanographic conditions are likely to be similar.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	western rock lobster; WRL
Contributors	Brenton Knott (UWA)
Study Start Date	2/1/2007
Study End Date	01-Nov-07
Hyperlink	N/a
References	N/a
Supplementary Information	western rock lobster
Ecological or Social Value	7.2.3 Commercial fishing 7.2.7 Recreational fishing 8.4 Research
JBMP Management Strategy	N/a

Metadata ID 27

Generic Information

Contact Person/Principal Investigator	Klonowski , Wojciech
Contact Organisation	Curtin University of Technology
Study Title	The development and validation of algorithms for remotely sensing case II waters
Abstract	N/a

Study Objectives	1) To develop and validate a coastal water reflectance model that will permit the simultaneous retrieval of the concentrations of in-water constituents (Chl-a, CDOM, SS), water column depth as well as the composition of the seafloor, from remotely sensed data. 2) To acquire in situ hyperspectral data from SRFME field programs to permit the testing of the coastal water reflectance model. 3) To implement the coastal water reflectance model to appropriate satellite/aircraft data sets. 4) To compare the retrieved products to in situ data.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay; Green Head; North Head

Other information

Keywords	water quality; reflectance; chlorophyll; hyperspectral data; remote sensing; habitat mapping;
Contributors	Mervyn Lynch (CUT); Brendan McGann (CUT); Peter Fearns (CUT); Lesley Clementson (CSIRO); Arnold Dekker (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Klonowski W, Lynch MJ, McGann BT, Fearns P, Clementson L, Dekker AG (2006) The development and validation of algorithms for remotely sensing case II waters. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 36-43. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Klonowski et al. 2006).
Supplementary Information	Results from all locations during the winter months (May – October) (Clementson et al. 2004).
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (4) Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution.

Metadata ID 28

Generic Information

Contact Person/Principal Investigator	Koslow, Tony
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Biophysical Oceanography off Western Australia: Dynamics across the Continental Shelf and Slope
Abstract	The aim of the SRFME Biophysical Oceanography project is to characterise the continental shelf/slope pelagic ecosystem off southwestern WA: its productivity and dynamics, and the physical, chemical and biological factors driving variability along dominant spatial and temporal scales. To achieve this, we undertook monthly sampling from 2002 – 2004 along an onshore-offshore transect off Two Rocks from nearshore to the outer continental shelf (100 m water depth), which we extended quarterly to offshore waters (1000 m depth). Cruise sampling was combined with satellite observations of sea-surface temperature (SST), ocean colour and altimetry, and subsurface measurements of currents and temperature from moorings. The program involved six core research components: 1) The physical structure and nutrient dynamics within the water column;2) Phytoplankton community composition, biomass and productivity; 3) Microzooplankton communities and their grazing dynamics; 4) Mesozooplankton communities and their grazing dynamics; 5) Ichthyoplankton community composition and ecology; 6) Spatial structure of zooplankton and micronekton communities.
Study Objectives	1) To characterise the continental shelf/slope pelagic ecosystem off southwestern WA. 2) To describe the plankton communities and their dominant patterns of spatial and temporal variability. 3) To assess the physical, chemical and biological processes driving this variability, and to collaborate with the other SRFME projects. 4) To develop a quantitative, integrated understanding of the biogeochemical and ecosystem dynamics.

Geographic Position

Region Name	West Coast
Extents (N,E,S,W)	Kalbarri to Cape Naturaliste

Other information

Keywords	meteorological (wind; air temperature); vertical CTD (conductivity- temperature-depth); in situ fluorescence; dissolved oxygen and subsurface irradiance; discrete water column samples for analysis of salinity; dissolved nutrients (nitrate+nitrite; ammonium
Contributors	Alan Pearce (CSIRO); Nick Mortimer (CSIRO); Joanna Strzelecki (CSIRO); Peter Fearns (CSIRO); Christine Hanson (CSIRO); Lesley Clementson (CSIRO); Rudy Kloser (CSIRO); Tim Ryan (CSIRO); Harriet Paterson (UWA); Stéphane Pesant (UWA); Anya Waite (UWA); Barbara Muhling (MDU)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	CORE PROGRAMS
Supplementary Information	Six core research components: 1) The physical structure and nutrient dynamics within the water column; 2) Phytoplankton community composition, biomass and productivity; 3) Microzooplankton communities and their grazing dynamics; 4) Mesozooplankton communities and their grazing dynamics; 5) Ichthyoplankton community composition and ecology; and 6) Spatial structure of zooplankton and micronekton communities.
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **29**

Generic Information

Contact Person/Principal Investigator	Lavery, Paul
Contact Organisation	Edith Cowan University
Study Title	Ecophysiology of benthic primary producers
Abstract	N/a
Study Objectives	1) To determine the effect of different intensities, durations and timing of light reductions on Amphibolis ecosystems; and 2) To determine the subsequent patterns of recovery.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	Seagrass
Contributors	Russ Babcock (CSIRO); Ray Masini (DEC); Kathryn McMahon (ECU)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Gartner A, Lavender S, McMahon C, Brearley A (in prep) Consequences of reduced light availability in seagrass meadows for fauna & fisheries. 32 p (Gartner et al. in prep); McMahon K, Lavery P (2008) The responses of *Amphibolis griffithii* to reduced light availability. Final Report on the Strategic Research Fund for the Marine Environment (SRFME) Collaborative Research Project: Ecophysiology of benthic primary producers. Centre for Marine Ecosystems Research, Edith Cowan University, Joondalup, Western Australia, Report 2008-01. 148 p.(McMahon & Lavery 2008); Lavery P, Babcock R, Masini R, McMahon K (2006) Ecophysiology of benthic primary producers. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 154-168. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Lavery et al. 2006).

Supplementary Information	N/a
Ecological or Social Value	7.1.4 Seagrass meadows 8.4 Research 8.5 Monitoring
JBMP Management Strategy	8.4 Research (1) Develop and progressively implement a coordinated and prioritised research program of key values and processes of the marine park; 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs;

Metadata ID **30**

Generic Information

Contact Person/Principal Investigator	Lek, Elaine
Contact Organisation	Murdoch University
Study Title	Biology of three species of wrasses in Jurien Bay Marine Park
Abstract	This study forms part of the SRFME funded project being conducted in the marine park by David Fairclough, Ian Potter and Russ Babcock (CSIRO). Analyses of the macroscopic and microscopic characteristics of the gonads of the three labrids demonstrate that each of these species is a protogynous hermaphrodite, i.e. individuals change from female to male at some stage in their life. Elaine has also shown that the three species spawn at different times of the year, with *C. auricularis* spawning in autumn and early winter, *N. parilus* in winter and early spring and *O. lineolatus* during spring and summer. Elaine's work is now focusing on determining the age compositions, growth patterns and mortality rates of these three species and also on how they partition their food resources. She is also comparing the biological characteristics of these three species in Jurien with those of the assemblages in the Perth metropolitan marine waters. Data collected during Elaine's PhD is necessary for the development of management plans, since these species are being taken more regularly by recreational fishers for food, as the stocks of traditionally sought-after species, such as Dhufish, Pink Snapper and Baldchin Groper, become depleted.
Study Objectives	To obtain comprehensive data on the biology of the western king wrasse *Coris articularis*, the brown-spotted wrasse *Notolabrus parilus* and the maori wrasse *Opthalmolepis lineolatus*, in two different areas.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	Labrids; finfish; JBMP
Contributors	Ian Potter (MDU); David Fairclough (DoF)
Study Start Date	N/a
Study End Date	completed 2008
Hyperlink	http://www.cffr.murdoch.edu.au/
References	Lek E (in prep) The biology of three sympatric species of wrasse (Labridae) on the west coast of Australia. Thesis, Murdoch University, Perth, Western Australia (Lek in prep).
Supplementary Information	N/a
Ecological or Social Value	7.1.8 Finfish;
JBMP Management Strategy	N/a

Metadata ID **31**

Generic Information

Contact Person/Principal Investigator	Limbourn, Andrew
Contact Organisation	N/a
Study Title	Recruitment dynamics of the western rock lobster

Abstract	N/a
Study Objectives	N/a

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	crayfish; WRL; western rock lobster; crustacean
Contributors	Brenton Knott (UWA)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	N/a
Supplementary Information	N/a
Ecological or Social Value	7.2.3 Commercial fishing; 7.2.7 Recreational fishing; 8.4 Research;
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park;

Metadata ID **32**

Generic Information

Contact Person/Principal Investigator	Loneragan, Neil
Contact Organisation	Murdoch University
Study Title	Evaluating how food webs and the fisheries they support are affected by fishing closures in Jurien Bay, temperate Western Australia
Abstract	OUTCOMES 1. An assessment of the influence of fishing closures on biological communities and the implications for target fisheries in the Jurien region of Western Australia. This will allow a comparison of the effectiveness of closures with traditional fisheries management measures for fisheries and conservation. 2. The development of ecosystem understanding of fisheries in the Jurien region and the construction of an ecosystem modelling framework that can be applied to this and broader regions of temperate Western Australia. 3. Building capacity in researchers and managers for ecosystem approaches to fisheries and building ecosystem modelling expertise in researchers. 4. Identifying useful ecosystem-level performance indicators and target reference points for the Jurien region, with possible extension to the other temperate regions of Western Australia. 5. Providing a logical framework for identifying key research questions and assigning priorities for ecosystem approaches to fisheries for research and management in temperate Western Australia. The main beneficiaries from these planned outcomes will be the commercial (lobster and finfish) and recreational fisheries and fishery researchers and managers of Western Australia.
Study Objectives	To maintain and improve the management and use of aquatic natural resources to ensure sustainability, through: 1) Evaluating how food webs and the fisheries they support are likely to be influenced by fishing closures in the Jurien region; 2) Investigating how past and future changes in abundance of key fished species (e.g. rock lobster, snapper, wrasse, dhufish) are likely to influence other species; 3) Investigating the effectiveness of area closures and alternative management approaches for conserving food webs and fisheries; and 4) Identifying useful indicators of ecosystem response to changes in the environment and management systems.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	qualitative modelling; quantitative modelling; recreational fishing; commercial fishing
Contributors	Jeffrey Dambacher (CSIRO); Hector Lozano-Montes (CSIRO); Russ Babcock (CSIRO)
Study Start Date	7/1/2006
Study End Date	30-Sep-09

Hyperlink	N/a
References	N/a
Supplementary Information	N/a
Ecological or Social Value	7.1.8 Finfish; 7.2.3 Commercial fishing; 7.2.7 Recreational fishing; 8.4 Research
JBMP Management Strategy	7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park; 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required; 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park; 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required; 8.4 Research (3) Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park;

Metadata ID **33**

Generic Information

Contact Person/Principal Investigator	Lourey, Martin
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Nearshore sediment/water column exchange processes
Abstract	This preliminary investigation into sediment nutrient fluxes in sandy sediments of the WA shelf reveals that within a region spatial variations in sediment nutrient fluxes are as large as regional and seasonal differences. The source of this spatial variability is likely to be due to the complex interactions between the physical and biological attributes of the sediments. Additional sediment flux deployments and focused laboratory incubations accompanied by statistical and modelling approaches as part of WAMSI Node 1 will help isolate the key mechanisms that contribute to the relationship between nutrient fluxes and sediment characteristics.
Study Objectives	1) To quantify the resupply of nutrients from the sediments to the water column in WA. 2) To improve our understanding of the physical, chemical and biological processes that control the magnitude of these important nutrient processes.

Geographic Position

Region Name	Southern West Coast
Extents (N,E,S,W)	5 parameters; 3 sites; Jurien Bay; Perth, Busselton; sampled seasonally

Other information

Keywords	sediment cores; nutrients; phosphates; nitrogen; Total Carbon; OP; NH4; NOx; TC; TOC; silicates, nitrogen flux
Contributors	Paul Dean (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	www.srfme.org.au
References	Lourey M, Dean P (2006) Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Nearshore sediment/water column exchange processes. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 62-71. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Lourey & Dean 2006).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID 34

Generic Information

Contact Person/Principal Investigator	Macarthur, Lachlan
Contact Organisation	Edith Cowan University
Study Title	Habitat use, movement and trophic linkage of western rock lobsters, *Panulirus cygnus*, within shallow coastal waters of Western Australia
Abstract	Understanding the residency and movement patterns of major consumers, such as lobsters, in coastal waters is important for the management of coastal habitats and their fisheries. In the present study, we tagged 34 *Panulirus cygnus* with acoustic transmitters on a shallow coastal reef in south-western Australia and monitored their movements using fixed and manual receivers between November and May 2005–2006 and 2006–2007. We determined the proportion of 'white' (migratory-phase) lobsters emigrating from the reef between November and January and also characterised the large-scale movements of 'red' (residential-phase) and white lobsters. We undertook tank experiments to determine the effect of tagging and handling on *P. cygnus* behaviour. Counter to our expectation, 50% of white lobsters were detected on the reef after the migration period, whereas only a small proportion (13.6%) of white lobsters were tracked leaving the reef and only one individual displayed directional offshore movement. This limited movement indicates that coastal no-take zones may build up legal-sized 4–5+-year-old lobsters because many of these are likely to remain resident over the migration season. Laboratory experiments and field observations suggest that tagging and handling affect lobster behaviour and movement for a few days post tagging, potentially confounding conclusions on dispersal and movement patterns in some studies.
Study Objectives	To identify trophic linkages of the western rock lobster within shallow water coastal waters of WA, by investigating foraging range and the population connectivity between reefs.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	JBMP; MMP

Other information

Keywords	crayfish; WRL; western rock lobster; acoustic tags; nocturnal range; crustacean
Contributors	N/a
Study Start Date	N/a
Study End Date	12-Feb-07
Hyperlink	http://www.srfme.org.au/
References	MacArthur LD, Babcock RC, Hyndes GA (2008) Movements of the western rock lobster (*Panulirus cygnus*) within shallow coastal waters using acoustic telemetry. Marine and Freshwater Research. 59, 603-613 (MacArthur et al. 2008).
Supplementary Information	N/a
Ecological or Social Value	7.2.3 Commercial fishing 7.2.7 Recreational fishing
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required.

Metadata ID 35

Generic Information

Contact Person/Principal Investigator	Macartney, Abbie
Contact Organisation	University of Western Australia
Study Title	The social value of seascapes in the Jurien Bay Marine Park: An assessment of positive and negative preferences for change

Abstract	The managers of Jurien Bay Marine Park consider the views of its pristine seascapes to be an important social asset. The marine park contains several different seascapes including views of the ocean and of the coastline. In order to aid the management of the various seascapes, their social value was determined through the use of a preference ranking and a contingent valuation. Positive and negative preferences for change were also considered within this valuation. A single function extended spike model was employed to estimate the willingness to pay of the seascapes, and was later constrained to a restricted version of a spike model. The restricted model identified that a proportion of the population had a positive preference for change within the seascapes, but a larger proportion had a negative preference for change resulting in a positive net willingness to pay estimate. Seascapes with coastal views were determined as being the most preferred and having the highest social value, however the value of the remaining seascapes followed closely behind. The positive welfare estimate suggests that changes to the seascapes should be kept to a minimum and there should be a concentration on preserving their natural state.
Study Objectives	Determination of the social value of the JBMP seascapes

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay

Other information

Keywords	human use; social survey; willingness to pay; conservation value; seascape value; seascapes
Contributors	A/Prof Michael Burton (UWA); Tim Grubba (DEC)
Study Start Date	N/a
Study End Date	30/10/2005
Hyperlink	N/a
References	McCartney A (2005) The social value of seascapes in the Jurien Bay Marine Park: An assessment of positive and negative preferences for change. Thesis (Honours), University of Western Australia, Perth, Western Australia. 70 p. (McCartney 2005).
Supplementary Information	N/a
Ecological or Social Value	7.2.6 Seascapes
JBMP Management Strategy	7.2.6 Seascapes (1) Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park.

Metadata ID **36**

Generic Information

Contact Person/Principal Investigator	Lynch, Mervyn
Contact Organisation	Curtin University of Technology
Study Title	Remotely sensing seasonal and interannual oceanic primary production for Western Australian waters
Abstract	N/a
Study Objectives	To develop a model to estimate phytoplankton primary production from remotely sensed sea surface reflectance data (collected in situ or via space based platforms).

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Dongara to Fremantle

Other information

Keywords	primary productivity; chlorophyll a; sea surface temp; Leeuwin current.; Capes current
Contributors	Majewski, Leon John (BOM); Mervyn J. Lynch (CUT); Brendan T. McGann (CUT); Peter R.C.S. Fearns (CUT); Lesley A. Clementson (CSIRO); Arnold G. Dekker (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	http://www.srfme.org.au/collab/phd_majew.htm

References	Majewski LJ, Lynch MJ, McGann BT, Fearns PRCS, Clementson LA, Dekker AG (2006) In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 51-57. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Majewski et al. 2006).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **37**

Generic Information

Contact Person/Principal Investigator	Maley, Bruce
Contact Organisation	Murdoch University
Study Title	The ecology of the rocky intertidal community in the proposed Jurien Bay Marine Park
Abstract	N/a
Study Objectives	To examine the intertidal biota of Jurien Bay: 1) To identify and classify communities of the rocky intertidal; and 2) To compare species abundance and diversity with that of Point Peron.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park; Green Head; North Head; Hangover Bay; Grey; Point Peron; Haliotis bay; Longreach Bay; Fisherman's Bay;

Other information

Keywords	intertidal; gastropods; reef flat; macroalgae
Contributors	Michael Borowitzka (MDU)
Study Start Date	N/a
Study End Date	30/10/2003
Hyperlink	N/a
References	Maley BG (2003) The ecology of the rocky intertidal community in the proposed Jurien Bay marine park. Thesis (Honours), Murdoch University, Perth, Western Australia. 106 p. (Maley 2003);.
Supplementary Information	N/a
Ecological or Social Value	7.1.3 Intertidal reef platforms 7.1.7 Invertebrate communities
JBMP Management Strategy	7.1.3 Intertidal reef platforms (2) Initiate research programs to characterise the flora and fauna of selected intertidal reef platforms within the marine park in relation to establishing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park.

Metadata ID **38**

Generic Information

Contact Person/Principal Investigator	Masini, Ray
Contact Organisation	Department of Environment and Conservation
Study Title	Background concentrations of selected toxicants in the coastal waters of Jurien Bay Marine Park

Abstract	A water quality survey was undertaken in February 2004 to determine dissolved concentrations of cadmium, chromium, copper, lead and zinc, total mercury, polyaromatic hydrocarbons, phenols, BTEX chemicals and petroleum hydrocarbons in the coastal waters of the Jurien region. This work was undertaken to provide an estimate of background concentrations for selected metals and organic chemicals in the waters of the Jurien Bay Marine Park and to ascertain whether the guideline trigger values from ANZECC & ARMCANZ (2000) are relevant to the region. The results of this study indicate that the coastal waters of the Jurien region were generally of very high quality. The concentrations of metals were low by world standards, with localised elevations of some metals adjacent to Cervantes townsite. Concentrations of metals in seawater met the environmental quality guidelines for a very high level of ecological protection (99% species protection) throughout the study area at the time of sampling. No organic chemicals were detected in any of the samples. For six of the seven organic chemicals that have guideline trigger values (ANZECC & ARMCANZ, 2000) the reporting limits were well below the values recommended for a very high level of ecological protection. The findings of this study, along with other work undertaken on the Western Australian coast suggest that the ANZECC & ARMCANZ (2000) 99% species protection guideline trigger values are appropriate for management of the marine waters in the region for organic chemicals and all metals, except cobalt where the 95% species protection guideline trigger value is recommended.
Study Objectives	The objectives of the survey were firstly: (1) to determine background concentrations of selected metals and organic chemicals in 'unimpacted areas' to both confirm the relevance of the National water quality guidelines; and (2) to establish a 'natural' baseline for the region, and secondly to determine ambient concentrations to identify potential problems and establish a baseline for these chemicals in 'potentially impacted' areas.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	14 sites within JBMP; Green Head; Jurien Bay; Cervantes; Grey; Wedge Island

Other information

Keywords	baseline; background sediment quality; Jurien Bay
Contributors	Kevin McAlpine (DEC); Krystal Wenziker (DEC); S. Apte (CSIRO)
Study Start Date	N/a
Study End Date	01-Mar-05
Hyperlink	N/a
References	McAlpine KW, Wenziker KJ, Apte SC, Masini RJ (2004) Background concentrations of selected toxicants in the coastal waters of the Jurien Bay Marine Park. Department of Environment, Perth, Western Australia, Technical Series 119. 24 p. (McAlpine et al. 2004).
Supplementary Information	contaminants, cadmium, chromium, copper, lead, mercury, zinc, TBT, Petroleum hydrocarbons, B-tex, PAHs, pesticides, PCBs
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment.

Metadata ID 39

Generic Information

Contact Person/Principal Investigator	Masini, Ray
Contact Organisation	Department of Environment and Conservation
Study Title	Background quality of marine sediments off the Western Australian mid-west coast

Abstract	The mid-west coast of Western Australia is a highly energetic coastline with only a few small rivers draining a relatively arid catchment. The sediments are medium to coarse grained sands interspersed between limestone reefs and the adjacent terrestrial geology is composed of reworked sands of marine and aeolian origin. The background concentrations of heavy metals and organic contaminants in marine sediments off the mid-west coast of Western Australia (WA) are not well documented. Sediment samples were taken at three unimpacted reference locations and one potentially impacted location from the shallow coastal marine environment (<12 m depth) off the mid-west coast of WA to determine concentrations of a range of selected metalloids, metals and organic chemicals under natural background conditions. The suite of chemicals measured included aluminium, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, butyltin compounds, total petroleum hydrocarbons, BTEX chemicals, polycyclic aromatic hydrocarbons, organochlorine and organophosphate pesticides and PCBs. The work was undertaken to achieve two primary objectives. Firstly, to provide a contemporary baseline for evaluating anthropogenic changes or trends in sediment quality around regional centres of development (e.g. ports). Secondly, to ascertain whether the sediment quality guidelines for the protection of ecosystem health recommended in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) are applicable to the region. Background sediment quality was found to be high with concentrations below the analytical limit of reporting for all of the organic chemicals measured and some of the metals. The concentrations of metals and metalloids in the sediments were found to be at similar levels or lower than the concentrations found in other studies undertaken around Australia. No organic chemicals were detected in any of the samples. Compliance with the recommended sediment quality guidelines (ANZECC & ARMCANZ, 2000) could not be determined for eight of the analysed chemicals (acenaphthene, anthracene, dibenzo(ah)anthracene, fluorene, lindane, chlordane, dieldrin and endrin) because the laboratory analytical limit of reporting was above the recommended guideline. The results of this study, and the guidelines and approaches recommended in ANZECC & ARMCANZ (2000), were used to develop a set of sediment quality guidelines that could be applied to four different levels of ecological protection in the marine environment of the mid-west coast. These are presented in Table 13 of the report.
Study Objectives	1. To determine whether the national sediment quality guidelines (ANZECC & ARMCANZ, 2000) for selected toxicants are suitable for application to nearshore marine sediments of the mid west coast, and to develop new sediment quality guidelines for those chemicals where the national guidelines are not applicable; and 2. To determine baseline conditions from which to assess any human-induced changes or trends in sediment quality.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Horrocks Beach, Geraldton, Dongara, Green Head, Jurien, Cervantes, 4 sites at each location

Other information

Keywords	sediment cores; background study; toxicants
Contributors	Kevin McAlpine (DEC); Tim Daly (DEC); Cameron Sim (DEC)
Study Start Date	N/a
Study End Date	01-Jul-07
Hyperlink	N/a
References	McAlpine KW, Masini RJ, Daly T, Sim C (2007) Background quality of marine sediments off the Western Australian mid-west coast. Department of Environment and Conservation, Perth, Western Australia, Report MTR 2. 44 p. (McAlpine et al. 2007).
Supplementary Information	contaminants, aluminium, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, TBT, Petroleum hydrocarbons, B-tex, PAHs, pesticides, PCBs
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment.

Metadata ID **40**

Generic Information

Contact Person/Principal Investigator	Masini, Ray
Contact Organisation	Department of Environment and Conservation
Study Title	Establishing reference and monitoring sites to assess a key indicator of ecosystem health (seagrass health) on the Central West Coast of Western Australia
Abstract	Quantify the natural spatial and inter-annual variability in proposed seagrass health indicators on the central west coast of WA for a period of three years. This objective has been achieved. Two permanent reference sites for monitoring seagrass health have been established in the Jurien Bay Marine Park. The sites were established in April 2003 and are located within *Posidonia sinuosa* meadows in the Fisherman Islands Sanctuary Zone and the Boullanger Island Special Purpose (Puerulus) Zone. At each site, 24 permanent relocatable quadrats have been established at each of three discrete depths (2.5 m, 3.5 m and 5.5 m) using methods described by Lavery and Westera (2003). A range of seagrass health indicators (i.e. seagrass shoot density, shoot height, percent cover) were monitored at the reference sites in 2003, 2004 and 2005. The data provide valuable new information about the natural spatial and temporal variability of *P. sinuosa.*
Study Objectives	1) To quantify the natural spatial and inter-annual variability in proposed seagrass health indicators on the central west coast of WA for a period of three years. 2) To enable comparisons to be made between natural variability in seagrass health indicators at sites in the vicinity of the JBMP and in Perth's southern metropolitan coastal waters. 3) To provide an information base to make an assessment of the transferability of proposed seagrass health indicators and criteria from the central west coast and other temperate coastal waters in WA. 4) To enable Government agencies to broaden the geographic coverage of the environmental quality management framework currently being implemented in Perth's coastal waters. 5) To enhance strong collaboration between university researchers, key Government natural resource management agencies and SRFME researchers.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Fisherman Islands Sanctuary Zone; Boullanger Island Special Purpose (Puerulus) Zone; JBMP

Other information

Keywords	seagrass; shading; baseline; reference sites
Contributors	Cam Sim (DEC); Paul Lavery (ECU); Chris Simpson (DEC); Jason How (ECU);
Study Start Date	N/a
Study End Date	N/a
Hyperlink	http://www.srfme.org.au/collab/link_proj4.htm
References	How J, Lavery P (2003) Seagrass health monitoring in the Jurien Bay Marine Park: Year two baseline sampling, March 2003. . Prepare by the Centre for Ecosystem Management and School of Natural Sciences, Edith Cowan University for the Department of Environment and Strategic Research Fund for the Marine Environment, Perth, Western Australia (How & Lavery 2003); How J, Lavery P (2004) Seagrass health monitoring in the Jurien Bay Marine Park: Year two baseline sampling, February 2004. Prepare by the Centre for Ecosystem Management and School of Natural Sciences, Edith Cowan University for the Department of Environment and Strategic Research Fund for the Marine Environment, Perth, Western Australia (How & Lavery 2004); Masini R, Lavery P, Simpson C, Sim C (2006) Establishing reference and monitoring sites to assess a key indicator of ecosystem health (seagrass health) on the Central West Coast of Western Australia. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 225-237. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Masini et al. 2006).
Supplementary Information	seagrass density; *Posidonia sinuosa*

Ecological or Social Value	7.1.4 Seagrass meadows
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **41**

Generic Information

Contact Person/Principal Investigator	McMahon, Kathryn
Contact Organisation	Edith Cowan University
Study Title	Monitoring seagrass health in Jurien Bay
Abstract	N/a
Study Objectives	1) To establish seagrass health reference and monitoring sites on the Central West Coast of Western Australia. 2) To provide an essential information base for setting Environmental Quality Criteria (EQC) for ecosystem health for coastal waters off central west WA.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Fisherman Islands Sanctuary Zone; Boullanger Island Special Purpose (Puerulus) Zone; JBMP

Other information

Keywords	seagrass; *Posidonia*; seagrass shoot densities; canopy heights; % cover estimates
Contributors	Paul Lavery (ECU); Kevin Crane (DEC)
Study Start Date	1/1/2003
Study End Date	ongoing monitoring
Hyperlink	N/a
References	How J, Lavery P (2003) Seagrass health monitoring in the Jurien Bay Marine Park: Year two baseline sampling, March 2003. . Prepare by the Centre for Ecosystem Management and School of Natural Sciences, Edith Cowan University for the Department of Environment and Strategic Research Fund for the Marine Environment, Perth, Western Australia (How & Lavery 2003); How J, Lavery P (2004) Seagrass health monitoring in the Jurien Bay Marine Park: Year two baseline sampling, February 2004. Prepare by the Centre for Ecosystem Management and School of Natural Sciences, Edith Cowan University for the Department of Environment and Strategic Research Fund for the Marine Environment, Perth, Western Australia (How & Lavery 2004).
Supplementary Information	seagrass density, seagrass biomass
Ecological or Social Value	7.1.4 Seagrass meadow 8.5 Monitoring
JBMP Management Strategy	8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **42**

Generic Information

Contact Person/Principal Investigator	Meeuwig, Jessica
Contact Organisation	University of Western Australia
Study Title	Securing Western Australia's Marine Futures

Abstract	*Securing WA's Marine Futures* is a Natural Heritage Trust II Statewide project, which is supporting marine resource management by developing marine resource indicators based on an improved understanding of the relationship between marine habitats, biodiversity and our use of these values. The project is based upon partnerships between marine resource managers (DEC, Fisheries WA, WA Museum, DPI, DEW), regional natural resource management (NRM) councils (South Coast NRM, SWCC, Swan, NACC and southern Rangelands), researchers (University of Western Australia) and industry (Fugro Survey Pty Ltd). Key outcomes of the project include the series of spatial layers, outlining information on marine habitats (type and distribution), associated key biodiversity attributes (e.g. fish) and patterns of human uses (e.g. fishing pressures). The project encompasses eight study locations from the Houtman Abrolhos Islands in the midwest to the Recherché Archipelago in the south. The project will provide information which (i) characterizes the marine resource condition at target areas and then (ii) provides a summary of the methods and indictors for monitoring resource condition in the future. In this way, the project is guided by, and developing applied information and products specifically for, resource managers and users, while still satisfying the research needs of the interested delivery groups.
Study Objectives	(1) To enhance and expand our understanding of the marine environment, and (2) to develop a practical and cost-effective "how-to" guide for monitoring the condition of key marine resources.

Geographic Position

Region Name	South West WA
Extents (N,E,S,W)	Abrolhos Islands; Jurien Bay; Rottnest Island; Cape Naturaliste/ Geographe bay; Broke Inlet; Two Peoples Bay, Point Anne; Esperance

Other information

Keywords	biodiversity; habitat mapping; finfish; macroalgal assemblages; BRUVs;
Contributors	Gary Kendrick (UWA); Euan Harvey (UWA), Jessica Meeuwig (UWA), Lynda Bellchambers (DoF), Jane Fromont (WA Museum), Paul Kennedy (FUGRO) and Ben Radford (UWA)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	www.marinefutures.com
References	N/a
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.4 Seagrass meadows 7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish 7.2.3 Commercial fishing 7.2.7 Recreational fishing
JBMP Management Strategy	7.1.2 Water & sediment quality (4) Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution. 7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park.

Metadata ID 43

Generic Information

Contact Person/Principal Investigator	Mortimer, Nick
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Bioacoustics

Abstract	Acoustic methodologies can be applied to characterise the spatial and temporal variability of continental shelf marine life (McGehee et al. 2004; Warren et al. 2004). Acoustic remote sensing enables scientists to map a cross section of the ocean and view the interaction of marine life with seabed and oceanographic features (Sutor et al. 2005). It also has the potential to provide quantitative metrics within and between seasons on the densities of major trophic groups from plankton to fish (Swartzman et al. 2002). To identify and quantify marine life from plankton (predominantly drifting small organisms 0.1 - 20 mm) to large nekton (organisms such as fish) that can move independently of currents) requires the use of many acoustic frequencies. In this study 9 frequencies were used ranging from 70 kHz to 3 MHz (Holliday and Pieper, 1995). The acoustic maps enable biological and physical samples to be better targeted and provide the necessary spatial and temporal context. Likewise the physical and biological samples are critical for the interpretation of the acoustic signatures and training of the multi-frequency remote sensing algorithms. To sample the marine life from phytoplankton to nekton, seawater pumps and variable meshed nets are used. These point samples of marine life can be used to ground-truth the acoustics and relate the samples to the across-shelf patches observed in the acoustics (Greene et al. 1998; Ressler et al. 2005;). It is often difficult to capture the organisms seen by the acoustics due to avoidance and difficulty in accurately targeting scattering layers. At 70 kHz the acoustic frequency is also selective towards larger organisms (macrozooplankton to micronekton). Current biological sampling methods using small meshed nets will under represent or undersample these animals. One way to assist in the identification and numbers of these species is to use multi-frequency acoustic methods (Korneliussen and Ona, 2003).
Study Objectives	To develop and apply acoustic methods to map and monitor zooplankton and micronekton at low frequencies: 70, 120 and 200 kHz; The objective of this part of the project was to develop and apply acoustic methods to assess the fine-scale vertical distribution of mesoplankton at high frequencies ranging from 265 to 3000 kHz.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Two Rocks

Other information

Keywords	multifrequency; low frequency; high frequency; mesoplankton; zooplankton; acoustics
Contributors	N/a
Study Start Date	N/a
Study End Date	completed
Hyperlink	www.srfme.org.au
References	Mortimer N (2006) Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Bioacoustics. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 102-121. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Mortimer 2006).
Supplementary Information	Some major advances have been made in this project to understand the spatial and temporal dynamics of marine biota from zooplankton to micronecton using acoustics. Our studies have highlighted the limitations of existing equipment that is commonly used to study plankton at high frequencies. This advanced understanding is being fed back to equipment manufacturers to make instruments more suitable to the Western Australian environment. Our use of the low frequency instruments has highlighted the difficulties of using small vessels to collect high data quality at multiple frequencies at the same time of day. The acoustic transect data in a qualitative sense provides a unique insight into the spatial structuring of marine biota that is impossible to obtain from coarsely-resolved sampling at fixed stations. In this way the acoustic data can assist in the extrapolation between sparse station sampling. Our use of multi-frequencies is in its infancy and we have demonstrated that by using simple scattering models we can segment the acoustic transect data into probable scattering groups. We see a clear path to improve the methods developed and applied so far in this project.

Supplementary Information (continued)	Improvements to existing use of acoustic data would probably require more emphasis on the partitioning into the various trophic groups with quantitative estimates of biomass, size and trophic spectra as well as integration with other environmental data. Ultimately, the objectives of data collection will determine the sampling protocols required and the best vessels (e.g., industry, research, mooring, drifter or autonomous underwater vehicle (AUV)). The use of AUV's, gliders, moorings and ships of opportunity (e.g. ferries) can greatly increase the spatial and temporal coverage at potentially low data collection costs.
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.8 Finfish
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.

Metadata ID **44**

Generic Information

Contact Person/Principal Investigator	Muhling, Barbara
Contact Organisation	Murdoch University
Study Title	Ichthyoplankton assemblage structure in coastal, shelf and slope waters off southwestern Australia
Abstract	N/a
Study Objectives	1) To document the seasonal and spatial variability in ichthyoplankton (larval fish) assemblages in inshore, shelf and offshore waters off Western Australia. 2) To relate this variability to environmental (physical, biological and meteorological) parameters.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	JB offshore

Other information

Keywords	fingerlings; fish larvae; biological oceanography
Contributors	Lynnath Beckley (MDU); Tony Koslow (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Muhling B, Beckley LE, Koslow T (2006) Ichthyoplankton assemblage structure in coastal, shelf and slope waters off southwestern Australia. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 57-64. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Muhling et al. 2006); Muhling B, Beckley LE, Olivar MP (2007) Ichthyoplankton assemblage structure in two meso-scale Leeuwin Current eddies, eastern Indian Ocean. Deep-Sea Research Part II. 54, 1113-1128 (Muhling et al. 2007); Muhling B, Beckley LE, Koslow JA, Pearce AF (2008) Larval fish assemblages and water mass structure off the oligotrophic south-western Australian coast. Fisheries Oceanography. 17, 16-31 (Muhling et al. 2008).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.8 Finfish
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.

Metadata ID 45

Generic Information

Contact Person/Principal Investigator	Murphy, Nicole
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Relationship between algal communities and faunal diversity and biomass
Abstract	N/a
Study Objectives	1) To measure the relationship between algal communities and their associated fauna. 2) To investigate regional trends of these relationships (Jurien, Perth, Geographe Bay).

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	51 sites: 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	Macroalgae; Fauna
Contributors	Geordie Clapin (CSIRO); Russ Babcock (CSIRO); Alison Sampey (CSIRO); Julia Phillips (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Murphy N, Clapin G, Babcock R, Sampey A, Phillips J (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Relationship between algal communities and faunal diversity and biomass. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 226-231. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Murphy et al. 2006).
Supplementary Information	algae habitat types, invertebrate densities, echinoderms, molluscs, sponges, crustaceans, diversity, abundances.
Ecological or Social Value	7.1.5 Macroalgal communities 7.1.7 Invertebrate communities 7.1.8 Finfish
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.

Metadata ID 46

Generic Information

Contact Person/Principal Investigator	Murphy, Nicole
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Spatial trends in reef invertebrate communities
Abstract	N/a
Study Objectives	1) To determine the broad-scale spatial trends of reef invertebrate communities between west coast regions (Jurien, Perth, Geographe Bay). 2) To determine fine-scale spatial trends of reef invertebrate communities within regions (Green Head, Jurien, Two Rocks, Marmion, Bunbury, Cape Naturaliste).

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	51 sites: 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	invertebrate community; invertebrate assemblages; MDS
Contributors	Geordie Clapin (CSIRO); Russ Babcock (CSIRO); Alison Sampey (CSIRO); Julia Phillips (CSIRO)

Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Murphy N, Clapin G, Babcock R, Sampey A, Phillips J (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Spatial trends in reef invertebrate communities. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 215-220. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Murphy et al. 2006).
Supplementary Information	invertebrate assemblages
Ecological or Social Value	7.1.7 Invertebrate communities
JBMP Management Strategy	7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park.

Metadata ID **47**

Generic Information

Contact Person/Principal Investigator	Onton, Kim
Contact Organisation	University of Western Australia
Study Title	Breeding phylogeny and habitat preference of seabirds on Boullanger and Whitlock Islands, Western Australia
Abstract	N/a
Study Objectives	The objectives of this study were to test two hypotheses: 1) different abundances and diversity of seabirds will occur on Boullanger and Whitlock Islands throughout the year (due to factors such as food availability and the life-cycles of the individual seabird species), with certain species favouring different habitats on each island; and 2) breeding success for burrowing birds depend on the habitat that the burrow is built in and the burrow parameters.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park; Boullanger Island; Whitlock Island

Other information

Keywords	seabirds
Contributors	Mark Garkaklis (DEC); Roberta Bencini (UWA)
Study Start Date	N/a
Study End Date	30/10/2003
Hyperlink	N/a
References	Onton K (2003) Breeding phylogeny and habitat preference of seabirds on Boullanger and Whitlock Islands, Western Australia. Thesis (Honours), University of Western Australia, Perth, Western Australia. 68 p. (Onton 2003).
Supplementary Information	N/a
Ecological or Social Value	7.1.6 Seabirds
JBMP Management Strategy	N/a

Metadata ID **48**

Generic Information

Contact Person/Principal Investigator	Ove Hoegh-Guldberg, Ian
Contact Organisation	University of Queensland
Study Title	Genetic distributions of the coral symbiont *Symbiodium* sp.
Abstract	N/a
Study Objectives	(a) To assess the diversity of *Symbiodium* within the tissues of Western Australian host invertebrates and provide an important baseline study for future studies. (b) To assess whether symbiont diversity from these species differs dramatically from their pacific and Western Indian Ocean counterparts.

Geographic Position	
Region Name	Tropical Australia
Extents (N,E,S,W)	Broome; Dampier; Ningaloo Marine Park; Shark Bay Marine Park; Jurien Bay Marine Park; Shoalwater Islands Marine Park

Other information	
Keywords	coral; symbionts
Contributors	N/a
Study Start Date	9/1/2007
Study End Date	current
Hyperlink	N/a
References	N/a
Supplementary Information	N/a
Ecological or Social Value	7.1.7 Invertebrate communities
JBMP Management Strategy	7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park.

Metadata ID 49

Generic Information	
Contact Person/Principal Investigator	Paterson , Harriet
Contact Organisation	University of Western Australia
Study Title	Microzooplankton off south west Western Australia: Their spatial and temporal variations and impact of phytoplankton
Abstract	N/a
Study Objectives	1) To characterise the microzooplankton assemblage off south western WA and their temporal and spatial variability. 2) To quantitatively assess the herbivory of microzooplankton on phytoplankton, and its temporal and spatial variability. 3) To examine the distribution of three functionally different groups of micro-zooplankton on the Two Rocks transect.

Geographic Position	
Region Name	Central West Coast
Extents (N,E,S,W)	Two Rocks

Other information	
Keywords	microzooplankton; phytoplankton
Contributors	Tony Koslow (CSIRO); Brenton Knott (UWA); Anya Waite (UWA)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Paterson H, Koslow T, Knott B, Waite A (2006) Microzooplankton off south west Western Australia: Their spatial and temporal variations and impact of phytoplankton. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 64-70. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Paterson et al. 2006); Paterson H, Knott B, Waite AM (2007) Microzooplankton community structure and grazing on phytoplankton, in an eddy pair in the Indian Ocean off Western Australia. Deep-Sea Research Part II. 54, 1076-1093 (Paterson et al. 2007a); Paterson H, Pesant S, Clode P, Knott B, Waite AM (2007) Systematics of a rare radiolarian—*Coelodiceras spinosum* Haecker (Sarcodina: Actinopoda: Phaeodaria: Coelodendridae). Deep-Sea Research Part II. 54, 1094-1102 (Paterson et al. 2007b).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID **50**

Generic Information

Contact Person/Principal Investigator	Phillips, Julia
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Environmental correlates of reef community structure
Abstract	As the largest number of sites sampled were from the Jurien region, and because Jurien was the only region from which modelled wave-driven orbital velocity at the sea floor was available, the correlation of algal community structure with environmental variables was restricted to this region. The extent to which environmental variables explained the patterns observed in reef algal community structure was investigated, as a means of better understanding and ultimately modelling important factors influencing reef ecosystems. Variables considered included nominal categories of depth of reef (≤6 m, 6.1-10m, >10 m), cross-shore position (inner, mid or outer shore) and reef relief (high, medium or low relief), while light attenuation, water column nutrients (Si, PO4, NOx, NO2, NH4), water column particulates (chl-a, total suspended solids (TSS)), as well as depth and rugosity of each quadrat were directly measured. Additionally, wave modelling was used to derive a number of parameters relating to the orbital motion experienced at each reef; namely cumulative, minimum, maximum and mean orbital motion.
Study Objectives	To determine which environmental variables explained the patterns observed in reef algal community structure.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	19 Jurien Bay; sampled seasonally

Other information

Keywords	Macroalgae; invertebrates
Contributors	Russ Babcock (CSIRO); Phillip England (CSIRO); Geordie Clapin (CSIRO); Alison Sampey (CSIRO); Nicole Murphy (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Phillips J, Babcock R, England P, Clapin G, Sampey A, Murphy N (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Environmental correlates of reef community structure. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 225-226. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Phillips et al. 2006a).
Supplementary Information	Variables considered included nominal categories of depth of reef (≤6 m, 6.1-10m, >10 m), cross-shore position (inner, mid or outer shore) and reef relief (high, medium or low relief), while light attenuation, water column nutrients (Si, PO4, NOx, NO2, NH4), water column particulates (chl-a, total suspended solids (TSS)), as well as depth and rugosity.
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.5 Macroalgal communities 7.1.8 Finfish
JBMP Management Strategy	7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment. 7.1.2 Water & sediment quality (4) Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution. 7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID **51**

Generic Information

Contact Person/Principal Investigator	Phillips, Julia
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Regional trends in reef algal community structure

Abstract	N/a
Study Objectives	1) To determine the broad-scale spatial trends of reef algae biomass between west coast regions (Jurien, Perth, Geographe Bay). 2) To determine fine-scale spatial trends of reef algae biomass within regions (Green Head, Jurien, Two Rocks, Marmion, Bunbury, Cape Naturaliste).

Geographic Position

Region Name	Southern West Coast
Extents (N,E,S,W)	51 sites. 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	reef algae; biomass; community structure
Contributors	Russ Babcock (CSIRO); Nicole Murphy (CSIRO); Geordie Clapin (CSIRO); Alison Sampey (CSIRO); Mat Kleczkowski (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Phillips J, Babcock R, Murphy N, Clapin G, Sampey A, Kleczkowski M (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Regional trends in reef algal community structure. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 204-207. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Phillips et al. 2006b).
Supplementary Information	Diversity and species richness
Ecological or Social Value	7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID **52**

Generic Information

Contact Person/Principal Investigator	Phillips, Julia
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Seasonal dynamics in reef algae communities
Abstract	N/a
Study Objectives	To characterise the seasonal-scale temporal variation in algae assemblages in the Jurien, Perth and Geographe Bay regions

Geographic Position

Region Name	Southern West Coast
Extents (N,E,S,W)	51 sites; 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	reef algae; biomass; community structure; diversity; mean algal biomass; LAC
Contributors	Russ Babcock (CSIRO); Nicole Murphy (CSIRO); Geordie Clapin (CSIRO); Alison Sampey (CSIRO); Mat Kleczkowski (CSIRO); Mark Westera (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Phillips J, Babcock R, Murphy N, Clapin G, Sampey A, Kleczkowski M and Westera M. (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Seasonal dynamics in reef algae communities. In Keesing JK, Heine JN, Babcock RC, Craig PD, Koslow JA (eds) Strategic Research Fund For the Marine Environment: SRFME core projects. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia, Final Report Volume 2. pp.201-203 (Phillips et al. 2006c).
Supplementary Information	diversity, mean algal biomass, LAC

Ecological or Social Value	7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID **53**

Generic Information

Contact Person/Principal Investigator	Phillips, Julia
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Spatial variation in reef algal community structure
Abstract	N/a
Study Objectives	1) To determine the broad-scale spatial trends of reef algae diversity between west coast regions (Jurien, Perth, Geographe Bay); and 2) To determine fine-scale spatial trends of reef algae diversity within regions (Green Head, Jurien, Two Rocks, Marmion, Bunbury, Cape Naturaliste).

Geographic Position

Region Name	Southern West Coast
Extents (N,E,S,W)	51 sites; 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	reef algae; biomass; community structure
Contributors	Russ Babcock (CSIRO); Nicole Murphy (CSIRO); Geordie Clapin (CSIRO); Alison Sampey (CSIRO); Mat Kleczkowski (CSIRO); Mark Westera (CSIRO)
Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Phillips J, Babcock R, Murphy N, Clapin G, Sampey A, Kleczkowski M, Westera M (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Spatial variation in reef algal community structure. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 207-214. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Phillips et al. 2006d).
Supplementary Information	*Ecklonia radiata*, red algae, brown alga
Ecological or Social Value	7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID **54**

Generic Information

Contact Person/Principal Investigator	Potter, Ian
Contact Organisation	Murdoch University
Study Title	Ecological Interactions in Coastal Marine Ecosystems: The Fish Communities and Main Fish Populations of the Jurien Bay Marine Park
Abstract	N/a
Study Objectives	To obtain baseline data on diversity, densities and compositions of fish fauna in different habitats in different management zoning of JBMP.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	JBMP; 35 sites; Green Head; Cervantes

Other information

Keywords	selected finfish; effectiveness; management zones
Contributors	David Fairclough (DoF); Russ Babcock (CSIRO); Elaine Lek (MDU)
Study Start Date	N/a

Study End Date	30-Sep-07
Hyperlink	http://www.srfme.org.au/documents/SRFME_potter2.pdf
References	Potter I, Fairclough D, Babcock R, Lek E (2006) Ecological interactions in coastal marine ecosystems: The fish communities and main fish populations of the Jurien Bay Marine Park. In Strategic Research Fund For the Marine Environment: Final Report Volume 1. The SRFME initiative and the SRFME collaborative linkages program. (eds. J Keesing, J Heine), pp. 181-193. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Potter et al. 2006); Lek E (in prep) The biology of three sympatric species of wrasse (Labridae) on the west coast of Australia. Thesis, Murdoch University, Perth, Western Australia (Lek in prep); Fairclough DV, Potter IC, Lek E, Bivoltsis AK, Babcock RC (in prep) *The fish communities and main fish populations of the Jurien Bay Marine Park*. Final Report to the Strategic Research Fund for the Marine Environment prepared by Murdoch University, Perth, Western Australia (Fairclough et al. in prep).
Supplementary Information	other studies: Study of the movement of Silver Trevally *Pseudocaranx georgianus* using acoustic telemetry; and Also, at each reef site, surveys were conducted of rugosity (structural complexity) and algal composition (using broad morphological groups).
Ecological or Social Value	7.1.8 Finfish 7.2.3 Commercial fishing 7.2.7 Recreational fishing
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required.

Metadata ID **55**

Generic Information

Contact Person/Principal Investigator	Sampey, Alison
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Environmental parameters
Abstract	N/a
Study Objectives	To explore and identify the environment factors that may explain spatial and temporal variability in flora and fauna distributions

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	51 sites; 9 Green Head; 19 Jurien Bay; 2 Two Rocks; 9 Marmion; 10 Bunbury; 2 Cape Naturaliste; sampled seasonally

Other information

Keywords	Physical characteristics; Chlorophyll-a; TSS; LAC; nutrients; NH4; NOx; carbon; nitrogen isotopes
Contributors	Geordie Clapin (CSIRO); Julia Phillips (CSIRO); Nicole Murphy (CSIRO); Mat Kleczkowski (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	www.srfme.org.au
References	Sampey A, Clapin G, Phillips J, Murphy N, Babcock R, Kleczkowski M (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Environmental parameters. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 197-200. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Sampey et al. 2006).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality. 7.1.5 Macroalgal communities. 7.1.7 Invertebrate communities. 7.1.8 Finfish.

JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.1.2 Water & sediment quality (3) Establish baseline water quality monitoring programs in relation to nutrient enrichment. 7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets. 7.1.7 Invertebrate communities (2) Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park. 7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required.

Metadata ID 56

Generic Information

Contact Person/Principal Investigator	Strzelecki, Joanna
Contact Organisation	Commonwealth Science and Industry Research Organisation
Study Title	Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Mesozooplankton
Abstract	N/a
Study Objectives	1) To describe spatial (particularly onshore-offshore) and seasonal patterns in abundance and biomass. 2) To assess seasonal and cross-shelf patterns in secondary productivity and in the role of the zooplankton in pelagic biogeochemistry through their grazing on phytoplankton and the smaller zooplankton, and the export of carbon to depth.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Two Rocks

Other information

Keywords	Zooplankton; plankton,
Contributors	Tony Koslow (CSIRO)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	www.srfme.org.au
References	Strzelecki J. and Koslow T. (2006) Temporal and spatial variability in biophysical oceanography across the continental shelf and slope: Mesozooplankton. In Keesing JK, Heine JN, Babcock RC, Craig PD, Koslow JA (eds) Strategic Research Fund For the Marine Environment: SRFME core projects. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia, Final Report Volume 2. pp.88-102 (Strzelecki & Koslow 2006); Strzelecki J, Koslow T, Waite AM (2007) Comparison of mesozooplankton communities from a pair of warm- and cold-core eddies off the coast of Western Australia. Deep-Sea Research Part II. 54, 1103-1112 (Strzelecki & Koslow 2006).
Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters.

Metadata ID 57

Generic Information

Contact Person/Principal Investigator	Sumner, Neil
Contact Organisation	Department of Fisheries
Study Title	Creel survey
Abstract	N/a
Study Objectives	N/a

Geographic Position

Region Name	West coast WA
Extents (N,E,S,W)	Kalbarri to Augusta

Other information

Keywords	recreational fishing survey; human usage; human impacts; human usage; recreation
Contributors	N/a
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	N/a
Supplementary Information	N/a
Ecological or Social Value	7.1.3 Intertidal reef platforms 7.2.3 Commercial fishing 7.2.5 Coastal use 7.2.6 Seascapes 7.2.7 Recreational fishing 7.2.8 Water sports 8.5 Monitoring 8.7 Direct management intervention
JBMP Management Strategy	7.1.3 Intertidal reef platforms (3) Assess the nature, level and potential impacts of human activities on intertidal reef platforms within the marine park. 7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.5 Coastal use (4) Identify popular beaches in the marine park and beaches that are potentially environmentally sensitive to RV use. 7.2.6 Seascapes (1) Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required. 7.2.8 Water sports (2) Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing water sports in the marine park. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs. 8.7 Direct management Intervention (1) Identify areas of existing human impacts in the marine park. 8.7 Direct management Intervention (3) Monitor human usage (visitor numbers and high use areas) and, consistent with available resources, provide visitor facilities where appropriate.

Metadata ID 58

Generic Information

Contact Person/Principal Investigator	Vanderklift, Mat
Contact Organisation	Commonwealth Science and Industry Research Organisation Marine and Atmospheric Research
Study Title	Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Regional trends in fish communities
Abstract	N/a
Study Objectives	1) To determine the broad-scale spatial trends of finfish diversity between west coast regions (Jurien, Perth, Cape Naturaliste). 2) To determine the fine-scale spatial trends of finfish diversity within regions

Geographic Position

Region Name	Southern West coast
Extents (N,E,S,W)	20 sites; 9 Green Head - Jurien Bay; 3 Two Rocks; 5 Marmion; 3 Cape Naturaliste; sampled seasonally

Other information

Keywords	finfish and macroalgae assemblages
Contributors	N/a

Study Start Date	N/a
Study End Date	completed
Hyperlink	N/a
References	Vanderklift MA (2006) Benthic Ecosystem Structure: Spatial and temporal variability in animal and plant diversity. Regional trends in fish communities. In Strategic Research Fund For the Marine Environment: Final Report Volume 2. SRFME core projects (eds. J Keesing, J Heine, R Babcock, et al.), pp. 221-224. Strategic Research Fund For the Marine Environment, CSIRO, Perth, Western Australia (Vanderklift 2006); Wernberg T, Vanderklift MA, How J, Lavery PS (2006) Export of detached macroalgae from reefs to adjacent seagrass beds. *Oecologia*. **147**, 692-701 (Wernberg et al. 2006); Vanderklift MA, How J, Wernberg T, MacArthur LD, Heck Jr KL, Valentine JF (2007) Proximity to reef influences density of small predatory fishes, while type of seagrass influences intensity of their predation on crabs. *Marine Ecology Progress Series*. **340**, 235-243 (Vanderklift et al. 2007).
Supplementary Information	N/a
Ecological or Social Value	7.1.8 Finfish
JBMP Management Strategy	7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.

Metadata ID 59

Generic Information

Contact Person/Principal Investigator	Waddington, Kris
Contact Organisation	University of Western Australia
Study Title	Diet and trophic role of western rock lobsters (*Panulirus cygnus* George.) in temperate Western Australian deep-coastal ecosystems (35–60 m)
Abstract	The western rock lobster (*Panulirus cygnus* George.) is a conspicuous consumer in the coastal ecosystems of temperate Western Australia. We used stable isotope analysis and gut content analysis to determine the diet and trophic position of western rock lobsters from mid-shelf coastal ecosystems (35–60 m depth) at three locations. Lobsters were primarily carnivorous, and no consistent differences in diet were detected with varying lobster size, sex or among locations. The main components of the diet were bait (from the fishery) and small crustaceans – crabs and amphipods/isopods. Foliose red algae, bivalves/ gastropods and sponges were minor contributors to diet. The diet of lobsters in deep coastal ecosystems differed from the results of previous studies of diets of lobsters from shallow coastal ecosystems. In particular, coralline algae and molluscs – important prey in studies of lobsters from shallow coastal ecosystems – were minor components of the diet. These differences are likely to reflect differences in food availability between these systems and potentially, differences in choice of prey by lobsters that inhabit deeper water. Given the high contribution of bait to lobster diet, bait is likely to be subsidising lobster production in deep coastal ecosystems during the fishing season.
Study Objectives	N/a

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay

Other information

Keywords	WRL; Western Rock Lobster; crayfish
Contributors	Mat Vanderklift (CSIRO); Lynda Bellchambers (DoF); Di Walker (UWA)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a

References	Waddington KI, Melville-Smith R, Walker DI, Knott B (2005) Effect of reproductive state and sex on movement and food consumption of western rock lobster (*Panulirus cygnus*) in a tank environment. New Zealand Journal of Marine and Freshwater Research. 39, 365-372 (Waddington et al. 2005); Waddington KI, Bellchambers LM, Vanderklift MA, Walker DI (2008) Western rock lobsters (*Panulirus cygnus*) in Western Australian deep coastal ecosystems (35–60 m) are more carnivorous than those in shallow coastal ecosystems. Estuarine, Coastal and Shelf Science. 79 114–120 (Waddington et al. 2008); Waddington KI (2008) Variation in evacuation rates of different foods skew estimates of diet in the western rock lobster *Panulirus cygnus*. Marine and Freshwater Research. 59, 347-350 (Waddington 2008).
Supplementary Information	N/a
Ecological or Social Value	7.2.3 Commercial fishing 7.2.7 Recreational fishing
JBMP Management Strategy	7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 8.5 Monitoring (1) Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.

Metadata ID **60**

Generic Information

Contact Person/Principal Investigator	Wernberg, Thomas
Contact Organisation	University of Western Australia
Study Title	Interactive effects of ocean climate, disturbance regimes and eutrophication on kelp beds
Abstract	N/a
Study Objectives	To test the interactive effects of ocean temperature, disturbance regime and nutrient addition on the resilience of temperate reef communities.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Jurien Bay Marine Park

Other information

Keywords	water quality; macroalgae
Contributors	Gary Kendrick (UWA); Mads Thomsen (ECU); Fernando Tuya (ECU); Peter Staehr (University of Copenhagen)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Vanderklift MA, Wernberg T (in prep) Stable isotopes show consistent consumer-prey relationships across hundreds of kilometres. *Global Ecology and Biogeography (Vanderklift & Wernberg in prep);* Wernberg T, Kendrick GA (in prep) Evidence for (limited) effects of ocean temperature on the biogenic habitat structure provided by algal canopies. *Journal of Climate Research (Wernberg & Kendrick in prep)*; Wernberg T, Thomsen MS, Tuya F, Kendrick GA, Staehr PA, Toohey BD (in prep) Global warming is eroding the resilience of kelp beds. *Global Change Biology (Wernberg et al. in prep-a);* Wernberg T, Tuya F, Thomsen MS (in prep) Turban snails as habitat for algae: contrasting geographical patterns in species richness explained by top-down control from epibiotic limpets? *Journal of Molluscan Studies (Wernberg et al. in prep-b);* Tuya F, Vanderklift MA, Hyndes GA, Wernberg T, Thomsen MS, Hanson C (in press) Proximity to reefs affects the balance between positive and negative effects on seagrass fauna. *Oecologia (Tuya et al. in press-a)*; Tuya F, Wernberg T, Thomsen M (in press) Habitat structure affect abundances of labrid fishes across temperate reefs in south-western Australia. *Environmental Biology of Fishes (Tuya et al. in press-b)*; Tuya F, Wernberg T, Thomsen MS (in press) Colonization of gastropods on subtidal reefs depends on density in adjacent habitats not on disturbance regime. *Journal of Molluscan Studies* (Tuya et al. in press-c).

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Supplementary Information	N/a
Ecological or Social Value	7.1.2 Water & sediment quality 7.1.5 Macroalgal communities
JBMP Management Strategy	7.1.2 Water & sediment quality (2) Develop an appropriate understanding of the circulation and mixing of the marine park's waters. 7.1.5 Macroalgal communities (2) Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.

Metadata ID **61**

Generic Information

Contact Person/Principal Investigator	Wise, B
Contact Organisation	Department of Fisheries
Study Title	Spatial scales of exploitation among populations of demersal scalefish: Implications for management. Part 1: Stock status of key indicator species for demersal scalefish fishery in the West Coast Bioregion
Abstract	The levels of exploitation on dhufish and pink snapper across the West Coast Bioregion and for baldchin groper at the Abrolhos Islands are above international benchmark standards. This indicates that these stocks are currently being overfished and are therefore likely to be being depleted to levels below those necessary to ensure their long-term sustainability. The current reliance of the dhufish catch on a single recruitment pulse together with the extremely truncated age distribution of pink snapper indicates that both these stocks are particularly vulnerable.
Study Objectives	To undertake a stock assessment of fish stocks by: 1) the examination of historical catch, effort and catch rate data; and 2) the examination of age structure data and other biological variables.

Geographic Position

Region Name	Central West Coast
Extents (N,E,S,W)	Kalbarri to Augusta

Other information

Keywords	targetted finfish; finfish diversity; stock assessments
Contributors	Jill St John (DoF); Rod Lenanton (DoF)
Study Start Date	N/a
Study End Date	N/a
Hyperlink	N/a
References	Wise BS, St John J, Lenanton RC (2007) Spatial scales of exploitation among populations of demersal scalefish: Implications for management. Part 1: Stock status of the key indicator species for the demersal scalefish fishery in the West Coast Bioregion. Final Report to the Fisheries Research and Development Corporation on Project No. 2003/052. Department of Fisheries, Perth, Western Australia, Fisheries research Report 163. 130 p. (Wise et al. 2007).
Supplementary Information	N/a

Ecological or Social Value	7.1.8 Finfish 7.2.3 Commercial fishing 7.2.7 Recreational fishing
JBMP Management Strategy	7.1.8 Finfish (2) Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park. 7.2.3 Commercial fishing (2) Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park. 7.2.3 Commercial fishing (3) Determine the effects of commercial fishing activity on the marine park's values and review management controls as required. 7.2.3 Commercial fishing (6) Monitor commercial fishing catch/effort within the marine park. 7.2.7 Recreational fishing (2) Evaluate the sustainability of existing recreational fisheries in the marine park. 7.2.7 Recreational fishing (4) Determine the effects of recreational fishing activities on the marine park's values and review management controls as required. 7.2.7 Recreational fishing (6) Monitor recreational fishing catch/effort within the marine park.

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8 APPENDICES

Appendix I. List of marine park values and associated management strategies

(Department of Conservation and Land Management 2005)

VALUE	STRATEGY	PRIORITY
Ecological Values		
7.1.1 Geomorphology (6)	Educate marine park users about the ecological importance of the marine park's geomorphology.	(L)
7.1.2 Water & sediment quality (1)	Establish and maintain a pollutant inputs database for the marine park.	(H-KMS)
7.1.2 Water & sediment quality (2)	Develop an appropriate understanding of the circulation and mixing of the marine park's waters.	(H-KMS)
7.1.2 Water & sediment quality (2)	Establish baseline water quality monitoring programs in relation to nutrient enrichment.	(H-KMS)
7.1.2 Water & sediment quality (4)	Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution.	(H)
7.1.3 Intertidal reef platforms (2)	Initiate research programs to characterise the flora and fauna of selected intertidal reef platforms within the marine park in relation to establishing management targets.	(H - KMS)
7.1.3 Intertidal reef platforms (3)	Assess the nature, level and potential impacts of human activities on intertidal reef platforms within the marine park.	(H)
7.1.3 Intertidal reef platforms (4)	Educate marine park users about the potential detrimental effects of fishing, collecting and reef-walking.	(H)
7.1.4 Seagrass meadows (2)	Educate users of the important ecological role of seagrass communities and the potential impacts of human activities, particularly boat moorings and nutrient pollution, on these communities.	(H - KMS)
7.1.4 Seagrass meadows (4)	Monitor seagrass meadows in areas at most risk of mooring and anchoring damage.	(H)
7.1.5 Macroalgal communities (2)	Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets.	(H)
7.1.5 Macroalgal communities (3)	Educate marine park users about the ecological importance of macroalgal communities.	(M)
7.1.5 Macroalgal communities (4)	Quantify the level of private algal wrack collection and introduce controls where this is having a significant impact on the nearshore ecology of the marine park.	(L)
7.1.6 Seabirds (1)	Educate marine park users about the ecological significance of the marine park's seabird populations and the potential detrimental impacts of human disturbance.	(H)
7.1.7 Invertebrate communities (2)	Undertake research programs to characterise invertebrate diversity and abundance in different zones in the marine park.	(H-KMS)
7.1.7 Invertebrate communities (3)	Identify invertebrate species which will be protected from recreational or commercial fishing in the marine park and provide the necessary legislative protection to achieve this.	(H-KMS)
7.1.7 Invertebrate communities (4)	Quantify the level and significance of by-catch for recreational and commercial fishing activities in the marine park and, if necessary and in accordance with DoF By-catch Action Plans, implement measures to progressively reduce the by-catch of invertebrate species in the marine park.	(M)
7.1.8 Finfish (2)	Undertake research programs to characterise finfish diversity and abundance in different zones in the marine park.	(H-KMS)

VALUE	STRATEGY	PRIORITY
7.1.8 Finfish (3)	Identify finfish species that will be protected from recreational or commercial fishing in the marine park and provide the necessary legislative protection to achieve this.	(H-KMS)
7.1.8 Finfish (4)	Quantify the level and significance of catch of targetted species and by-catch for recreational and commercial fishing activities in the marine park and, if necessary and in accordance with DoF By-catch Action Plans, implement measures to progressively reduce the by-catch of invertebrate species in the marine park.	(M)
7.1.8 Finfish (5)	Educate reserve users about the detrimental impacts of human activities on finfish stocks in the marine park.	(M)
7.1.9 Cetaceans and turtles (1)	Maintain records of the incidence of entanglement, boat collisions and strandings of cetacean and turtle species.	(M)
7.1.9 Cetaceans and turtles (2)	Ensure cetacean interaction activities do not impact wildlife, through education programs and liaison with charter operators.	(L)
7.1.9 Sea lions (3)	Monitor trends in sea lion pup production each breeding season.	(H)
7.1.9 Sea lions (4)	Quantify the level of sea lion entrapment and drowning in commercial fishing gear and, if necessary, investigate ways to reduce this, through the development of a By-catch Action Plan by DoF and in collaboration with the commercial fishing industry.	(H)
Social values		
7.1.12 Education (2)	Support local schools that wish to develop a marine education program relating to the proposed marine park.	(M)
7.1.12 Education (3)	Provide support, where possible, to institutions using the marine park for educational purposes.	(M)
7.2.2 Maritime heritage (2)	Distribute educational material relevant to conserving historic shipwrecks in Western Australia to marine park users.	(L)
7.2.3 Commercial fishing (2)	Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park.	(H-KMS)
7.2.3 Commercial fishing (3)	Determine the effects of commercial fishing activity on the marine park's values and review management controls as required.	(H-KMS)
7.2.3 Commercial fishing (6)	Monitor commercial fishing catch/effort within the marine park.	(H)
7.2.5 Coastal use (1)	Increase awareness of marine park users about the ecological and social impacts arising from the inappropriate use of RVs on marine park beaches.	(M)
7.2.5 Coastal use (3)	Educate marine park users about the potential impacts of litter on the social values of the marine park.	(L)
7.2.6 Coastal use (4)	Identify popular beaches in the marine park and beaches that are potentially environmentally sensitive to RV use.	(L)
7.2.6 Seascapes (1)	Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park.	(H-KMS)
7.2.7 Recreational fishing (2)	Evaluate the sustainability of existing recreational fisheries in the marine park.	(H-KMS)
7.2.7 Recreational fishing (4)	Determine the effects of recreational fishing activities on the marine park's values and review management controls as required.	(H-KMS)
7.2.7 Recreational fishing (6)	Monitor recreational fishing catch/effort within the marine park.	(H)
7.2.7 Recreational fishing (7)	Undertake research that documents the oral history of fishing in the marine park.	(H)
7.2.8 Water sports (2)	Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing water sports in the marine park.	(H)
Generic management strategies		
8.2 Education and interpretation (1)	Develop and implement, in collaboration with DoF and other relevant agencies, education and interpretation programs to ensure users of the marine park are aware of and understand the values of the marine park, management zones and regulations and the reasons for these controls.	(H - KMS)
8.2 Education and interpretation (2)	Develop and distribute to the local community and visitors a range of education materials about the marine park's values and management.	(H)
8.2 Education and interpretation (3)	Provide talks and briefings about the marine park's values, uses and management to local and visiting groups.	(H)
8.4 Research (1)	Develop and progressively implement a coordinated and prioritised research program of key values and processes of the marine park.	(H-KMS)

VALUE	STRATEGY	PRIORITY
8.4 Research (3)	Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park.	(H-KMS)
8.4 Research (4)	Develop and maintain a database of historical and current research in the marine	(H)
8.4 Research (5)	Facilitate scientific and social research in the marine park by research, academic and educational institutions by providing financial and logistical assistance (where possible).	(H)
8.5 Monitoring (1)	Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the reserves, including community-based monitoring programs.	(H-KMS)
8.5 Monitoring (2)	Develop and maintain a database of human usage in the marine park.	(H-KMS)
8.5 Monitoring (3)	Ensure that proponents of development proposals or activities with the potential to impact on the marine park's values conduct appropriate compliance monitoring programs.	(H)
8.6 Public participation (1)	Establish and maintain a MAC.	(H - KMS)
8.6 Public participation (2)	Encourage community involvement in education and interpretation programs.	(M)
8.6 Public participation (3)	Encourage community involvement in monitoring programs.	(M)
Generic Research Strategies	Identify and communicate high priority scientific and social research projects relevant to the management of the marine park to appropriate research organisations.	(H-KMS)

List of Marine Science Program reports

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MSPDR 1. Preliminary assessment of coral communities at selected sites in the proposed Dampier Archipelago Marine Park. Armstrong SJ (2008).

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