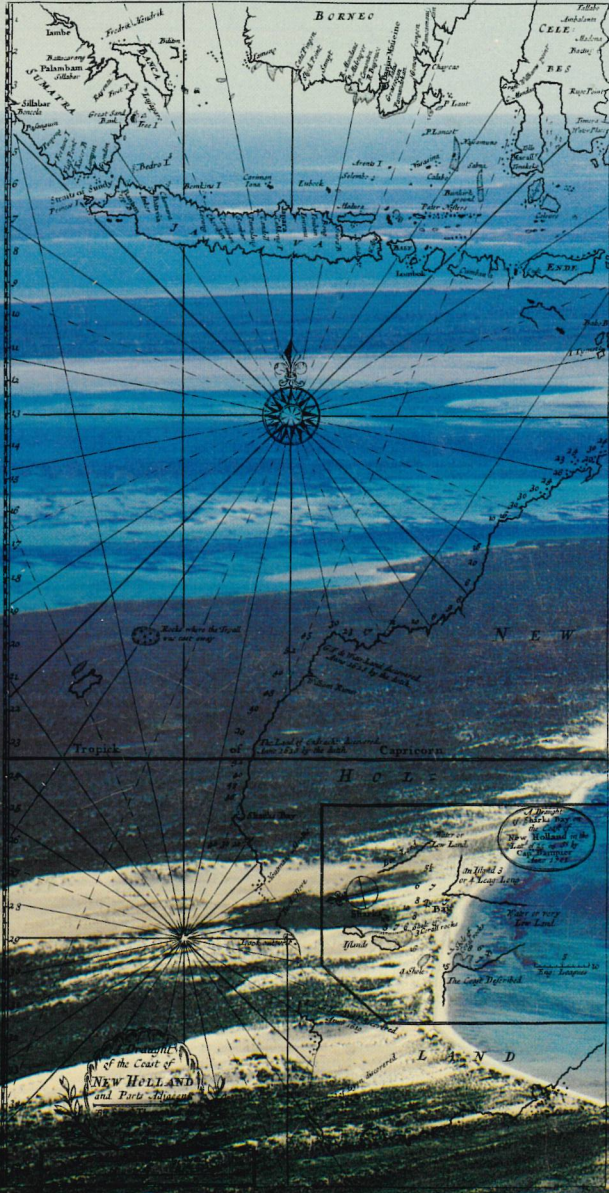


LEAH OLSON

SHARK BAY



REGION PLAN



STATE PLANNING
COMMISSION



DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

PERTH, WESTERN AUSTRALIA. ADOPTED JUNE 1988

COVER

Photograph: Surf Point on Dirk Hartog Island, and
Blind Strait.

Chart: A draught of the coast of New Holland
and parts adjacent by Samuel Thornton, 1743.

Sharks Bay inset by Captain Dampier, 1701.

Tooley Collection, National Library of Australia.

Reproduced from a facsimile chart by the Australian
Institute of Cartographers A.C.T. Division.

SHARK BAY REGION PLAN



**STATE PLANNING COMMISSION,
22 St. Georges Terrace,
Perth. Western Australia. 6000.**



**DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT,
50 Hayman Road,
Como. Western Australia. 6152.**

047

ADOPTED JUNE 1988

First published March 1987
Reprinted with corrections April 1987
Second edition March 1988
Reprinted with corrections March 1988
Final edition June 1988

STATEMENT BY THE PREMIER OF WESTERN AUSTRALIA

Shark Bay is an area unique in natural beauty and history.

It is the site of the first recorded European landing in WA, it is the home for friendly dolphins at Monkey Mia and has the fortune to have some of the best examples of stromatolites at Hamelin Pool.



Shark Bay residents have made their living from fishing and utilising pastoral areas.

More recently solar salt production has provided a major economic boost to the region.

Tourism has increased significantly.

While residents are proud of their environment, they are concerned that unmanaged resource development and tourism may adversely affect their way of life.

Conservation interests want to protect the tremendous conservation values.

With all these concerns and pressures the State Planning Commission and the Department of Conservation and Land Management, through extensive consultation with local residents, conservation, recreation and industry interests and Government agencies has developed a Region Plan.

One hundred and sixty-eight people and organisations made submissions on the plan and the majority of these comments are included in this final plan.

The Strategy has been widely accepted and recognises community economic and conservation needs and proposes vast new national and marine parks in Shark Bay. It uses a balance of commonsense and practical knowledge to make commitments which can be achieved.

This is the State's first Region Plan outside the metropolitan area which has been adopted by the Government and I congratulate those associated with it.

A handwritten signature in black ink, which appears to read "Peter Dowding". The signature is fluid and cursive.

PETER DOWDING LL.B. MLA
PREMIER OF WESTERN AUSTRALIA.

MEMBERS OF THE STATE PLANNING COMMISSION

MR W A MCKENZIE	CHAIRMAN
MR S P WILLMOTT	DEPUTY CHAIRMAN
MR S W PARKS	MEMBER
MR K R BARRETT	MEMBER*
DR E J HARMAN	MEMBER*

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

DR S R SHEA	EXECUTIVE DIRECTOR
DR B R WILSON, FTS.	DIRECTOR, NATURE CONSERVATION

COUNTRY PLANNING COUNCIL

MR R W MASLEN	CHAIRMAN	STATE PLANNING COMMISSION ASSOCIATE MEMBER FOR THE NORTHERN REGION
MR S P WILLMOTT		DEPUTY CHAIRMAN, STATE PLANNING COMMISSION, AND LOCAL GOVERNMENT REPRESENTATIVE
DR S R SHEA		EXECUTIVE DIRECTOR, DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
DR M J MULCAHY		INDEPENDENT SCIENTIST, CONSULTANT
MR C C SANDERS		DIRECTOR OF ENVIRONMENTAL INVESTIGATIONS, ENVIRONMENTAL PROTECTION AUTHORITY
MR N J HALSE		DIRECTOR, DEPARTMENT OF AGRICULTURE
DR D R KELLY		DIRECTOR GENERAL, DEPARTMENT OF MINES
MR N J SMYTH		EXECUTIVE DIRECTOR, DEPARTMENT OF LAND ADMINISTRATION
MR W S SHELTON		DIRECTOR OF OPERATIONS, WATER AUTHORITY OF WESTERN AUSTRALIA

DR W J COX

DIRECTOR, DEPARTMENT OF
REGIONAL DEVELOPMENT AND THE
NORTH WEST

SHARK BAY COMMUNITY CONSULTATIVE COMMITTEE

DR B R WILSON, FTS. CHAIRMAN DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

MR D C EVERALL STATE PLANNING COMMISSION

MR J L SELLENGER SHIRE OF SHARK BAY

MRS V A KOPKE SHIRE OF SHARK BAY

MR P J WILSON SHIRE OF CARNARVON*

MR J A WILLIS INDEPENDENT

MR B M WAKE PASTORALISTS AND GRAZIERS
ASSOCIATION - SHARK BAY

MR J W ANDREWS, JP. SHARK BAY CHAMBER OF
COMMERCE*

MR R O HOULT DENHAM FISHERMEN'S
ASSOCIATION

MRS G M McCLEARY SHARK BAY TOURIST COMMITTEE*

MR P R GRATTON SHARK BAY SALT JOINT
VENTURE*

SHARK BAY PROJECT TEAM

MR D C EVERALL, PROJECT MANAGER STATE PLANNING
COMMISSION

MR T ARIAS, EXECUTIVE OFFICER STATE PLANNING
COMMISSION*

DR R I T PRINCE DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

MR C E CHALMERS ENVIRONMENTAL PROTECTION
AUTHORITY

MR P J CURRY DEPARTMENT OF AGRICULTURE

DR H E JONES FISHERIES DEPARTMENT

MR D J ALLEN DEPARTMENT OF LAND
ADMINISTRATION

MR G M GARE CONSULTANT FOR SHIRE OF
SHARK BAY

DR P J WOODS ENVIRONMENTAL CONSULTANT

MR C SPASESKI STATE PLANNING COMMISSION

* Membership changed during the study

CONTENTS

(i)	SUMMARY OF STRATEGIES	xv
1.0	INTRODUCTION	1
2.0	REGIONAL PROFILE	5
2.1	BIOPHYSICAL ENVIRONMENT	5
2.1.1	CLIMATE	5
2.1.2	LANDFORMS	6
2.1.3	GEOLOGY	6
2.1.4	HYDROLOGY	7
2.1.5	SEAFORMS	8
2.1.6	OCEANOGRAPHY	8
2.1.7	PLANTS	9
2.1.8	ANIMALS	11
2.1.9	CONSERVATION OF THE NATURAL FEATURES AND SYSTEMS OF SHARK BAY	12
2.2	SOCIAL ENVIRONMENT	18
2.2.1	HISTORIC AND CULTURAL VALUES	18
2.2.2	POPULATION	20
2.2.3	GOVERNMENT SERVICES	21
2.2.4	ACCESS	22
2.2.5	OTHER SOCIAL SERVICES	23
2.3	ECONOMIC ENVIRONMENT	24
2.3.1	FISHING	25
2.3.2	MINING	28

2.3.3	PASTORALISM	34
2.3.4	TOURISM	40
2.3.5	OTHER INDUSTRIES	42
2.3.6	POTENTIAL INDUSTRIES	42
<hr/>		
3.0	PLANNING ISSUES	44
<hr/>		
3.1	MINING	44
3.2	PASTORALISM	45
3.3	FISHING	45
3.4	CONSERVATION	45
3.5	REGIONAL DEVELOPMENT	47
<hr/>		
4.0	OBJECTIVES FOR SHARK BAY	49
<hr/>		
4.1	THE SHARK BAY STUDY BRIEF	49
4.1.1	COMMUNITY DEVELOPMENT	49
4.1.2	ECONOMIC DEVELOPMENT	50
4.1.3	CONSERVATION	50
<hr/>		
5.0	STRATEGIES FOR ACHIEVING OBJECTIVES	51
<hr/>		
5.1	ANALYTICAL METHOD	51
5.1.1	LAND USE PLAN	51
5.1.2	OTHER STRATEGIES	
5.2	LAND USE PLANNING STRATEGY	52
5.2.1	MINING ZONE	56
5.2.2	PASTORAL USES ZONE	56
5.2.3	URBAN USES ZONE	57
5.2.4	COMMERCIAL FISHING AND TRAWLING AND RECREATION ZONE	57

5.2.5	RECREATION AND COMMERCIAL FISHING ZONE	59
5.2.6	ENVIRONMENT PROTECTION RESERVE	59
5.2.7	ENVIRONMENT PROTECTION AND RECREATION RESERVE	60
5.2.8	PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS RESERVE	60
5.2.9	PROTECTION OF MARINE MAMMAL HABITAT RESERVE	61
5.2.10	PRAWN NURSERY AND SEAGRASS PROTECTION RESERVE	62
5.2.11	PROTECTION OF COASTAL LANDFORMS AND VEGETATION RESERVE	62
5.3	STRATEGIES FOR ACHIEVING COMMUNITY DEVELOPMENT	63
5.3.1	TRANSPORTATION	63
5.3.2	COMMUNITY SERVICES	64
5.3.3	RECREATION	66
5.4	STRATEGIES FOR ACHIEVING ECONOMIC DEVELOPMENT	66
5.4.1	PASTORAL DEVELOPMENT	66
5.4.2	FISHERIES DEVELOPMENT	68
5.4.3	MINING DEVELOPMENT	69
5.4.4	TOURISM DEVELOPMENT	70
5.4.5	POTENTIAL NEW INDUSTRIES	74

5.5	STRATEGIES FOR CONSERVING THE NATURAL ENVIRONMENT	76
5.5.1	INTENT OF EPA'S SYSTEM 9 RECOMMENDATIONS	76
5.5.2	INFORMATION FOR CONSERVATION	76
5.5.3	CONSERVATION OF MARINE ENVIRONMENTS	77
5.5.4	CONSERVATION OF LAND ENVIRONMENTS	83
5.5.5	MONKEY MIA	85
5.5.6	CULTURAL AND HISTORIC FEATURES	88
5.5.7	NOMINATION FOR WORLD HERITAGE LISTING	90
<hr/>		
6.0	IMPLEMENTATION	91
<hr/>		
6.1	CO-ORDINATING THE ACTIVITIES OF THREE LEVELS OF GOVERNMENT	91
6.1.1	LOCAL GOVERNMENT	91
6.1.2	STATE GOVERNMENT	92
6.1.3	COMMONWEALTH GOVERNMENT	92
6.2	OPTIONS FOR ADMINISTRATION OF THE REGION	92
6.3	CO-ORDINATION OF MANAGEMENT	94
6.3.1	RESPONSIBILITIES OF PROPOSED SHARK BAY REGION TRUST	94
6.3.2	STRUCTURE OF THE PROPOSED SHARK BAY REGION TRUST	95

6.4	PROVIDING FOR ON-THE-GROUND MANAGEMENT AND DEVELOPMENT	96
6.4.1	LOCAL GOVERNMENT FUNDING	96
6.4.2	STATE GOVERNMENT FUNDING	96
6.4.3	COMMONWEALTH GOVERNMENT FUNDING	96
6.4.4	POTENTIAL SOURCES OF FUNDING	97
6.4.5	SHARK BAY MANAGEMENT FUND	97
6.5	LEGISLATIVE REQUIREMENTS	98
	REFERENCES	101
	APPENDICES	107
1.	ANALYSIS OF PUBLIC SUBMISSIONS TO THE SHARK BAY REGION PLAN	108
2.	LIST OF CROWN RESERVES IN THE STUDY AREA	133
	TABLES	
1.	ESTIMATED RESIDENT POPULATION AT SHARK BAY 1976-1991	21
2.	ATTRIBUTES OF PASTORAL STATIONS AT SHARK BAY	39
3.	PROPOSED LAND USE ZONES	55
4.	PASTORAL LEASES AFFECTED BY OTHER USE ZONES	58

FIGURES

1.	DISTRIBUTION OF CONSERVATION AND HISTORIC FEATURES	15
2.	MAIN COMMERCIAL FISHING AREAS	30
3.	MAIN RECREATIONAL FISHING AREAS	31
4.	MINERAL EXPLORATION AREAS	35
5.	PASTURE VALUES MAP	37
6.	LAND USE	54
7.	PROPOSED HAMELIN POOL MARINE NATURE RESERVE	81
8.	PROPOSED CONSERVATION AREAS	87
9.	CONCEPT - PROPOSED MONKEY MIA REDEVELOPMENT	89

PLATES

1.	SHARK BAY'S SECURE DUGONG POPULATION IS OF WORLD WIDE INTEREST	16
2.	ZUYTDORP CLIFFS, TAMALA STATION	16
3.	COMMERCIAL FISHING - THE MAJOR INDUSTRY AT SHARK BAY	29
4.	A WESTERN AUSTRALIAN FISHING VESSEL RIGGED FOR PRAWN TRAWLING	29

5.	BUSH CAMPING - WELL EQUIPPED FOR THE CATCH	32
6.	ON THE JETTY AT MONKEY MIA	32
7.	SNAKEWOOD - SILVER SALT-BUSH SHRUBLAND ON HAMELIN STATION PROVIDES HIGH VALUE SHEEP GRAZING COUNTRY	38
8.	HAMELIN STATION - SHELL BLOCK CONSTRUCTION UNIQUE TO THE SHARK BAY AREA	38
9.	PROTECTION OF THE DOLPHINS OF MONKEY MIA IS A FEATURE OF THE PLAN	53
10.	STEEP POINT - THE MOST WESTERLY POINT OF MAINLAND AUSTRALIA. PART OF THE PROPOSED EDEL LAND NATIONAL PARK	53
11.	HAMELIN POOL - A HYPERHALINE ENVIRONMENT CONTAINING SEDIMENTARY DEPOSITS OF SCIENTIFIC INTEREST	82
12.	STROMATOLITES - ALGAL BOUND SEDIMENTARY STRUCTURES SIMILAR TO LIFE-FORMS WHICH EXISTED IN THE EARLIEST PERIOD OF LIFE ON EARTH	82

SUMMARY OF PROPOSED STRATEGIES

This planning report identifies a number of important planning and environmental issues at Shark Bay. These are:

- . The E.P.A.'s 1975 System 9 recommendations proposed the acquisition of several pastoral leases and the creation of a large national park at Shark Bay. Acquisition of these leases could threaten the viability of the Shire and industries in the area.
- . Shark Bay's marine resources are considered at risk and a large marine park has been proposed to manage the resources and recreational use. Current legislation for marine parks does not provide for commercial fishing and other activities.
- . There are proposals to nominate all or part of Shark Bay for World Heritage Listing. This would have protection and funding benefits, but is also a matter of controversy.
- . Proposals to expand salt mining at Useless Loop and gypsum mining to Peron Peninsula would provide employment and export earnings, but could affect fishing and conservation values.
- . Introducing pasture plants could improve pastoral production, but could adversely affect conservation of native plants and animals.
- . A number of areas on pastoral leases have high conservation value. Pastoralists want to continue managing such areas while other interests want them to be vested as national parks or nature reserves.
- . The tenure and term of pastoral leases is an issue common to all pastoral areas. It is addressed by the Pastoral Lands Tenure Review Report (1986).
- . New activities, such as tourism on pastoral lands diversify a narrowly based economy, but may cause environmental problems.
- . An acceptable allocation of the fisheries resource between professionals and amateurs must be determined.

- . Increasing tourism places stress on the environment, local services and the Shire budget.
- . Bush camping reduces the need to provide expensive seasonal facilities and is desired by many, but increases the fire risk and the environmental impacts of tourism and may affect the economic viability of formalised camp sites.
- . The use of off-road vehicles provides access to many places which are otherwise inaccessible, but can result in serious environmental impacts.
- . Local services are limited. A strategy is required for providing necessary services as efficiently as possible.
- . The many attractions at Monkey Mia beach, boat ramp and dolphins result in congestion there and may result in adverse ecological effects initially on the dolphins.

The issues, as identified above, were reflected in the Planning Study Brief which was to "prepare a Planning Strategy that identifies and provides for the region's development, community and conservation needs."

The Study shows that the renewable natural resources of Shark Bay are the most important features, that exploitation of these resources to date has sustained the region's community and economic activity and that wise management of these limited and fragile resources is the key to the future.

Conservation of natural resources is the major theme and is thus the major Planning Goal for Shark Bay.

The preferred and multiple uses of the land and marine environments have been identified, and where necessary, reservations to secure conservation values have been proposed and broad guidelines for subsequent management of these areas have been indicated. Measures needed to ensure orderly economic and community development in this setting in the future have also been identified. Proposals to implement the specific strategies are provided.

PLANNING GOAL AND OBJECTIVES

Within an overall Planning Goal of Conservation of Natural Resources, three primary objectives have been established for Shark Bay for the Foreseeable future:-

- (i) **Community Development** : to provide for the social and recreational needs of local residents and visitors to the area, consistent with land use capabilities.

These include transportation, community services and recreation.
- (ii) **Economic Development** : to provide for appropriate levels and types of economic development in the area, consistent with land use capabilities.
- (iii) **Conservation** : to achieve the intent of the Environmental Protection Authority's System 9 recommendations for Shark Bay and to protect cultural and historical features of the area while allowing for uses and the needs of local residents and visitors.

Community and economic development strategies proposed recognise the importance of existing industries and community infrastructure and the need for continuity of enterprise and further development within the capacity of regional and community resources. Tourism is seen as the major potential growth industry.

Land Use Planning Strategy

The principle strategy proposed is the Land Use Plan for Shark Bay. The proposed plan divides Shark Bay into five zones and six reserves.

Zones:

- Mining
- Pastoral Uses
- Urban Uses
- Commercial Fishing and Trawling & Recreation
- Recreation and Commercial Fishing

Public Purpose Reserves:

- Environment Protection
- Environment Protection and Recreation
- Protection of Stromatolites and Sedimentary Deposits
- Protection of Marine Mammal Habitat
- Prawn Nursery and Seagrass Protection
- Protection of Coastal Landforms and Vegetation

It is proposed that the Land Use Plan be implemented as a Statutory Plan.

Strategies for Transportation:

- . Shark Bay Chamber of Commerce, the Shire of Shark Bay and the State Planning Commission should investigate options for improving road transport to Denham as part of the economic study proposed under "Strategies for Community Services".
- . The Department of Aviation should be requested to identify a site suitable for construction of an all weather airport to accommodate larger aircraft than the current aerodrome and advise of funding options.
- . A new entrance route into Denham should be established to maximise the scenic views of the Bay, improve the accessibility of the commercial area and the foreshore, improve road safety and focus initial visitor contact on Denham itself.

Strategies for Community Services:

- . All major development should be encouraged to locate in Denham.
- . The State Planning Commission, in conjunction with the Council and the Department of Regional Development should commission an economic study of the region with special reference to determining the future development of tourism.
- . The Shark Bay Council should adopt a planning strategy which provides for the long term planning needs of Denham and is approved by the State Planning Commission.
- . The State Planning Commission should advise Government of the need for a change in legislation to provide for land, the subject of a Land Use Strategy, to be alienated and vested in a relevant management body.
- . Adequate land should be zoned in Council's Town Planning Scheme for industrial, residential, commercial and tourist purposes.
- . The Shark Bay Shire Council, in conjunction with the Denham Chamber of Commerce and State Planning Commission should prepare a foreshore plan and undertake a program to redevelop the foreshore land for public amenity.

Strategies for Pastoral Development:

- . The pastoral industry should investigate options available for diversification on pastoral properties, particularly in the area of tourism.
- . Tenure and management proposals for pastoral leases should be effected as recommended in the Pastoral Land Tenure Review Report (1986).
- . Monitoring and research of pastures within the study area should be continued by the Rangelands Management Branch of the Department of Agriculture in consultation with pastoralists and the Pastoral Board.
- . Initiatives directed at identifying and developing technological innovations for the pastoral industry should be promoted, both by the Authorities directly responsible for pastoral lands and the industry itself.
- . Establish Conservative Pastoral Land Management Practices on lands within the water shed draining into Shark Bay, particularly within the catchment of the Wooramel River.

Strategies for Fisheries Development:

- . The long term sustainability of the fishing industry at Shark Bay should be ensured by ongoing management by the Department of Fisheries and by members of the industry, and by protection of marine habitat, especially those areas which serve as breeding and nursery areas for juvenile fish.
- . Recent improvements in the handling of snapper leading to better overall quality of catch should be maintained.
- . The viability of diversifying the fisheries within the region to include other species such as tuna, mackerel, squid and bait fish should be investigated and where economically and environmentally feasible, should be pursued.
- . Future conflict between the amateur fishery and professional beach seine and line fisheries in the embayment waters should be resolved on the basis of a nexus between the two to ensure the long term viability of both fisheries.

Strategies for Mining Development:

- . The solar salt mining operation at Useless Loop should be continued in accordance with the Shark Bay Solar Salt Agreement Act 1983.
- . Prior to any further expansion of the salt mining operations at Useless Loop which would result in further closure of Useless Inlet, it is essential that the operator undertake a study to determine the potential effects on existing beach seine and other fishing activities and recreational potential. This needs to comply with the assessment procedures of the EPA.
- . The new shell quarry recently established in a less visually obtrusive area, with the advice of the EPA, should continue under EPA guidelines to ensure that shell extraction is not excessive. Coquinite mining should be similarly managed.
- . Commencement of mining of the gypsum resource at the northern end of Peron Peninsula should not proceed until environmental assessment procedures of the EPA have been satisfied.
- . Access for mineral exploration should be permitted in accordance with the Mining Act.

Strategies for Achieving Tourism Development:

- . The Denham Tourist Committee, in association with the Shark Bay Shire Council, the Tourism Commission and local tourist operators should develop a tourism infrastructure for the planning and marketing of the industry. This should include funding of essential interpretive facilities and products.
- . Opportunities for the widest range of tourist related activities which do not conflict with the environmental significance of the region or other existing industries should be developed.
- . New areas for tourism on Peron Peninsula will be opened by the provision of a new road to Herald and Broadhurst Bights and links to other proposed day use areas. The Shire of Shark Bay and Department of Conservation and Land Management should consult Main Roads Department on funding options. Road construction and related developments should be consistent with proper management planning.

- . The tourism industry should consider implementation of the strategies proposed in the Tourism Development Plan for the Gascoyne.
- . The Western Australian Tourism Commission, in conjunction with other relevant bodies should prepare a Tourism Development and Management Plan for Shark Bay which reflects conservation priorities, recreation and Education opportunities and management constraints of the region.

Strategies for New Industries:

- . The State Planning Commission should approach representatives of the Education Department, appropriate research institutions and organisations to assess the practicability of establishing a marine research facility in Denham.
- . The Education Department should instigate a study of the prospects for the development of further educational opportunities in the Shark Bay region.
- . The Department of Conservation and Land Management and the Sandalwood Export Committee should reassess the question of a limited sandalwood industry at Shark Bay.

Strategies for Providing Information for Conservation:

- . The Department of Conservation and Land Management should commission a detailed survey of biological, cultural and historic resources of Shark Bay and establish and maintain an inventory of their condition and status.
- . A call for further scientific research work in Shark Bay should be made by the Environmental Protection Authority.

Strategies for Conservation of Marine Environments:

- . A multiple use marine park should be established at Shark Bay, which permits commercial and recreational fishing while providing for comprehensive environmental and use management of the waters affected.

- . The whole of Hamelin Pool, including the foreshore areas to the edge of the Holocene deposits, and part of the Faure Sill as shown on Figure 7 should be made a Marine Nature Reserve for the purpose of Protection of Stromatolites and Sedimentary Deposits.
- . As an early priority an area of water, at least one kilometre wide, adjacent to the Monkey Mia Reserve should be made a Marine Park to ensure protection of dolphins and control of boating and other activity which may endanger the dolphins.
- . The high energy marine environments west of Bernier, Dorre and Dirk Hartog Islands should be investigated for possible Marine Park Status in consultation with the Fishing Industry

Strategies for Conservation of Land Environments

- . Areas of high conservation value should be identified to enable pastoralists and other land managers to take appropriate conservation management actions.
- . Specific conservation measures should be implemented where necessary on pastoral lands.
- . The northern part of Peron Peninsula should be made a National Park.
- . A carefully designed and located road from the Denham-Monkey Mia road to the northern tip of the peninsula should be constructed, with spurs east and west to points of interest, to relieve congestion at Monkey Mia and to provide Denham based visitors easy access to a range of sightseeing, fishing and swimming options not at present available, or only available at Monkey Mia.
- . Edel Land should be made a National Park from Zuytdorp Point to Steep Point and Cape Bellefin because of its recreation and scenic values.
- . Zuytdorp Nature Reserve should be created by amalgamating the existing Cooloomia Nature Reserve, the undeclared Zuytdorp National Park and intervening land which should be acquired in the future from Tamala and Nanga Stations.
- . Existing Nature Reserves should retain their current vesting and use.
- . Meade Island should be afforded Nature Reserve status.

- . Action should then be taken to identify representative reserves for those vegetation systems not included in existing reserves or in the proposals for reserves in the Plan, by way of a Biological Survey in consultation with land owners.
- . There is a need for consultation with the lessees of Dirk Hartog Island in order to negotiate the Island's future with the objective of reserving it for a National Park.

Strategy for Monkey Mia:

- . The Development Plan for Monkey Mia should be implemented to improve Management.

Strategies for Historic/Cultural Protection:

- . An historic reserve should be created at Cape Inscription to protect Dirk Hartog's Landing Place, the ruins of the historic lighthouse buildings and the old tramway and horseworks.
- . The old Hamelin Post Office should be acquired for preservation, interpretation and research purposes, should it come on the market.
- . Further surveys and research on prehistory and historic sites should be undertaken to determine measures for protection and interpretation of the sites.

Strategy for World Heritage Nomination and Listing:

- . A Government Committee comprising Ministers of the relevant portfolios and representatives of Local Government should have discussions with the Commonwealth in relation to World Heritage Listing, for advice to Government.

Strategies for Implementation:

Action should be taken to:

- . Investigate options for administration of the Region including a proposed 'Shark Bay Region Trust' with responsibilities as set out in Section 6.3.1

- . Permit a user fee to be levied on visitors to Shark Bay and collected through retail, government and other outlets in Shark Bay and other centres (see the 'Shark Bay Management Fund' - Section 6.4.5)
- . Amend the Conservation and Land Management Act to allow for commercial fishing use within particular management zones of Marine Parks.
- . Amend existing Planning legislation to allow for the final Region Plan for Shark Bay to have statutory authority similar to a Town Plan. This could also be achieved under new planning legislation.

1.0 INTRODUCTION

For over three hundred and seventy years Shark Bay has had a significant place in the history of modern Australia. From being the site of the first European landing in Western Australia in 1616 to its expanding role as a major tourist destination, Shark Bay has excited the imagination of visitors and others with its almost endless list of rare, unusual and fascinating features. Some of these features are:

- The abundance of large sea animals found there, including:
 - . the sharks which gave the Bay its name
 - . manta rays and turtles
 - . dugong, whales and the dolphins of Monkey Mia
- The extremely salty waters of large enclosed bays like Hamelin Pool which contain rare stromatolites.
- Crystal clear waters and good fishing.
- The presence of rare mammals, birds and plants.
- Extensive marine seagrass meadows.
- Dramatic red cliffs and coastal scenery.

In 1975 the Environmental Protection Authority (EPA) recommended to the State Government that the significant land and marine conservation values of Shark Bay be conserved through a system of Nature Reserves and National Parks on land and water. These recommendations have not been implemented because of legislative and funding difficulties, although they were accepted by the Government of the day.

However, it has become clearer with each passing year that the environment of Shark Bay must be conserved, not only for scientific or educational interest, but also because the environment is essential to the continued economic prosperity of the region through its fishing, pastoral and tourist industries.

This need has become particularly critical since 1985, when the road to Denham from the Overlander Roadhouse on National Highway 1 was sealed and

the number of visitors to the area increased dramatically.

In response to this situation, the Government, in March, 1986, resolved that the State Planning Commission (SPC) and Department of Conservation and Land Management (CALM) jointly should, in conjunction with Consultative and Technical Committees, prepare a Planning Strategy which identifies and provides for the region's development, community and conservation needs. The strategy was to:

- (a) identify the preferred and multiple uses for the land and marine environments of the region.
- (b) indicate the reservations of the land and marine environment required to give effect to the preferred and multiple uses and to protect the local environment.
- (c) include broad guidelines for subsequent formulation of management programs.

The Steering Committee for the project was the Country Planning Council, which was advised by the Shark Bay Community Consultative Committee and a Project Team. Membership of these groups is shown inside the front cover of the report.

Many submissions were received from Government Departments, agencies and private groups and individuals.

This report describes the region plan, its proposals for Shark Bay and the information upon which the proposals are based.

Public submissions on these proposals were invited, between April and August 1987. 168 Submissions were received and an analysis of the submissions is at Appendix 1.

Public response to the Shark Bay Region Plan indicated that there is a general lack of understanding of planning and its relation to management and management planning of the kind commonly undertaken by the Department of Conservation and Land Management.

It is considered that there is a need to clarify the purpose, use and function of a statutory land use plan and its relationship to management.

Planning, implementation and management are considered to be a continuum, forming an overall policy framework for a region, rather than distinct isolated processes. The concise statement of goals, objectives and strategies allows all branches of government and the community to work towards common goals in a changing social, economic and physical environment.

However, within that overall policy framework, particular organisations have quite separate functions. This is best demonstrated by examination of the principal acts controlling the State Planning Commission and the Department of Conservation and Land Management, the joint partners in this planning strategy.

The preamble to the State Planning Commission act 1985 states -

"AN ACT to establish a body with responsibility for urban, rural and regional land use planning and land development and related matters in the State, and to provide for a planning council for the metropolitan region and a planning council for the remainder of the State, and for connected purposes."

while that of the Conservation and Land Management Act 1986 states -

"AN ACT to make better provision for the use, protection and management of certain public lands and waters and the flora and fauna thereof, to establish authorities to be responsible therefor, and for incidental or connected purposes."

Other Departments and Instrumentalities have analogous specific charters and the process of planning, that is, formulating an overall regional policy framework, must necessarily involve all sections of the community and its government agencies.

The Department of Conservation and Land Management's principal role in Shark Bay after adoption of the Shark Bay Region Plan will be in the establishment and management of National and Marine Parks and Nature Reserves, as well as the management of wildlife generally. There are formal processes prescribed in the Act for both establishment of Parks and the preparation of Management Plans, which look in detail at management problems and measures of the kind raised by many submissions.

The State Planning Commission's principal role is Land Use planning in Western Australia. At Shark Bay it is proposed that there should be a Statutory Land Use Plan, based on the Land Use Plan in the Shark Bay Region Plan. This would be administered by State Planning Commission with many powers delegated to the Local Authorities. It would be expected that local Town Planning Schemes would reflect and be made consistent with the Statutory Land-Use Plan.

2.0 REGIONAL PROFILE

The Shark Bay region lies on the western most point of the coast of Western Australia, about 700 km north of Perth.

It is, in many ways, the area of the State in which the interactions of man's land and sea activities are most intimate, including an area of about 28 690 km², of which 45% is land and 55% water, with a coastline of over 1 500 km. The majority of the region's economic activities are closely associated with water based industry, chiefly fishing and salt production. The recreational pursuits of local residents and the increasing number of tourists who visit the area are also primarily water based - boating, fishing and exploring the islands, bays and coast of the region.

This section contains a profile of the region which briefly describes the biophysical environment, the social environment and the regional economy. This information forms the basis of the planning proposals which are developed and explained in the remainder of this report.

2.1 BIOPHYSICAL ENVIRONMENT

2.1.1 CLIMATE

Shark Bay has hot, dry summers and mild winters, with summer temperatures averaging between 20°C and 35°C and winter temperatures between 10°C and 20°C. According to the Australian Atlas of Resources, Carnarvon and Shark Bay experience about 25 days of heat discomfort each year and three days of high heat discomfort. The near absence of cold discomfort is a major reason why people visit the area in winter. Average annual rainfall varies from 400mm in the far west to 200mm in the east, with most reliable rain falling in winter between May and July, and a smaller, but significant, amount in summer between January and March. Annual evaporation is high, ranging from 2 000mm in the west to 3 000mm in the east.

The area is influenced by the belt of South East Trade Winds which generate southerly winds for most of the year. During summer, southerlies

commonly blow for several days at over 25 km/h. There are infrequent summer cyclones which generate stronger winds of 70-110 km/h with gusts up to 180 km/h. During winter, winds are lighter (10-15 km/h) and more variable, though occasional gale force winds occur from the north west.

Planning Implications: While the winter climate is very amenable, the summer climate reduces the area's recreational potential. The low rainfall, high evaporation and high winds combine to create problems with potable water availability and with land stability if vegetation cover is disturbed.

2.1.2 LANDFORMS

The region comprises of a series of north-south trending peninsulas and islands which separate the long inlets and gulfs of the Bay from each other and from the open ocean. It can be divided into three distinct provinces.

The Gascoyne-Wooramel Province, which comprises the coastal strip along the eastern coast of the Bay, consists of a low-lying plain backed by a limestone escarpment.

Peron Province, which comprises the Nanga/Peron Peninsulas and Faure Island, consists of undulating sandy plains with gypsum pans or birridas. The seaward margin of the province terminates in a scarp 3-30m high and narrow sandy beaches.

Edel Province, which comprises Edel Land Peninsula and Dirk Hartog, Bernier and Dorre Islands, is a landscape of elongate north trending cemented to loose limestone dunes. The province terminates to the west as a series of spectacular cliffs which rise a maximum of 300m above sea level.

Planning Implications: The varied landforms of Shark Bay provide a variety of soil types, habitats, scenery and recreational opportunities. The 1500 km of coastline creates difficulties for transport around the area and for management and surveillance.

2.1.3 GEOLOGY

The most extensive surface and near-surface rock

unit in the region is the Peron Sandstone, a red quartz dune sandstone. It crops out mainly as cliffs around the Peron Peninsula and Hamelin Pool.

Westward from Tamala station, the Peron Sandstone is overlain by the Tamala Limestone which is made up of dune limestone and limesand. Edel Land, Dirk Hartog, Dorre and Bernier Islands are all composed of this material. Smaller areas of the limestone occur on Peron Peninsula between Denham and Nanga station.

The fossil dunes of the Peron Sandstone and Tamala Limestone accumulated during the middle to late Pleistocene, between one million and 20 000 years ago.

The unconsolidated red dunes which occur on Peron Peninsula and further south to Nilemah are composed of quartz sand, derived from the reworking of the underlying Peron Sandstone.

Gypsum-filled hollows, known locally as birridas, are distributed widely in the region. These birridas reflect areas which were originally interdune depressions.

The coastal zone between Carnarvon and Yaringa is dominated by Quaternary deltaic and fluvial deposits of the Gascoyne and Wooramel Rivers. There is little active sediment outbuilding now that the calcareous seagrass banks have become established immediately offshore.

The basement rock for the area is the Late Cretaceous Toolonga Calcilutite. This 80 million year old rock formation is composed of limestone and chalk. It is exposed in cliffs and mesas between Yaringa and Hamelin, along the east side of Hamelin Pool.

2.1.4 HYDROLOGY

Apart from intermittent flows of the Wooramel River into the eastern half of the Bay, there is very little surface runoff into Shark Bay due to low rainfall, high evaporation and permeable soils. Consequently, marine environments are principally determined by internal processes, whilst on land, supplies of fresh water are limited.

The salinity of the shallow groundwater generally exceeds 6,000 mg/L, although thin localised

layers of lower salinity water occur in the Peron Sandstone, Tamala Limestone and younger deposits.

Artesian water can be obtained from the Birdrong Sandstone at depths ranging from 100m in the south to 500m in the north-west. The water has a salinity of between 3,000 mg/L and 6,000 mg/L and may have a temperature of up to 50°C. It is desalinated for use at Denham and Useless Loop.

Planning Implications: As water suitable for human consumption should contain less than 1,000 mg/L, the limited availability of water is a severe constraint on residential and tourist development. Water for domestic stock, which can tolerate up to 12,000 mg/L is, however, more abundant. Any alteration to the input of surface and ground waters to the Bay might disrupt the existing apparently finely balanced marine ecosystem.

2.1.5 SEAFORMS

The main water bodies of the Bay are of moderate depth (10-15m), but fringing banks around the coast and barrier banks of Faure Sill, Fork Flat and Bar Flat, are often several kilometres wide and partially separate the southern extremities of most inlets and gulfs from more open waters to the north. The banks are covered by only 1-5m of water and often become exposed at low tides, particularly in summer.

Planning Implications: The semi-enclosed water bodies of variable depth provide a range of marine environments with a number of shallow protected water areas having high scientific, conservation, educational and recreation value. The deeper areas support snapper and prawn fisheries, while beach seine fishing occurs in shallow areas, often between high and low water marks.

2.1.6 OCEANOGRAPHY

The astronomic tidal range varies from 1.2m in Hopeless Reach to 0.6m at the southern end of Hamelin Pool. Meteorological tides are larger than astronomic tides at Shark Bay. During most of the year southerly winds generate waves and currents and influence local tidal range in the Bay.

In general, the shores of the Bay are protected from wave action by wide shallow fringing banks, though during cyclones, the combination of tidal surge and strong onshore winds may subject parts of the coast, particularly those with a northern aspect, to extreme wave action.

The waters of Shark Bay are separated from the open ocean by the outer peninsulas and islands and further subdivided by the internal shallow banks, peninsulas and islands. As a consequence, circulation and mixing of the water mass by wind and tides is restricted.

The combination of restricted circulation and high evaporation has caused waters in some parts of the Bay to be more salty than the sea. In particular, the waters in Hamelin Pool and Lharidon Bight are hypersaline, up to twice as salty as the sea. Those in Hopeless Reach and Freycinet Inlet are metahaline, or one and a half times saltier than the sea. This has resulted in the deposition of evaporites of gypsum and salt and other unusual sediments (coquinas and ooids) and has permitted the development of rare stromatolites (algal bound sediments) in Hamelin Pool.

Planning Implications: The oceanography of Shark Bay, particularly the distribution of salinity, is unusual and it is critical to maintenance of the distribution of the biochemically produced sediments and the seagrass, dugong and fish populations. As this system has developed through the particular seaforms and climate present, it is possible that only a small amount of disturbance such as pollution or disruption of internal banks could cause the system to be greatly altered.

The wide variety of carbonate and evaporite sediments in the Bay is of major scientific interest.

2.1.7 PLANTS

Terrestrial: The boundary between the South West Botanical Province, which is dominated by **Eucalyptus** species, and the Eremean Botanical Province, which is dominated by **Acacia** species, passes through Shark Bay. Vegetation on Peron Peninsula is mostly of the Eremean Province, whereas vegetation on southern Nanga Peninsula and to the east of Tamala station is composed of South West Province associations. On Edel Land

and the larger islands to the north, there is a mix of species between the two provinces, most probably due to the fact that, despite higher rainfall, the immature calcareous soil is highly permeable and the area subject to persistent strong drying winds during summer.

North of the Wooramel River, the coast is colonised by salt tolerant low shrublands such as saltbush, bluebush, samphire flats and mangroves, the latter constituting the southern most mangrove stand of significant size.

In some places the indigenous plant communities have been affected by grazing, fire, rabbits, goats and similar aspects linked to European presence in the area.

Planning Implications: The pattern of interaction between climate and landforms has resulted in development of vegetation formations peculiar to the Shark Bay region and specific to different areas of the Bay. The diverse and fragmented habitats have provided evolutionary opportunities which are reflected in the presence of numerous rare and restricted species and in the highly unusual growth forms of some species. The region has conservation significance from a botanical point of view especially where mixes of vegetation types occur.

Marine: The protected, shallow and clear waters of Shark Bay contain one of the most diverse seagrass assemblages in the world. They developed during the last 5,000 years and have had a significant impact on the evolution and distribution of sediments and other organisms in the Bay. In particular, the formation of barrier banks, such as the Faure Sill, has been associated with growth of seagrass meadows and has resulted in the generation of highly saline marine environments in which only algae and a limited range of invertebrates and fish can survive for extended periods.

Seagrass provides a direct source of food for dugong and turtles, and some fish and crustacea. In particular, the **Halodule** beds off the Wooramel delta provide a critical summer food source for dugong. The majority of seagrass production is not, however, directly consumed, but is broken down, providing input to the detrital food chain. Seagrass meadows are also significant nursery areas for many animals, including commercial stocks of fish and crustacea.

Planning Implications: Seagrass communities provide the foundation for the distribution, production and stabilisation of bio-chemically produced sediments and the marine biology around the Bay. They are prone to direct physical damage and to disturbances through changes in water quality. There is potential for conflict in the use of seagrass areas and special precautions are required in planning and management.

2.1.8 ANIMALS

Terrestrial: Numerous species of native mammals, reptiles and birds present in the region are at their northern or southern limits. Additionally, the protected peninsulas and islands harbour the only remaining populations for some native animals which were once common elsewhere in the State. In particular, Bernier and Dorre Islands contain the only known populations of the Banded Hare Wallaby and the Marl or Western Barred Bandicoot, while Dirk Hartog Island, Edel Land, Peron Peninsula and parts of the mainland contain other rare or endangered species, some of which are found nowhere else.

Planning Implications: Shark Bay is an area of major zoological importance, in particular because isolation of suitable habitats on the peninsulas and islands from disturbances which have occurred elsewhere has prevented extinction of several species. Shark Bay has high conservation significance and management should be directed toward ensuring the survival of populations and species.

Marine: Shark Bay contains one of the largest dugong populations in the world, is an important wintering area for the humpback whale and is a nesting area for several species of turtle. The Bay is also noted for its dolphins, some of which provide an attraction at Monkey Mia.

In addition, the Bay supports populations of fish, large sharks, manta rays, prawns and scallops and sustains major commercial and recreational fisheries.

Planning Implications: Fisheries and tourism are dependent upon the maintenance of marine animal populations, which in turn are dependent on the integrity of the Shark Bay ecosystem.

2.1.9 CONSERVATION OF THE NATURAL FEATURES AND SYSTEMS OF SHARK BAY

"Conservation is the wise use of resources; it includes man's nexus with nature and the continuities between past, present and future".

(Report of the National Estate P26, Canberra 1974).

The region's exceptional natural, cultural and historic resources are the basic resources on which recreation, tourism and industry depend. Conservation of these resources must be a fundamental objective.

The Environmental Protection Authority's System 9 Report identified many issues and areas of concern and further information has been obtained from submissions to this study.

The following summary and Figure 1 identify the principal values, natural resources, conservation needs and recreational potential of the study area and their planning implications. Cultural and historic values are identified in section 2.2.

The outer western coasts and the northward trending barrier island chain include some of the most spectacular scenery in Western Australia as well as providing exceptional recreational fishing and marine wildlife viewing opportunities. This area includes the western-most point on the Australian mainland, the first landing point of Europeans in Western Australia, a range of fauna and flora species now restricted to particular sites within this sector, winter refuge areas for the dugong population, and productive commercial fishery areas in the adjacent waters.

Edel Province: In contrast with the western coasts, the eastern coastline of the Edel Land Peninsula includes a number of calm bays and inlets with sandy beaches interspersed with rocky platforms and headlands. Eastern coasts of the islands to the north are also less rugged than the western side and bordered by shallower water, but are exposed to the east and south east. The seagrass of these shallow areas sustains dugong populations during winter when the population is stressed.

Peron Province: The Peron-Nanga land mass separates the eastern and western sectors of the Bay. The landscape here is of lower relief than the western lands and the coastal cliffs and

undulating inland areas are predominantly red in colour. Low lying evaporite pans or **birridas** are a prominent feature inland, ranging in width from around 100m to more than 1km. The interdune depressions of Little Lagoon close to Denham and Big Lagoon further northward on the west coast of Peron Peninsula retain connections to the sea. The wide expanses of shallow waters are most attractive, and provide yet another marine habitat variation.

Wide shallow banks fringe the coasts and the northward facing sandy beaches at Herald Bight and Monkey Mia on the Peron Peninsula east coast provide attractive sheltered recreational sites. Nanga camp provides a similarly attractive site on the north west coast of the Nanga Peninsula. The south eastern coasts of the peninsulas abut the briny waters of Lharidon Bight and Hamelin Pool respectively.

The unusual beach ridge deposits of coquina and coquinite formed from the shells of countless small bivalve shellfish are indicative of the effects of these peculiar environments on the marine fauna here and also along the south eastern coasts abutting the farthest reaches of Henri Freycinet Harbour (Estuary). The algal stromatolites around the shores of Hamelin Pool further reflect the influence of hypersaline conditions on the marine fauna and flora.

The terrestrial flora of the Peron-Nanga Peninsulas is more similar in composition to that of the arid sand plains found further inland, than to that of the western areas. **Acacia** shrublands mixed with low shrubs, spinifex (**Triodia/Plectrachne**) and thickets of falsepaperbark (**Lamarchea hakeifolia**) and mallee eucalyptus dominate the Peron Peninsula. In contrast, from the southern half of Nanga southward to the study area boundary and westward to the coast, the flora is dominated by typical South West genera, such as **Grevillea, Banksia, Eucalyptus, Calothamnus, Thryptomene, Acacia, Melaleuca, Hakea, Conospermum, Calytrix, Eremaea, and Alyogyne**. A large part of this southern area vegetation is a unique tree heath formation which includes numbers of rare and restricted species. There are several undescribed species known only from recent collections and the whole area has been so little studied that other undiscovered plants may be found with further investigations.

The fauna includes the larger kangaroos, typical of mainland habitats, plus a range of rare vertebrates and uncommon species associations, and the world's only flourishing population of

the thick-billed grass wren on Peron Peninsula.

Good commercial and recreational fishery opportunities abound on these coasts, while important dugong/seagrass habitats, turtle feeding grounds, and of course, the Monkey Mia dolphins, are major features. Numerous historic and cultural sites are also present.

Gascoyne - Wooramel Province: Lands fringing the eastern shores of the Bay from Carnarvon southwards are held under pastoral lease and include valuable rangelands. Vegetation of the northern sector is predominantly halophytic shrubland dominated by Gascoyne bluebush with limited areas of coastal **Acacia** scrub and sandplain from Long Point northwards to Carnarvon. These lands adjoin the intertidal and supratidal coastal zones with their extensive mangrove stands and algal-mat covered salt flats which are the landward edge of the Wooramel Seagrass Bank.

The Wooramel Delta - Gladstone embayment is the only place where fresh water nutrient and sediment loads can now enter the Bay. The shallow Wooramel Delta deposits support a growth of **Halodule** seagrass which is a critical summer food resource for the Shark Bay dugong, but the Gladstone area is also one of the few places where easy access to the Bay waters is possible along the eastern coast, giving access to an important recreational fishery. Management of boating access is required to avoid disturbance of dugong or the seagrass meadows on the nearby Faure Sill. Vegetation here is similar to that of areas to the north.

-
- | | | | |
|---------|---|---------|---|
| ① | Stromatolites | ⑩ | Habitat for Two Endemic Lizards |
| ② a,b | Halodule Beds and Habitat for Dugongs | ⑪ | Dugong Habitat |
| ③ a,b,c | Seagrass Bank with Pockets of Mangroves
Prawn Nursery | ⑫ | Sill Deposits |
| ④ | Habitat for Four Rare Mammals | ⑬ | Dugong Habitat |
| ⑤ | Wallaby, Bandicoot, Mouse, Bettong | ⑭ | Habitat for Two Rare Bird Species
White-winged Fairy Wren
Southern Emu Wren |
| ⑥ | Bird Sanctuary | ⑮ a,b,c | Majestic Zuytdorp Cliffs |
| ⑦ a,b | Habitat for a Rare Bird Species
Thick-billed Grass Wren | ⑯ a | Dolphin Habitat |
| ⑧ a,b,c | Sanctuaries and Colony for
many Bird Species | ⑰ a,b | Artesian Springs
Watering Area for Birds |
| ⑨ | Wide Variety of Heath Species
from South west Botanical Province | | |

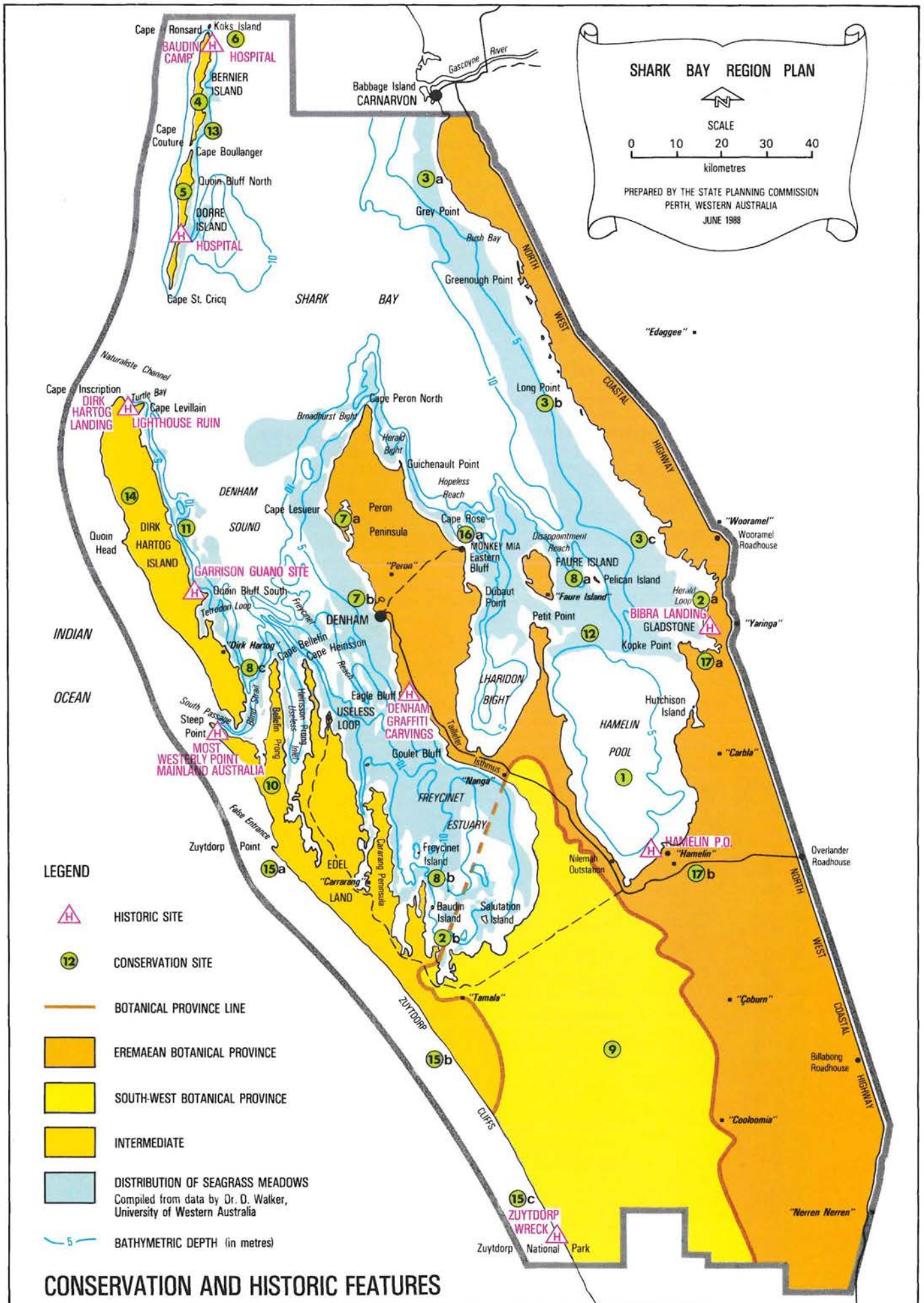
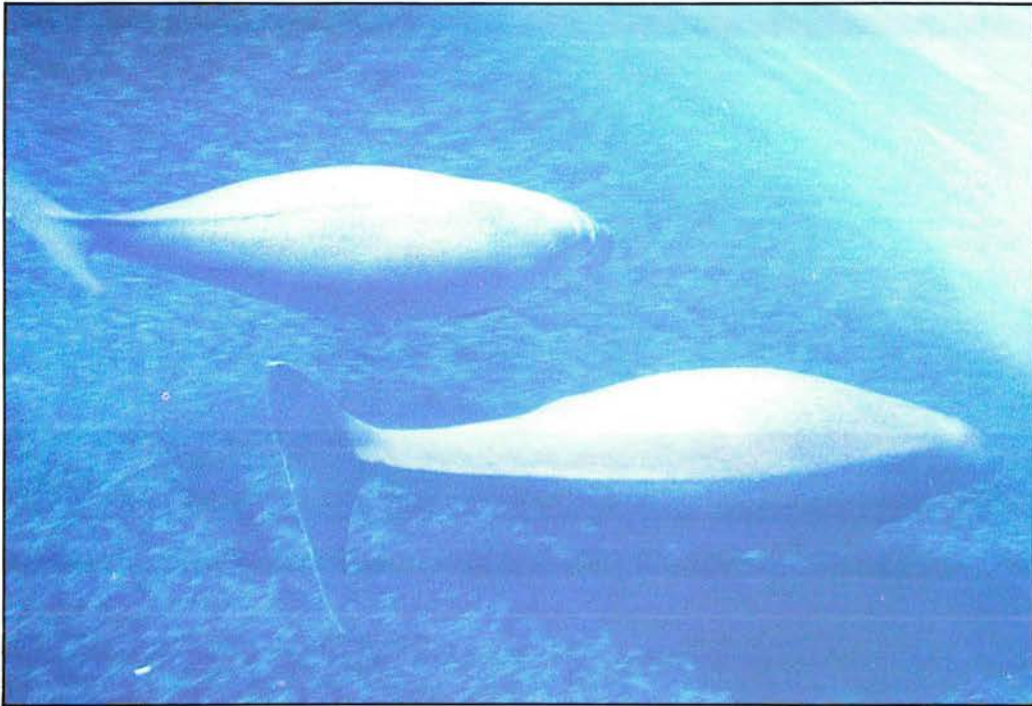


Figure 1.

Photograph courtesy of Mr J. Bannister



Shark Bay's secure Dugong population is of world wide interest.



Zuytdorp Cliffs, Tamala station.

From Gladstone southward, the coastline forms the eastern edge of that special marine environment, Hamelin Pool.

Vegetation of land adjoining the eastern shores of Hamelin Pool is more diverse, including areas of samphire, salt bush, **Acacia** shrub and sandplain. Further toward the south east corner of the study area **Eucalyptus** tree and mallee formations become prominent. The terrestrial flora of this eastern sector of Shark Bay is not represented elsewhere in the system and has no existing reservations for nature conservation, however **Acacia** shrub and sandplain associations occur in Tooloonga Nature Reserve.

The Wooramel Seagrass Bank itself covers approximately 1,030 km² and is an unrivalled phenomenon worldwide. Apart from the seagrass communities and sedimentary processes, which are of major scientific importance, the Bank includes important nursery areas for replenishment of commercial and recreational fish stocks and parts are used for commercial fishing and recreation.

Most, but not all, small islands within the study area are included in existing Nature Reserves. Flora and fauna on each of these islands is variable in composition and limited in species, but the majority of islands have particular conservation importance, mainly for nesting seabirds. Baudin Island has its own special species of small lizard. Faure Island is the largest of the small island group and is a pastoral lease. Together with Petit Point, this island ties the western end of the Faure Sill, the stability of which is so important to maintenance of the Hamelin Pool ecosystem.

Important omissions include Meade Island with its roseate terns, while Slope Island, the nesting site of a form of shearwater peculiar to Shark Bay is now occupied by the loading facilities and product stock piles of the Useless Loop mining venture.

Planning Implications: The deeper waters of the Bay between Bernier, Dorre and Dirk Hartog Islands to the west, across Denham Sound to Peron Peninsula and thence from Cape Peron North across to the westward edge of the Wooramel Seagrass Bank and thence northward towards Carnarvon supports a major prawn fishery and the main Western Australian scallop fishery. Methods used in these fisheries have significant environmental impact, but pose no insurmountable environmental conservation problems while fishing is limited to areas currently used. The other existing

commercial fisheries operating in the shallower waters of the Bay pose no conservation problems. However, set gill nets which are not commercially employed, but used principally by some recreational fishermen, do pose special hazards to dugong in particular. Increased power boating activity in shallow water areas following from increasing recreational uses can also pose special conservation hazards in critical areas such as over the shallow seagrass banks and in dugong habitat. Otherwise, existing multiple uses of the main open water areas of the Bay appear compatible with known marine conservation requirements. Protection for some special sites may, however, be desirable.

As the fundamental resource supporting most human activity at Shark Bay, the region's natural resources must be planned and used in such a way that they remain in good condition for future generations.

What will Shark Bay be like in 10, 50, 100 or 200 years? A region plan must provide land use decisions and a management and protection framework which promotes conservation of these resources for all time.

2.2 SOCIAL ENVIRONMENT

Shark Bay was the site of the first European landing in Western Australia in 1616. Since that time many other explorers have visited the area and it has been used by guano miners, pearlers, fishermen and pastoralists.

Prior to European settlement Shark Bay was important for the survival of the apparently small Aboriginal population. The Bay's waters provided their main source of food consisting of fish, shellfish and the larger marine animals such as dugongs and turtles.

This section contains a brief overview of the history and current social environment of Shark Bay.

2.2.1 HISTORIC AND CULTURAL VALUES

Historic and cultural values stem from the early Aboriginal inhabitants, the associations with some of the earliest European contacts in the exploration of Australia and the region's further development and settlement.

Prehistory: There are few obvious signs of Aboriginal presence in the region and no comprehensive examination of the Shark Bay region has yet been undertaken. However, the Department of Aboriginal Sites of the Western Australian Museum has a number of sites registered.

Among the sites known to exist in the region is a burial ground which is periodically exposed by shifting dune sands. Small artifacts remain around some of the numerous cliff caves. A stone fish trap, thought to have been used by Aborigines, has been located south of Denham.

Post European: Sites of historic significance abound in the Shark Bay region. The site where Dirk Hartog erected his plate recording the first known visit of a European to Western Australian soil on October 25, 1616, is well known. Locations of other historic sites associated with exploration of the area are not all so well known. Vlamingh revisited Dirk Hartog's landing place in 1697 and William Dampier, the first English visitor in 1699, made his landing near the north east end of Dirk Hartog Island and also occupied several different anchorages. Dampier's visit is of great biological significance in that he collected the first specimens of the flora and provided accurate descriptions and some illustrations of some recognisable members of the fauna. The Frenchman, St Allouarn, also landed on this same part of Dirk Hartog Island in 1772 and left behind the remains of one of his crew, as well as making the first formal claim of territory for France.

Major exploration of Shark Bay was undertaken in 1801 by the French Baudin Expedition. The main detailed work was undertaken by those on board the **Naturaliste** under Captain Hamelin, but Baudin's crew from the **Geographe** established a camp on Bernier Island while making checks on their instruments. Baudin also revisited the eastern part of the Bay in 1803. Landing points, anchorage sites and sites of contact with the Aboriginal inhabitants all require research, but lasting mementos to these visits are the names of prominent features.

The collections made by Peron, Baudin and others are still able to be seen in museums in Europe and published papers of these expeditions form the earliest scientific work on Western Australia and are thus of great heritage value and scientific interest.

De Freycinet, the last of the French explorers, returned on the **Uranie** in 1818, camping on Peron Peninsula and making some further exploration.

Philip P. King paid a brief visit to Shark Bay in 1822, while Captain H.M. Denham charted the waters of the Bay in the **Herald** in 1858. Denham's name is commemorated by the town, but a record of the visit was also left in the cliff face at Eagle Bluff.

Apart from the explorers, some other early seafaring visitors were not so fortunate. The wreck of the **Zuytdorp** in 1712 is commemorated in the name of the coastal cliffs south of Steep Point and a camp site associated with the wreck survivors is secured by reservation. Other camp sites on land include those from **Perseverant** (1841), **North Star** (1856), and **Macquarie** (1878).

Underwater wreck sites associated with the early guano trade include **Prince Charlie** (1850).

Ruins of two Aboriginal hospital settlements remain on Bernier and Dorre Islands.

More recent sites associated with pastoralism, continuing development and settlement in the region also exist.

Planning Implications: The heritage and cultural value of the area is a prominent theme at Shark Bay which could be further developed in tourism programs. Sites of significance require protection and further research is necessary.

2.2.2 POPULATION

Table 1 provides estimates of the resident population in 1976, 1981 and 1986. It also provides an estimate of the population at 1991, based on past trends.

The estimated resident population growth over the last ten years has averaged 2.7% per annum. A significant increase of resident population of the area occurred with the commencement of mining activities at Useless Loop in 1968.

Future population projections are highly speculative, as several major development projects have been proposed. The figures given for 1991 in Table 1 should be considered conservative.

TABLE 1 - ESTIMATED RESIDENT POPULATION AT SHARK BAY 1976-1991

ESTIMATED RESIDENTS	1976 ¹	1981 ¹	1986 ²	1991 ³
Denham	227	290	350	400
Tamala (Rural)	116	142	140	150
Useless Loop	157	198	200	200
TOTAL FOR SHARK BAY	500	630	690	750

¹ Australian Bureau of Statistics (ABS)

² Shire of Shark Bay

³ Trend analysis using information from ABS and Shire of Shark Bay.

Planning Implications: The small population in the area makes it difficult to service an area as large as the Shark Bay region, both because of the lack of local service and governmental infrastructure and because of the low rates the Shire can collect and use.

2.2.3 GOVERNMENT SERVICES

Local Government: The Shark Bay Road District was proclaimed in 1904, but had no plant and no permanent employees until a Commissioner was appointed in 1953. The first full time Shire Clerk was appointed in 1967. At present the Shire has 15 employees and provides the following services:

- . Administration
- . Rubbish Collection
- . Construction and maintenance of roads
- . Landscaping and Maintenance of Parks
- . Ranger Service at Monkey Mia
- . Health Services
- . Civil Defence
- . Bushfire Control

Carnarvon Shire administers the north eastern part of the study area.

State Government: The following State Government services are located in Denham:

- . Water Authority of Western Australia
- . Police Department
- . Fisheries Department
- . Education Department
- . Department of Marine and Harbours
- . Department for Sport and Recreation
- . Department for Regional Development and North West
- . Western Australia Tourism Commission

Other State Government offices servicing Shark Bay include the Department of Conservation and Land Management, with a Regional Office located in Geraldton and a District Wildlife Officer in Carnarvon.

Commonwealth Government: Offices servicing Shark Bay are located in Geraldton or Carnarvon. These include:

- . Telecom
- . Department of Transport
- . Commonwealth Employment Service and Social Security
- . Customs

2.2.4 ACCESS

Access to the region is possible by road, air or water. Currently, main access is by road via North West Coastal Highway from north and south, and thence from the Overlander to Denham. The highway was sealed in the 1960s and sealing of the link road completed in early 1985. Further access within the region is via unsealed roads and tracks, and by boat. High transport costs and backloading have a major affect on local prices.

Air: Air access is via unsealed airstrips adjacent to Denham and Useless Loop. Services are provided by one commuter airline from Perth, Geraldton and Carnarvon, three flights per week,

plus a charter link to Carnarvon connecting with regular airline services. Most stations have private airstrips.

Sea: There are no regular services, but private pleasure craft and commercial vessels do visit. Many private vessels from Carnarvon use the Bay.

Planning Implications: Access to the region has in the past been limited by poor roads. The recent upgrading of the road from Denham to the Overlander has resulted in a marked increase in visitors to the area. Road freight to the region is expensive. Air freight capacity is limited as are boat charter services. Local prices are high and many visitors bring their own provisions and fuel to the area for this reason.

2.2.5 OTHER SOCIAL SERVICES

Education: There are currently only two Government primary schools operating within the study area, one being located in Denham, the other at Useless Loop.

In July, 1986, there were 47 students enrolled at Denham Primary School and 31 at Useless Loop Primary School, as well as two correspondence secondary school students in Denham. Many students are boarded at schools in Geraldton and Perth.

Employment: There are few service or other industries offering employment to the Denham residents. The main employment prospects are in the various seasonal industries, so Denham generally experiences high unemployment. Major service industries are mainly located in Carnarvon and Geraldton.

Scheme Water Supplies: The water supply of Denham is a dual supply consisting of a limited potable water supply using desalinated water and a secondary saline supply. The source of all water is an artesian aquifer. This water is used, after iron removal, as the saline supply. Some of the saline water is desalinated by reverse osmosis process to provide potable water. As the cost of production of potable water is very high and the supply is limited, the Water Authority has adopted a quota system and a pricing policy for the desalinated water which discourages excessive use.

The dual water supply system at Denham has a very limited capacity to cater for future residential

and tourist development. The cost of production of potable water is very high and will remain so. One of the Water Authority's corporate objectives is "To develop a pricing policy and a tariff system which are fair and simple to understand and as far as possible recover the full cost of all services provided". Hence significant development proposals for Denham or the study area will require referral to the Authority for investigation of water supply considerations, including the recovery of costs.

Services: The following services are provided, often as agencies only:

- . Bank agencies
- . Retail
- . Doctors/Health
- . Australia Post
- . Telecom
- . Silver Chain Nursing Centre
- . Tourist Information Centre
- . Other

Recreation Facilities: The following recreation facilities are provided in Denham or in close vicinity:

- . Council Hall
- . Golf Club
- . Bowling Club
- . Speedway
- . Oval
- . Boat Ramps
- . Amenities
- . Television access

The services and recreation facilities are adequate for the local population, but tend to be inadequate for the increasing visitor numbers.

2.3 ECONOMIC ENVIRONMENT

The economy of the Shark Bay region has passed through a number of phases since Europeans arrived in the area. The first European use of the area was for safe anchorage and potential resupplies of water by explorers and early marine resource users, such as whalers. Guano miners and pearlery established the first settlement in the region at Denham which was named 'Freshwater Camp' prior to 1898.

Pearling remained the major industry until the late 1940s, when it declined and fishing greatly

increased in scale. The fishing industry peaked in the 1960s when Denham supported four fish processing plants, but then declined due to over exploitation. As a result, Denham's population was greatly reduced in the 1960s. It was not until the fishing industry was regulated in the 1970s that the local economy and permanent population began to stabilise.

Throughout this time the pastoral industry was experiencing fluctuating fortunes as a result of variable seasons and wool prices and changes in property management as a consequence of lower staff levels.

In the late 1960s mining activity in Shark Bay recommenced, with salt derived from the solar evaporation of sea water and gypsum from land based deposits.

In just the past few years tourism has become a more important component of the regional economy, largely due to the road from the Overlander to Denham being sealed.

2.3.1 FISHING

The Shark Bay region is one of the major areas in WA for commercial and recreational fishing. It is the major fishery in the State for prawns, scallops, snapper and western sand whiting. In 1985 these fisheries were worth \$18.5 million, \$2.3 million, \$3 million and \$378,000 respectively to the fishermen. The total catch in Shark Bay was about \$25 million, representing about 15% of the State's fishing catch by weight.

Besides employment on the boats, the fishing industry supports considerable employment in the land-based processing and vessel maintenance industries, particularly in Carnarvon, where much of the catch is landed.

In line with changing knowledge of fish stocks, some further restrictions are being placed on parts of the Shark Bay fishery. These restrictions are intended to avoid a repeat of the decline of the industry which occurred in the 1960s from over-fishing.

Professional Fisheries: (See Figure 2)

(i) Snapper Fishery

There are currently sixty boats employing about 300 people which fish for snapper commercially in Shark Bay, mainly between May and August. In 1986 and 1987 professional fishing for this species will not be allowed during July and from mid April to mid May access to fish will be further restricted. A limit of 32 boats is anticipated in 1987, eight of which will be for trap fishing.

(ii) Prawn Fishery

The prawn fishery became commercial in the early to mid 1960s and has been managed as a limited entry fishery since 1963. The species caught are King, Tiger and Endeavour with King prawns constituting the main catch.

In 1986 there were 35 vessels fishing commercially for prawns in Shark Bay, employing about five people per vessel. The fishing season extends from March 1 to October 31, with peak catches being obtained in April and May. The catch at Shark Bay represents about 65% of the total WA catch.

The nursery areas are mainly located at the Wooramel Seagrass Bank and around Faure Island and Peron Peninsula. The importance of these nursery areas is recognised by their closure to prawn fishing.

(iii) Scallop Fishery

Scallops were first caught in Shark Bay as an incidental catch of the prawning fleet. There was minimal interest shown in the fishery until the late 1970s.

A maximum of 14 scallop boats fish the area on a full time basis, employing up to ten crew members per boat. The fishing season is mainly from March to October. Shark Bay is the major scallop fishery in WA with catches ranging from 1,000 to 4,000 tonnes per year live weight (1985 catch - 1,160 tonnes).

(iv) Other Fish

Apart from snapper, the other scale fish caught commercially in the area include whiting, tailor, mullet, bream, Spanish mackerel and tuna (mainly yellow fin). Of these, the western sand whiting is the most important species. In 1985, 192 tonnes were caught, worth \$378,000, representing about 80% of the WA catch for this species.

Fishing for the main species, whiting, tailor, mullet and bream is by beach seine. The major catching periods are April to August for whiting, January to May for mullet, February to May for tailor, and August to September for bream.

(v) Pearl Oysters

There are currently four pearl oyster lease areas in Shark Bay at Egg Island, Herald Bight, Heirisson Cove and Red Cliff Bay. Pearl culture is not of major economic significance at present, but this may change in the near future as more leases are taken up.

Recreational Fisheries (See Figure 3): Mainly scale fish are caught by recreational fishermen, with catches of the more popular species representing an important part of the total catch. Approximately 50 tonnes of pink snapper were taken by amateurs in 1983, representing about 8% of the professional catch. Pink snapper also accounts for about two thirds of the weight of fish caught by amateurs.

Boat fishing accounts for the bulk of the recreational catch (85-95% of reef fish such as snapper and 65-70% of game fish such as tailor and Spanish mackerel), but shore based recreational fishing is also important.

Management controls on recreational fishing may differ from those applied to the commercial industry to cater for differing needs of the fishermen and differences in fishing methods.

Planning Implications: The main planning implications associated with the fishing industry are as follows:

- (a) In view of the decline of the scale fishing industry in the 1960s, it is essential for the stability of the region's economy that the fisheries not be over-exploited. This will require good knowledge of the fisheries resources and continuing management.
- (b) Nursery areas must be protected from disturbance in order to ensure that the fisheries resource can replenish that part of it which is harvested each year.
- (c) The feedstocks which support the Shark Bay fishery must be protected from disturbance.
- (d) Some fish are sought by both professional and recreational fishermen. Adequate and fair restrictions should be maintained on both groups to ensure that the resource does not suffer through competition.
- (e) Pearl lease areas require adjacent land access. These leases should not be assigned without proper consideration of land use planning objectives.

2.3.2 MINING

Current Mining Operations: Two mines have been operating in the Shark Bay region since 1968, both at Useless Loop.

A solar salt operation in which seawater is progressively concentrated by evaporation in a series of ponds produces sodium chloride (table salt). Gypsum is mined from enclosed evaporite pans, known locally as **birridas**, from deposits located on Heirisson Prong, a peninsula on the eastern side of Useless Loop. The original gypsum mining site at the Useless Loop deposit is now largely depleted and mining has shifted to a smaller deposit at Bibby Giddy, 25 kilometres south of the loading port.



Commercial fishing - the major industry at Shark Bay.



Photograph courtesy of
M.G. Kailis group of companies.

A Western Australian fishing vessel rigged for prawn trawling.

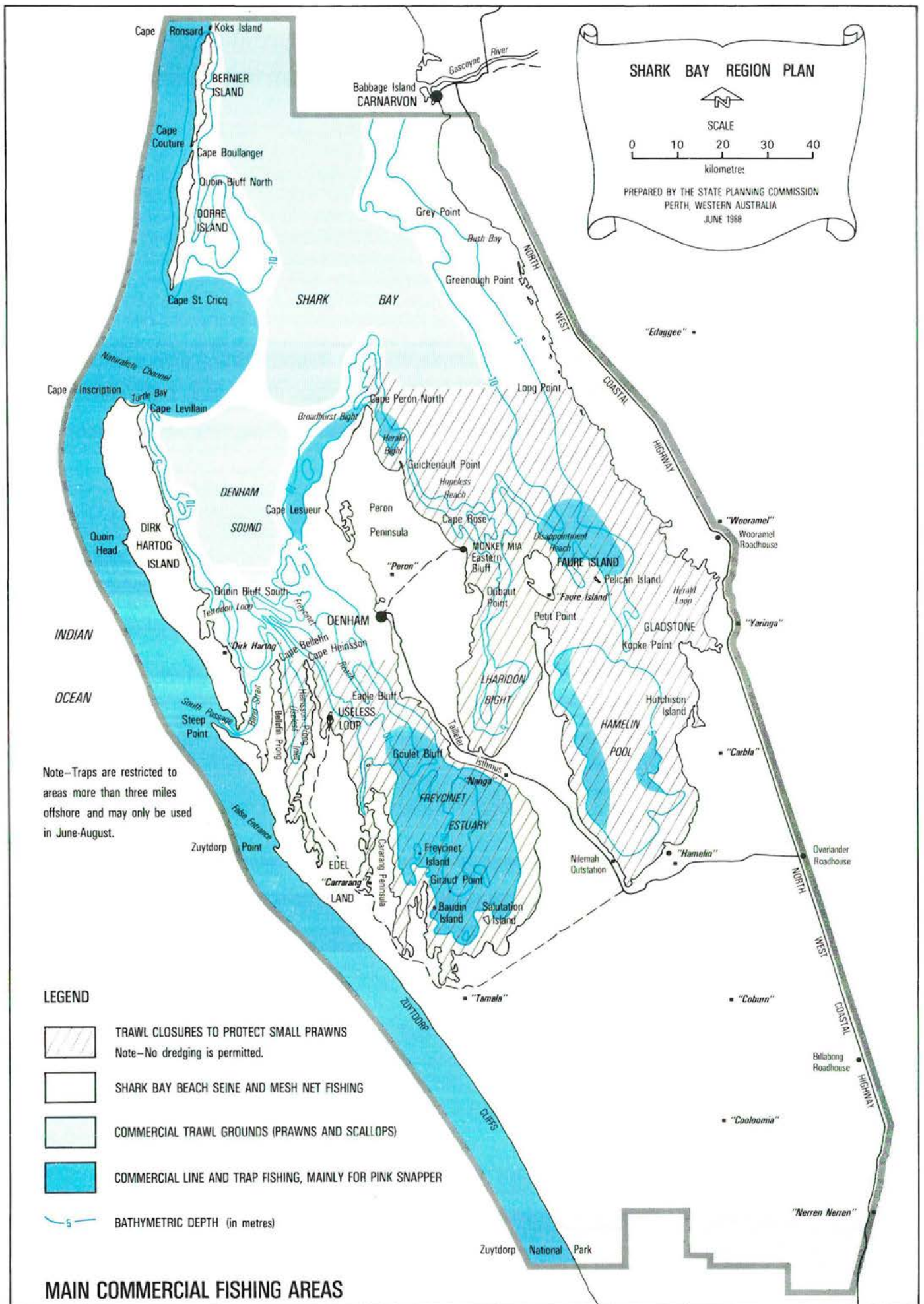


Figure 2.

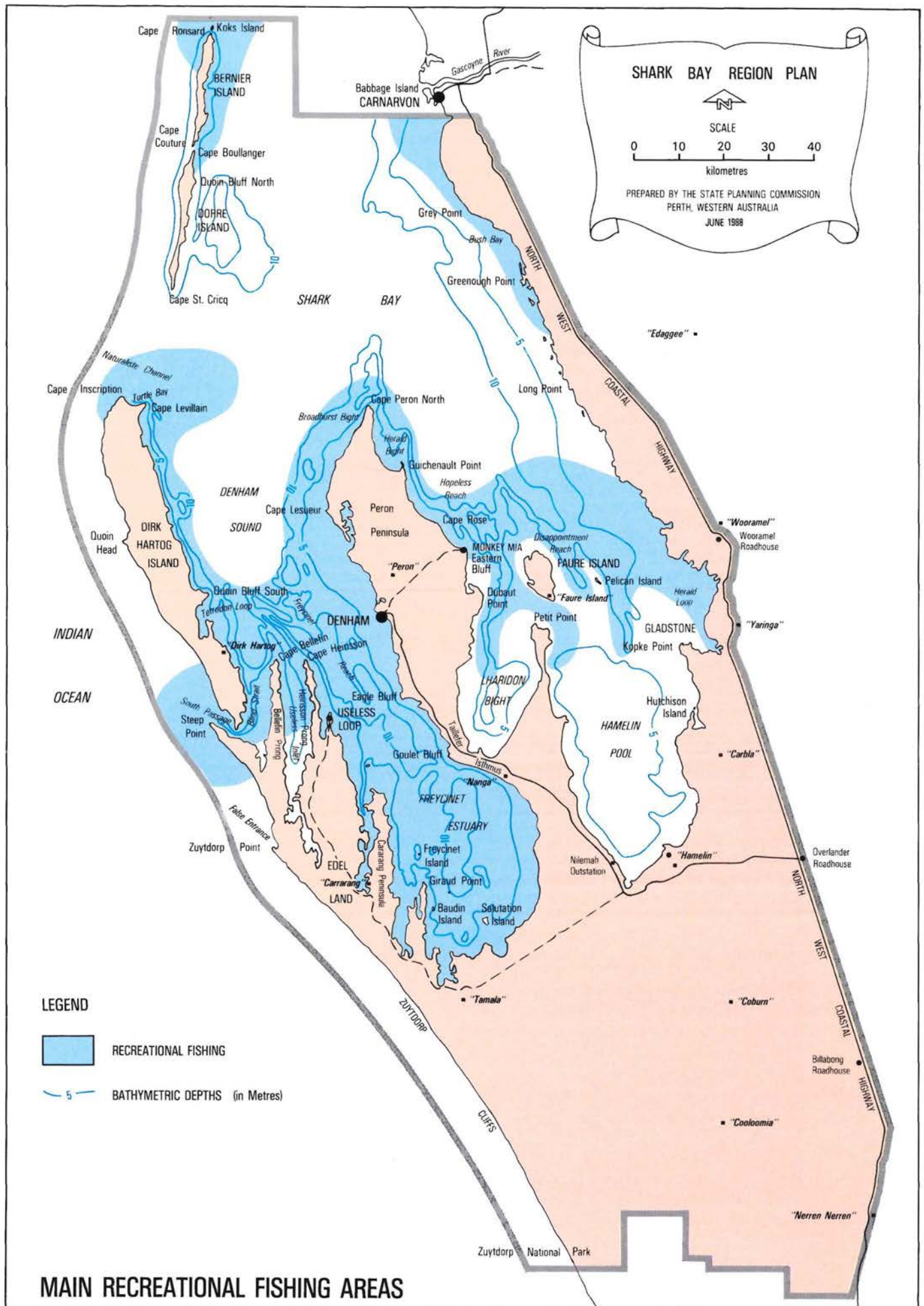


Figure 3.



Bush camping - well equipped for the catch.



On the jetty at Monkey Mia.

Salt and gypsum are stockpiled on Slope Island, prior to being loaded onto bulk carrier vessels. Almost all of these products are exported, principally to the Far East, the Middle East and East Africa. In 1985, 639,926 tonnes of salt and 224,138 tonnes of gypsum were exported, earning \$A12,290,065 and \$A3,874,999, respectively.

These mines constitute an important source of employment in the local area. Currently, Useless Loop has a resident population of 190, of which 83 persons are directly employed by the company in mining operations.

Current Mineral Exploration: Mining leases are held over unexploited gypsum deposits by the current gypsum mine operators at Brown Inlet at the southern end of Heirisson Prong and at the northern end of the Peron Peninsula. While the deposits at Brown Inlet are comparatively small, those at the Peron Peninsula contain substantial proven reserves of high grade gypsum and are close to the coast with deep water close by.

Commercial evaporite potash deposits are currently being sought on part of Coburn station by the holder of a mineral exploration lease.

Part of an offshore petroleum exploration tenement extends into the area east of Bernier Island. To date no petroleum has been found in the tenement. Several other current prospecting licenses also affect the study area (Figure 4).

Future Trends in Mining: It is anticipated that salt production will be continued indefinitely at its present site at Useless Loop.

It is likely that upon the exhaustion, within the next two years, of the currently exploited gypsum deposits, application could be made to begin gypsum mining at the Peron Peninsula.

Exploration for petroleum may continue, but there is no indication that an exploitable resource exists.

Planning Implications: The production of salt at Useless Loop provides a relatively stable economic base, but changes in markets or prices could affect the value of production. Expansion of the operation could conflict with existing fisheries and recreational pursuits.

Gypsum mining requires access to suitable deposits. These are restricted in occurrence and have limited productive life. Mining operations and the requirements for transport and shipping also impose environmental costs. Development of mining sites can, however, produce benefits to the local community by way of additional economic expansion and facilities.

New mining proposals are the subject of the environmental assessment procedures of the Environmental Protection Authority.

2.3.3 PASTORALISM

There are fifteen pastoral leases in the Shark Bay region, of which seven are entirely and eight partly in the study area, embracing approximately 1 111 000 hectares. Most of them are owner operated.

At Shark Bay the pastoral industry is based on wool production. The region defined by the study area carried approximately 40 000 sheep in 1984, a figure about 15% lower than average for the area, reflecting the lowering of stock numbers and agistments associated with preceding dry years.

Some local substitution of cattle for wool and sheep, partly because of low wool prices, has occurred recently. Sales of feral goats and goat fleece have become significant contributors to the region's pastoral income.

The average gross income of the industry has been about \$1 million per year in recent times, \$750 000 coming from wool sales and the remainder from sheep and cattle sales, feral goats and goat fleece from Faure Island.

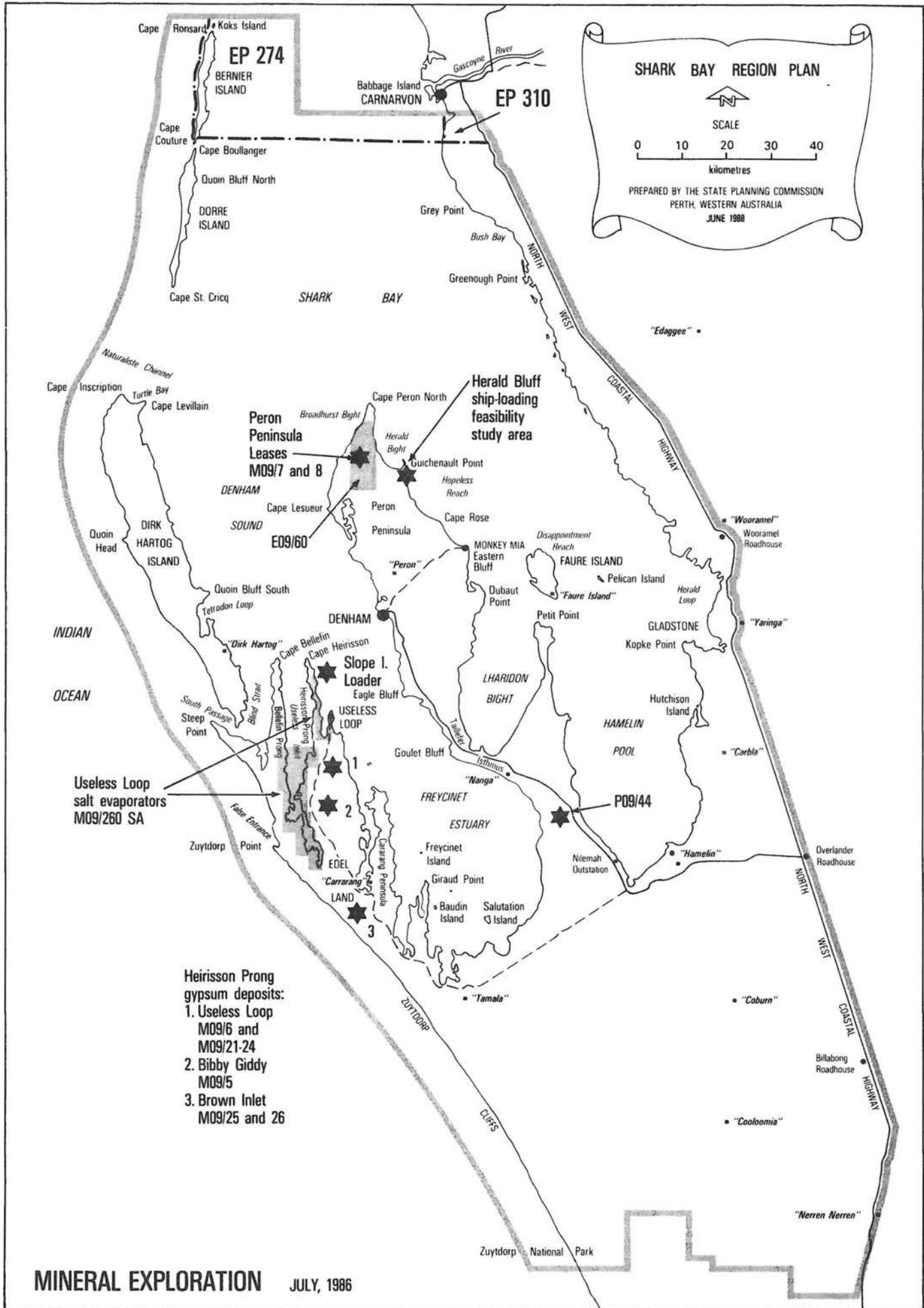


Figure 4.

In recent years, some pastoralists have expressed interest in developing tourist facilities on their leases. With the increase in tourism in the area, trespass has markedly increased.

Pasture Value: Figure 5 shows pasture values for the Shark Bay region and Table 2 summarises the values found on each lease.

Pasture Management: Livestock rely mainly on shrubby pastures which consist of complex and varying mixtures of roughly 1000 species of native perennial and annual plants. Some are favoured by stock, but others are unpalatable. Pasture quality varies with the season, the soil type, the topography and grazing history of the site.

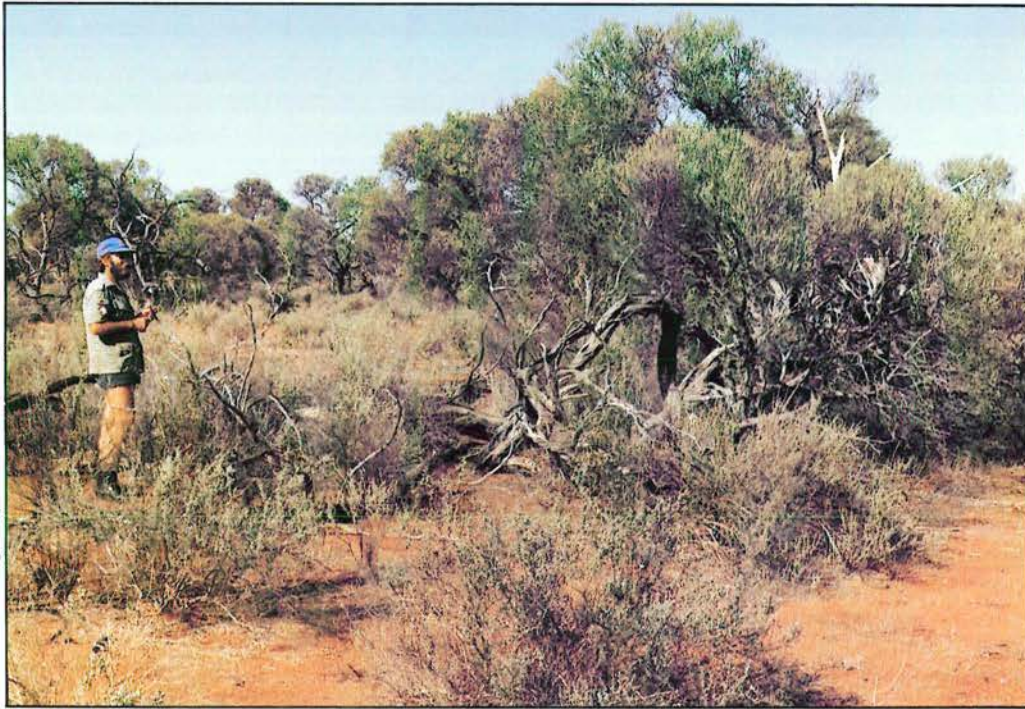
Because of the great variability of available feed from one year to the next, stocking rates are normally maintained at about the dry season capability and increased or decreased as appropriate in exceptional seasons.

Seven stations have networks of rangeland monitoring sites from which long term changes in vegetation composition and pasture reserves can be gauged.

Views of Pastoralists: Local pastoralists have expressed the view that pastoralism does not interfere with the major conservation interests of the area. They also suggested that the presence of pastoral lands in Shark Bay served the interests of conservation because the on-site managers of the stations ensured that damage from visitors would be limited.

Planning Implications: Where pastoral activities are not harmful to the overall conservation values of the Shark Bay region, such use could continue. While there is little evidence that existing pastoral activities are harmful to the overall conservation values of the Shark Bay region, there is some recent evidence that pastoral areas are generally stable or recovering

Photograph courtesy of Mr P. Curry



Snakewood - Silver Salt Bush shrubland on Hamelin station provides high value sheep grazing country.



Hamelin Station - shell block construction unique to the Shark Bay area.

TABLE 2 - ATTRIBUTES OF PASTORAL STATIONS AT SHARK BAY

PASTORAL STATIONS ENTIRELY WITHIN THE STUDY AREA

LEASE	AREA (Ha) WITHIN STUDY AREA	PASTORAL VALUE OF LAND (FIGURE 5)
Dirk Hartog	61 674	Variable: Parts V.Low/Moderate/High
Carrarang	80 515	Moderate to High
Tamala	129 766	Very Low in S/Very High in N
Faure Is.	5 816	Moderate to Very High
Peron	105 200	Moderate to High
Nanga	175 066	Mainly Very Low/Low/ Moderate/High in N
Coburn	99 700	Very Low in W/Low to Moderate elsewhere
TOTAL:	657 737	

=====

PASTORAL STATIONS WHICH ARE PARTLY WITHIN THE STUDY AREA BOUNDARY

LEASE	AREA (Ha) WITHIN STUDY AREA	PASTORAL VALUE OF LAND (FIGURE 5)
Yaringa	18 000	Moderate to High
Carbla	40 000	Moderate to High
Hamelin	120 000	Moderate to High/Very Low in Far W
Wooramel	48 000	High
Meadow	30 000	Mainly Moderate to High
Edaggee	24 000	High
Brickhouse	28 000	High
Nerren		
Nerren	145 000	Variable: Very Low to High
TOTAL:	453 000	
GRAND TOTAL	1 110 737	

from local over-use in the past. It is essential to ensure that appropriate and responsive grazing management of rangelands continues.

The place of this industry in the local economy and society must also be recognised and accommodated, while ensuring that significant scientific, recreational and educational values are not placed at risk.

2.3.4 TOURISM

The tourist industry is an increasingly important component of the Shark Bay economy. Over the years the total visitor arrivals have increased dramatically.

Tourist Attractions: Tourist attractions at Shark Bay may be divided into the following categories:

- Natural
- Man-made
- Recreational

The natural attractions of Shark Bay relate primarily to the marine environment and the recreational opportunities it provides. Some of the attractions include:

- Algal stromatolites at Hamelin Pool
- Wild dolphin at Monkey Mia
- Shell Beach
- Big Lagoon and Little Lagoon
- Dirk Hartog Island
- Steep Point, South Passage and False Entrance
- Zuytdorp Cliffs
- Flora and Fauna

The man-made attractions are mainly related to the historical development of Shark Bay and include:

- Freshwater Camp: Located at Nanga, it contains the pioneer Homestead Museum and the Pottery.
- Shell Block Buildings: Includes the Old Pearler Restaurant, St Andrew's Church and the Shark Bay Hotel.
- Denham Townsite
- Solar salt operation at Useless Loop

Existing recreational activities in Shark Bay are almost entirely related to the marine environment:

- Fishing: Big game, sports, bottom, surf and snapper fishing.
- Diving: Steep Point and South Passage.
- Boating: Shark Bay provides ideal conditions for recreational boating.
- Windsurfing
- Sailing

Tourist Infrastructure and Visitor Use: There are four caravan parks with 344 licensed caravan bays, of which 169 are fully serviced. One hotel/motel with 14 units and 41 self contained residential accommodation cottages, incorporating 82 rooms, occur in the Shark Bay region.

In 1985/86 the average occupancy rate for caravan parks was 58% and for hotel/motel and accommodation cottages it was 55% (ABS). In that year total arrivals for all establishments were 50,100 people, of which 39,100 people stayed in caravan parks and about 11,000 in the hotel/motel or cottages.

Based on domestic tourism monitor surveys, about 90% of visitors to Shark Bay are permanent residents of WA, 85% of visitors use private vehicles as a means of transport to the area and 55% of total visitors arrive for reasons of holiday and pleasure. The peak visitor periods are during school holidays, Easter and winter long weekends.

Planning Implications: The economic base of Denham will increase and become more dependent on tourism so long as there is an orderly development of services and infrastructures for tourists and so long as the attractions upon which tourism is based are not impaired. Thus, it is essential that tourism facilities be

encouraged to develop in accordance with a plan which protects the attractions listed above. It is also necessary to ensure that other activities do not harm the tourist attractions.

2.3.5 OTHER INDUSTRIES

Fine stands of sandalwood occur on Peron and Nanga stations. Until the end of 1985, some sandalwood was pulled and exported from the region, latterly as salvage from the upgrading of the Overlander/Denham Road. Sandalwood pulling is not likely to be a major pursuit in the future, however the position is under review. Sandalwood is a dwindling and scarce resource in Western Australia and substantial stands should be retained in reserves if approval is to be given to re-establish this industry in the Shark Bay region.

Coquina shell is mined at Lharidon Bight from a legal quarry and the material has been used around Denham for many years for landscaping, footpaths and primary road surface, and for use as shell grit on poultry farms for which it is a most important resource, scarce in other areas of the State. Shell blocks from Hamelin Pool are used as a building material locally, particularly in the maintenance of historic buildings.

2.3.6 POTENTIAL INDUSTRIES

As noted above, tourism offers the greatest potential for future development of the Shark Bay economy. The geological and biological features make the area suitable for other potential industries.

- (1) Research - The possible future development of marine and other research facilities in the area.
- (2) Education - Educational camps and courses making use of the area's natural phenomena, historical and recreational features.
- (3) Commercial Aquaculture - Potential exists for commercial prawn, fish and algae ventures.
- (4) Services -
 - (a) Government - There will be an increasing need for both State and

Federal Government presence in the region to provide new services and to expand existing facilities.

- (b) Commercial - Increasing private investment will be required by existing and new businesses to meet the needs of future local population and tourist growth.

Planning Implications: Some of the potential industries are dependent upon the maintenance of the unique biological/geological features of Shark Bay and several could be developed as adjuncts to existing industries, particularly in regard to research and education associated with tourism.

3.0 PLANNING ISSUES

Planning issues are the indicators of disagreements about how resources should be used. In the Shark Bay area the main resource users are the fishing, mining and pastoral industries, but the tourism industry is dependent on the same resources remaining as tourist attractions. The major recreational opportunities for the area's residents and visitors are based on resources used or potentially harmed by some industrial activity. In addition, there is significant scientific, educational, conservation and cultural interest in the region and its resources.

This section contains a brief summary of the main current planning issues in Shark Bay. This Plan resolves these issues and provides a framework for addressing similar issues in the future.

3.1 MINING

Expansion of salt mining operations at Useless Loop would provide export revenue for Australia and create employment opportunities. It may also create an environment where aquaculture can be advanced. The Denham Fishermen's Association are concerned that such expansion will affect fish nursery areas and the beach seine fishing industry. The area is also an important habitat for trans-equatorial migratory waders, which has been created as a positive spinoff from the solar salt mining operations.

Development of a gypsum mine on Peron Peninsula would provide export revenue for Australia and create employment opportunities and increase the resident population of Denham. It could result in a good road to Cape Peron being constructed and thus improving access to the scenic areas of the east and north coast of the Peninsula for recreation purposes. There is, however, concern that the industry and ship loading facilities near Herald Bluff could reduce the conservation value of the area, and additional recreation pressure may adversely affect the beach seine fishing industry and seagrass/dugong habitat.

3.2 PASTORALISM

Introduction of non-indigenous pasture species may locally improve stockholding capacity of current properties, but may also lead to competition with native flora species and possibly the loss of native plants currently used by native fauna for food and shelter.

Tourist developments on pastoral properties would provide financial benefits to pastoralists, who already find it necessary to manage tourists to some extent. There are, however, concerns that such developments may reduce the effective management of the land for pastoral or conservation purposes and that competition may affect tourist centres.

The development of a goat fibre industry indicates that there is potential for such development on other stations. Such diversification provides insurance against falling prices for wool or meat. There are well recognised management problems in running herds of goats, which require upgraded fencing to effect stock control and management vigilance to protect shrub based pastures from overuse.

The current tenure and term of pastoral leases provides poor security for pastoralists and discourages long term investment development of the properties. The problem is addressed by the Pastoral Land Tenure Review Report (1986).

3.3 FISHING

A workable allocation of the fisheries resource between professional and amateur fishermen would assist the continued viability of the Shark Bay fishery. Professional fishermen blame 'shamateurs' who sell fish illegally for placing fish stocks at risk, while amateurs often feel that methods of catch used by professionals could harm fish habitat, as well as taking too much of a resource that is owned by all of the public.

3.4 CONSERVATION

The EPA's System 9 recommendations proposed the acquisition of several pastoral leases and the

creation of a large national park at Shark Bay. Acquisition of these leases would threaten the viability of the Shire and industries in the area.

Shark Bay's marine resources are considered at risk. Based on past trends and on an assessment of community and scientific concern there is an indication that Shark Bay Marine Resources should be considered at Risk. The creation of a large marine park has been proposed to manage the resources and recreational use. Current State legislation for marine parks does not provide for commercial fishing and other related activities.

There are proposals to nominate all or parts of Shark Bay for World Heritage Listing. This would have the benefits of prestige and promotion, increased protection, and access to Commonwealth funding for research, protection and presentation. This is a controversial matter requiring further investigation.

Tourist accommodation and recreation facilities at Monkey Mia would permit people to enjoy the dolphin phenomena over extended periods. The presence of an attractive beach area and boat ramp which is protected from the southerly wind and has good access to productive fishing grounds often results in congestion at the water's edge. This causes management problems for rangers, reduces enjoyment of visitors and could have an adverse effect on the dolphins.

Pastoral stations often contain vegetation or other wildlife of considerable biological importance. Many species are evidently able to co-exist with pastoralism, particularly if pastoralists are aware of their existence and can adjust their management programs to protect them.

Conservation is an issue which is not wholly dependent on tenure and some major conservation objectives could be met by conservative management of pastoral rangelands under existing arrangements and further application of measures proposed in the Pastoral Land Tenure Review Report (1986). There is, however, a need to provide a system of national parks and nature reserves in the study area in order to provide for recreation and to protect the natural wonders of the area. Such a system should include representative and viable samples of the biota and land forms.

Creation of conservation reserves secures tenure, but realisation of the conservation objectives requires adequate management. Apart from the

consequent loss of economic and cultural values attributable to the pastoral industry, the original EPA proposal to terminate several pastoral leases in the centre of the study area did not address the problem of the limited ability of the State to replace the management presence and resources currently provided by pastoral management.

There is a need to balance resources available, economic viability of the region, and conservation priorities.

Continuation of bush camping would provide the opportunity to camp in remote areas for people so inclined. It reduces the need to provide expensive seasonal services and formal camping areas, and the visual landscape intrusion of an intensive camping area, but also results in management problems, such as increased fire hazards, dispersed environmental impacts and health problems. It may also reduce the commercial viability of formalised camp sites in Denham, Nanga and Monkey Mia.

Four wheel drive access to remote areas enables recreation, fishing and camping away from developed areas. Destruction of vegetation from proliferation of tracks over the landscape can create major erosion and management problems.

Revival of a sandalwood industry would generate limited export income and some local employment. It would marginally reduce freight costs to Denham by providing a product to be back-loaded south. There are concerns that this could affect sandalwood conservation and associated flora, remove indigenous fauna habitat, and create erosion problems.

3.5 REGIONAL DEVELOPMENT

Development of Denham as the regional centre for Shark Bay would ensure optimum use of existing services and infrastructure and provide economic advantages in the servicing of large developments. Further expansion would assist in providing security for the future of Denham. This would result in major tourist development near Steep Point being deferred for some time.

Establishment of a new all-weather airport having the potential for larger aircraft would provide for a wider tourist market. It would provide

better services to the Shark Bay community, including fast and efficient freight services. It could also be used by military and surveillance aircraft. Such an airport might have to be further from Denham than the present one.

4.0 OBJECTIVES FOR SHARK BAY

This section contains a statement of objectives for the future use of the Shark Bay region so that local residents and the people of Western Australia can benefit from its local, state, national and international significance.

The objectives are based on an understanding of the natural environment, the existing uses and users of the area's land and waters, of the special place of Shark Bay within Western Australia and of the interaction between these factors, including the planning issues outlined in the previous section.

4.1 THE SHARK BAY STUDY BRIEF

The brief to this study was to identify how the land and marine environments could best be used for the benefit of local residents and residents of Western Australia generally, to identify how the land and marine areas should be vested so to ensure that these best uses are achieved, and to suggest broad guidelines for necessary management programs.

Within an overall Planning Goal of Conservation of Natural Resources, three primary objectives have been established for Shark Bay for the Foreseeable future:-

4.1.1 COMMUNITY DEVELOPMENT

To provide for the social and recreational needs of local residents and visitors to the area, consistent with land use capabilities.

The following needs have been identified:

Social: Transport - Safe air travel facilities.
- Road access to recreational and tourist sites.

Community Services - Potable water.
- Housing.

- Improved employment opportunities.
 - Health, welfare and safety facilities.
- Recreational
- Fishing and boat facilities.
 - Safe beaches.
 - Picnic and sanitation facilities.
 - Wide range of accommodation.

4.1.2 ECONOMIC DEVELOPMENT

To provide for appropriate levels and types of economic development in the area consistent with land use capabilities.

The existing and future importance of the diverse industries to the economy of Shark Bay should be recognised. These industries provide employment opportunities, and also help provide road and other infrastructures which benefit the wider public.

Given the large size of the area, management staff of these main industries could act as custodians for the region in the absence of an adequate surveillance service to manage the increase in tourism.

4.1.3 CONSERVATION

To achieve the intent of the Environmental Protection Authority's System 9 recommendations relating to the natural environment of Shark Bay and to protect cultural and historic features of the area, while allowing for appropriate industry uses and the needs of local residents and visitors.

The area has scientific, educational and cultural values of national and international significance. It is essential that these values be conserved and if possible, enhanced, while also providing for people to live and work in the area.

Because the natural features and systems of Shark Bay are the basis of its economic prosperity through tourism, fishing and pastoralism, conserving the natural features and systems will serve the aims of both conservation and economic development.

5.0 STRATEGIES FOR ACHIEVING OBJECTIVES

This section contains an analysis of information pertinent to the objectives stated in the previous sections with the aim of developing a series of strategies which will achieve the objectives while minimising conflict between different interests in the area and its resources.

5.1 ANALYTICAL METHOD

5.1.1 LAND USE PLAN

The land use plan, which is one of the major strategies developed in this section, was prepared using an overlay technique. Maps indicating areas which have a significant importance for each use relevant to each objective were prepared as overlays to topographic base maps. This technique indicated areas where competing demands existed for use of an area or its resources and where no such conflict existed. Where no competition existed, the single or compatible multiple uses are proposed. Where conflict existed, other strategies are proposed in addition to the land use plan.

It is proposed that the Land Use Plan be a Statutory Plan under new provisions of the State Planning Commission legislation.

The purpose of a Statutory Land-Use Plan is threefold:

- Firstly it would provide security of purpose for the various land uses in that a change of land use proposed by any person, and agreed by the Local Authority and the Commission, would be the subject of a legal amendment procedure which includes a period for public submissions.

- Secondly it would provide for reservation of lands for public purposes of different kinds, and provisions for compensation for any injurious affection to the landholder.
- Thirdly it would provide development control measures for lands reserved in the plan and in other areas, Most of these powers would be delegated to the Local Authorities.

A Statutory Land Use Plan provides a mechanism for the husbandry of land use change in the future, security of purpose and protection from capricious change, and a compensation mechanism should the process lead to injurious affection to a landholder.

5.1.2 OTHER STRATEGIES

Other strategies listed in this plan include research, the development of facilities, the formation of liaison committees, the enactment of legislation and others. They have been developed through a logical analysis of relevant factors, the analysis being summarised in this section with each strategy.

5.2 LAND USE PLANNING STRATEGY

The Land Use Plan has zones and reserves which embody multiple use concepts. The zones and reserves are shown on Figure 6 and explained in Table 3 and in the remainder of this section.



Protection of the Dolphins of Monkey Mia is a feature of the plan.

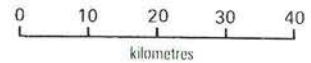


Steep Point - the most Westerly point of mainland Australia. Part of the proposed Edel Land National Park.

SHARK BAY REGION PLAN



SCALE



PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
JUNE 1988



- NAVIGATION CHANNEL
- ⚓ ANCHORAGE
- LOADING SITE
- ▲ HISTORICAL SITES
- RECREATION AND TOURISM SITES
- CENTRAL
- MAJOR
- MINOR
- DAY USE
- ROADS
- SEALED
- UNSEALED
- PROPOSED

LEGEND

ZONES

- MINING
- PASTORAL USES
- URBAN USES
- COMMERCIAL FISHING, TRAWLING AND RECREATION
- RECREATION AND COMMERCIAL FISHING

PUBLIC PURPOSE RESERVES

- ENVIRONMENT PROTECTION
- ENVIRONMENT PROTECTION AND RECREATION
- PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS
- PROTECTION OF MARINE MAMMAL HABITAT
- PRAWN NURSERY AND SEAGRASS PROTECTION
- PROTECTION OF COASTAL LANDFORMS AND VEGETATION

LAND USE

TABLE 3—LAND USE ZONES

PROPOSED LAND USE	LOCATION	MULTIPLE USES	MANAGEMENT EMPHASIS	PUBLIC ACCESS	TOWN PLANNING SCHEME	PROPOSED TENURE
1. MINING	Useless Loop Brown Inlet	Mining. Pastoral uses. Residential.	Management and protection of environment. Rehabilitation of mine sites. Subject to E.P.A.'s Environmental Assessment procedures.	Restricted vehicle access. No public access to mining areas.	Extractive industry.	Agreement Act. Mining Tenements.
2. PASTORAL USES	Stations: Brick House, Wooramel, Edaggee. Yaringa, Carbla, Hamelin. Peron, Nanga, Faure Island, Tamala, Carrarang, Coburn, Nerren Nerren, Meadow.	Pastoral uses. Mining. Forestry. Recreation. Limited tourism development.	Management of pastoral values, prevention and rehabilitation of erosion. Maintenance of vegetation. Control of recreational use and trespass.	Public access only by consent of lessee. Access to recreation sites by public road through pastoral lease.	Rural.	Pastoral lease.
3. URBAN USES	Denham.	Residential. Industry and Commerce. Tourist resorts. Caravan parks.	Provision of recreation and leisure facilities including accommodation.	Open public access.	Various, urban and other zones.	Freehold. Leasehold.
4. COMMERCIAL FISHING AND TRAWLING, RECREATION	Shark Bay: Areas deeper than 11 metres.	Commercial fishing for prawns, scallops, snapper. Shipping. Recreational fishing and boating.	Management of commercial and amateur fishing. Shipping. Management of boating. Research.	Public boating access.	Waterway.	Waterway.
5. RECREATION AND COMMERCIAL FISHING	Freycinet Estuary, Disappointment Reach and Lharidon Bight	Recreational and commercial fishing. Beach seine fishing. Aquatic recreation. Seagrass protection.	Management of seagrass and marine environment. Management of commercial and amateur fishing. Maximise public use and enjoyment of area.	Open access for recreational fishing and boating.	Waterway. Includes 40 metres above high water mark.	Marine park. Includes 40 metres above high water mark.

PUBLIC PURPOSE RESERVES

6. ENVIRONMENT PROTECTION	Zuytdorp National Park. Cooloomia Nature Reserve. Bernier and Dorre Island – Small island nature reserves. Parts of Nanga and Tamala Stations.	Wildlife conservation. Fauna observation and scientific research. Protection of vegetation.	Management of wildlife to enhance survival. Protection of rare species' habitats. Protection of vegetation. Major part of area to be amalgamated with Cooloomia Nature Reserve and Zuytdorp National Park.	Limited public access. <i>Present:</i> Access by invitation of pastoral lessees. <i>Future:</i> Proposed nature reserve, managed access.	Parks and recreation reserve.	Nature reserve.
7. ENVIRONMENT PROTECTION AND RECREATION	Peron Peninsula North, Edel Land Steep Point, Big Lagoon.	Protection of environment. Recreation.	Proposed staged acquisition for national park. Protection of vegetation and wildlife. Public use encouraged.	New road for public access to some beaches. Controlled access to areas of environmental interest.	Parks and recreation reserve.	National park.
8. PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS	Hamelin Pool. Faure Sill.	Stromatolite and sedimentary deposit protection. Limited recreation. Scientific research. Beach seine fishing on Faure Sill.	Management and protection of stromatolites and sedimentary deposits. Prohibit dredging and mining, except for restoration of historic buildings.	Limited public access to Hamelin Pool Nature Reserve.	Waterway.	Marine nature reserve. Marine Park on Faure Sill.
9. PROTECTION OF MARINE MAMMAL HABITAT	Waters near Dirk Hartog Island. Freycinet Estuary. Wooramel Delta Berrier and Dorre Islands. Monkey Mia	Dugong habitat protection. Recreational fishing. General recreation. Controlled commercial fishing at Dirk Hartog Island. Dolphin habitat protection. Boat launching and mooring. Recreation.	Protection and management of dugong habitats. Control of boat access and speed in certain seasons. Protection and management of dolphin population.	Dirk Hartog Island and Freycinet Estuary – Managed public access. Berrier and Dorre Islands and Wooramel Delta – Limited public access. Controlled boat access at Monkey Mia.	Waterway.	Marine park.
10. PRAWN NURSERY AND SEAGRASS PROTECTION	Wooramel Seagrass Bank.	Seagrass and marine habitat protection. Prawn nursery. Recreation sites at New Beach and Bush Bay. Commercial beach seine fishing.	Management and protection of marine habitats and prawn nursery areas. Management of recreational boating access.	Limited boat access to area. Recreation and boat launching. Access from New Beach and Bush Bay.	Waterway.	Marine park.
11. PROTECTION OF COASTAL LANDFORMS AND VEGETATION	Dirk Hartog Island, Zuytdorp Point to Womerangee Hill.	Landform protection. Historic site protection. Recreation. Limited pastoral use. Protection of fragile areas.	Protection and conservation of coastal landforms. Management of erosion. Phase out Pastoral uses on Dirk Hartog Island. Protection of fragile areas.	Public access to recreation sites by consent of pastoral lessees.	Rural.	Pastoral lease.

5.2.1 MINING ZONE

Two areas are included in the mining zone. The first provides for the Shark Bay solar salt Joint Venturers' operations at Useless Loop, the area zoned being that prescribed by the Shark Bay Solar Salt Agreement Act 1983. The other provides for proposed gypsum mining at Brown Inlet.

These operations must conform to regulations and standards set by the Environmental Protection Authority and the Department of Mines. New proposals will be the subject of environmental assessment by the Environmental Protection Authority.

5.2.2 PASTORAL USES ZONE

Approximately 62% of the land in the Shark Bay region is zoned for continuing pastoral uses. This zone permits pastoral activities in accordance with existing legislation affecting other industrial and public activity and conservation in the areas affected. The development of non-pastoral uses and facilities on these lands is dealt with under current legislation and should be provided for under new legislation for pastoral lands. In view of the resources required for managing such large areas, the intent of the EPA's System 9 recommendation will be best achieved by maintaining effective land use controls over the area zoned for pastoral use.

Rangeland managers and pastoralists are aware of the need to ensure that there is no long term degradation of rangelands and their vegetation.

Rangeland monitoring sites established by the Department of Agriculture provide valuable information, but there is a need for further study, particularly of the flora. Provisions of the Wildlife Conservation Act for protection of rare flora and fauna and management of kangaroo populations do apply. The Agriculture and Related Resources Protection Act also applies in regard to management of problem species.

Supervision of pastoral leases is presently the province of the Pastoral Board working under provisions of the Land Act. Protective management of soils and vegetation is also covered by the Soil and Land Conservation Act, while the Conservation and Land Management Act has application in regard to use of some other natural resources.

Proposals for new legislation flowing from the Pastoral Land Tenure Review Report (1986) should also strengthen measures aimed at conservation.

Several pastoral leases are affected by other land use zoning proposals, as shown in Table 4.

5.2.3 URBAN USES ZONE

The town of Denham is zoned to permit urban uses. Some details about the overall development of Denham are provided in following sections of this report, however, detailed planning of the town is the prerogative of the Council of the Shire of Shark Bay and is dealt with in the Town Plan for Denham.

The townsite at Useless Loop, being a mining town and not an urban centre in the normal sense, is included in the mining zone.

5.2.4 COMMERCIAL FISHING AND TRAWLING AND RECREATION ZONE

This is the main zone for commercial fishing and trawling. The delineation of the zone is based on the 11 metres (6 fathoms) isobath which is normally the shallowest extent of trawling and also approximates the seaward extent of seagrass meadows which are a fundamental conservation resource for fisheries and other marine species. An area of deeper water north east of Cape Peron is subject to a temporary Fisheries Department trawl closure as an extended nursery area during the early part of the prawning season.

The zoning proposed does not affect the management measures prescribed for the various fisheries by the Fisheries Department.

In addition to shipping, commercial fishing and trawling, various forms of recreational fishing, boating and navigation are compatible.

TABLE 4

PASTORAL LEASES AFFECTED BY OTHER USE ZONES AND RESERVES

PASTORAL LEASE	OTHER PROPOSED ZONES AND RESERVES AFFECTING THE LEASE
Tamala	Protection of coastal landforms and vegetation Environment protection.
Dirk Hartog Island	Protection of coastal landforms and vegetation.
Peron	Environment protection and recreation.
Nanga	Protection of stromatolites and sedimentary deposits. Environment protection.
Carrarang	Protection of coastal landforms and vegetation Mining.
Carbla	Protection of stromatolites and sedimentary deposits.
Yaringa	Protection of stromatolites and sedimentary deposits.
Hamelin	Protection of stromatolites and sedimentary deposits.
Coburn	Environment protection.
Brickhouse	Prawn nursery and seagrass protection.
Edaggee	Prawn nursery and seagrass protection.
Wooramel	Prawn nursery and seagrass protection.

5.2.5 RECREATION AND COMMERCIAL FISHING ZONE

This zone is proposed for the shallower waters of Shark Bay which are not otherwise zoned. These areas are the main areas for commercial beach seine fishing, recreational fishing, boating, sailing and other pursuits. Other uses include pearling, for which leases have recently been granted, and wildlife conservation. Several small islands in the zone are Nature Reserves (See Appendix 2).

Protection of the extensive seagrass beds, mangroves, coastal shallows and inlets of this zone is a fundamental objective as these areas are the prawn and fish nursery areas for the whole of Shark Bay.

5.2.6 ENVIRONMENT PROTECTION RESERVE

This reserve affects an area near Point Petit and another between Nanga, Tamala and Coburn, which is made up of extensive undulating sand plains and dunefields of sand ridges inland, and sandy plains over limestone nearer the coast. The latter area is floristically rich, having a wide variety of unique undisturbed heath-like communities.

Protection of the vegetation is the main objective of this reserve. The major part of this area is proposed for amalgamation with Cooloomia Nature Reserve and Zuytdorp National Park and is of high conservation value with minimal alternative use value.

This reserve also applies to Bernier and Dorre Islands, the undeclared Zuytdorp National Park, Cooloomia Nature Reserve and the small island Nature Reserves in Shark Bay (See Appendix 2).

Bernier and Dorre Islands are elongated masses of Pleistocene coastal limestone separated by a small channel, which mark the north western limits of Shark Bay. They have a diverse pattern of steppe, scrub and dune formations and in places, particularly on Bernier Island, the dune rims above cliffs have blown out to form large areas of mobile sand. Their flora combines elements from the South West and Eremean Botanical Provinces.

Zuytdorp National Park was created around the campsite remains from the Zuytdorp wreck and contains a small reserve for the wreck site itself. It also has a representative section of the Zuytdorp Cliffs and coastal vegetation.

Cooloomia Nature Reserve contains part of the tree heath vegetation of the Western Victoria Sandplain. Lands proposed to be reserved for vegetation protection could be acquired and amalgamated with this Reserve and the Zuytdorp National Park area.

Later sections of this report recommend that the Zuytdorp National Park reserve and Cooloomia Nature Reserve be amalgamated with the land in the Vegetation Protection Reserve, that Marine Parks be declared adjacent to Bernier and Dorre Islands and that the small island Nature Reserves be retained.

5.2.7 ENVIRONMENT PROTECTION AND RECREATION RESERVE

This reserve is proposed for the northern sections of Peron Peninsula and Edel Land. It provides for recreational use and environmental protection.

Both areas are already the subject of extensive recreational use and the provision of further recreational opportunities in a manner that protects environmental values in these areas is required.

The reserve includes Big Lagoon and the zoning implies closure to all forms of netting

5.2.8 PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS RESERVE

This reserve is designed to protect the environment of Hamelin Pool where hypersaline conditions have led to the development of a number of unique geological and biological features. These include:

- (i) Algal stromatolites which are modern "living fossils", similar to the oldest life forms occurring many millions years ago and are of great scientific interest.
- (ii) Deposits of unconsolidated and lithified beach ridges of shell of **Fragum erugatum**.
- (iii) Coquina and ooid shoals.

Conserving the Hamelin Pool environment depends primarily on maintaining the hydrologic conditions in the area and by the protection of the Faure Sill. Foreshore vegetation is of

importance in the maintenance of the systems. Any human interference with the Sill would disturb the natural processes. This in effect could lead to destruction of algal stromatolites and other deposits.

Dredging, mining and extractive industry access are to be prohibited in this zone, even though they are remote possibilities, and public access limited to prevent damage to the stromatolites and sedimentary deposits. Provision is made for limited removal of coquina shell blocks for restoring historic buildings in Shark Bay.

5.2.9 PROTECTION OF MARINE MAMMAL HABITAT

Four of the five areas proposed for Protection of Marine Mammal Habitat near Dirk Hartog Island, Wooramel Delta and Bernier and Dorre Islands and Monkey Mia are proposed as Marine Parks to enable appropriate management measures to be introduced. Amendment of the Conservation and Land Management Act to permit controlled commercial fishing near Dirk Hartog Island is proposed.

The fifth Protection of Marine Mammal Habitat area in the south west of Freycinet Estuary is also an important area for commercial beach seine fishing and recreation. Existing commercial fishing does not harm dugongs and no restriction on this activity is proposed. The presence of several small island Nature Reserves in the area has created a public awareness of conservation requirements, and dugong frequent the area during the boating off-season. No recreation sites or boat ramps are proposed in this area and it is considered that the dugong's habitat can be secured without the creation of specific reserves.

The seasonal migratory paths of dugongs are known. Measures proposed for management of marine areas should provide a mechanism to ensure their safety.

The reserve proposed for Monkey Mia will extend at least 1 km into the water.

Management for protection of the wild dolphin/human interaction and water based recreational activities in the area is required.

5.2.10 PRAWN NURSERY AND SEAGRASS PROTECTION RESERVE

The Wooramel Seagrass Bank is a major nursery area for prawns and fish and a major dugong feeding area. This reserve covers an area between the 11 metre isobath and the Pastoral Uses Zone on the east shore of Shark Bay and includes the mangroves, tidal flats and coastal areas adjacent to the Wooramel Seagrass Bank. The boundary between this reserve and the adjacent Pastoral Uses Zone is the existing fence line.

The area is also used for commercial beach seine fishing by Carnarvon fishermen and includes two recreation sites. Provision is made for both of these uses to continue.

The main management emphasis includes:

- (i) Access - boating access should be directed toward deeper waters to avoid disturbance.
- (ii) Control of nutrient supply due to accelerated erosion in the Wooramel River Catchment or on adjacent pastoral lands, or from mining in nearby areas.

5.2.11 PROTECTION OF COASTAL LANDFORMS AND VEGETATION RESERVE

This reserve covers extensive areas of aeolianite and fragile dunes and swales which occur as an irregular band several kilometres wide along the western coasts on Dirk Hartog Island and Edel Land.

For management, all of Dirk Hartog Island is placed in this Reserve, while the boundary on Edel Land follows the natural changes in landform.

Characteristic landforms are steep sided, long walled parabolic dunes and blowouts with broad undulating deflation areas and hind dune flats with most of the area being highly fragile and susceptible to wind erosion. However, hind dune swales away from the Zuytdorp Cliffs and coastline are much less susceptible to wind erosion and have a high pastoral potential. Continued pastoral use would be allowable over some of these areas with strict management controls to restrict grazing in highly vulnerable

areas. The proposed reservation while allowing for pastoralism to continue, reflects the wider community aspiration to ensure that these lands are very carefully husbanded into the future.

The long term purposes of the area should be emphasised and should be subject to adequate Management controls, which exclude pastoralism in fragile areas. In the long term the aim for the area is a complete phasing out of pastoral activity on Dirk Hartog Island.

In the short term, whilst the appropriate areas can be used for pastoralism, the intention of management practices should be directed towards protection of coastal fragile areas and vegetation, so as to prevent any possibilities of degradation.

5.3 STRATEGIES FOR ACHIEVING COMMUNITY DEVELOPMENT

In addition to the strategies implicitly contained in the Land Use Plan, the following strategies will help to provide for the social and recreational needs of local residents and visitors to the area.

5.3.1 TRANSPORTATION

Transportation and the lack of it has played a large part in the pattern of development of the Shark Bay society and economy. It will play an equally large part in the area's future.

Road Transport Costs: Most of Denham's fuel, foodstuffs, building materials and other commodities are brought in by truck from Perth at a considerable cost. Retail and wholesale costs can be reduced if backloads to Perth are available. Currently only wool, shell, sandalwood and other primary products are available for backloading.

Air Services: The location, size and construction of the aerodrome at Denham limits access. Construction of a better airport to serve larger aircraft and possibly surveillance and military aircraft, would attract a wider range of tourists and enhance local services.

Road Entry to Denham: The current entries into Denham via Hamelin Road, Hughes Street and Durlacher Street do not handle high levels of traffic and are unsafe. The steep grades which are encountered leaving Denham via the same route are undesirable, particularly for vehicles towing caravans or boats.

Redesign of the road entry to Denham should be included as part of a townsite strategy plan for Denham. The new entry should take advantage of views into the Bay, providing an attractive first impression of the town.

Strategies for Transportation:

- (1) Shark Bay Chamber of Commerce, the Shire of Shark Bay and the State Planning Commission should investigate options for improving road transport to Denham as part of the economic study proposed under Strategies for Community Services.
- (2) The Department of Aviation should be requested to identify a site suitable for construction of an all weather airport to accommodate larger aircraft than the current aerodrome and advise of funding options.
- (3) A new entrance route into Denham should be established to maximise the scenic views of the Bay, improve the accessibility of the commercial area and the foreshore, improve road safety and focus initial visitor contact on Denham itself.

5.3.2 COMMUNITY SERVICES

Denham as the Single Major Service Centre: It is always most efficient to provide services in a single, well located centre. For this and other reasons Denham is proposed as the commercial and tourism centre for Shark Bay. In many ways it already fulfils this role, but there has been increasing pressures for further development at other recreation areas, such as Nanga and Steep Point. The development of these areas in the future should complement Denham, rather than detracting from the development of a comprehensive service centre.

The timing of major tourism development, particularly at Steep Point, is critical to the development of Denham. For this reason an economic study focusing on the timing of major

tourism in areas other than Denham should be undertaken.

Facilitating Commercial, Industrial and Tourist Development: Concern has been expressed that delays in land tenure transactions of Crown Land and in obtaining planning approvals may be discouraging development. To a large extent such delays could be overcome if a planning strategy for the Denham townsite, which identified appropriate land uses in various areas, was prepared and agreed to by the relevant authorities.

The present system of land release by Department of Land Administration is not geared to provide timely responses to requests for Crown Land. This could be overcome by preparation of a Land Use Strategy by the State Planning Commission. This would be a non-statutory document which identifies growth in the foreseeable future. When the strategy is agreed to by all relevant bodies, the land could be alienated in accordance with that strategy and transferred to a relevant body, such as the Local Authority. As land is released for development, the use would be formally recognised in Council's Town Planning Scheme to allow for effective development control. It would be appropriate if this was provided in legislation.

Denham Townsite Design: The current commercial area in Denham does not provide any incentives for tourists to remain in the area - rather they simply do their shopping and drive away. The townscape should be more attractive.

This could be achieved by increasing the land available in the centre of Denham by closing part of Knight Terrace or reserving a portion of the beach area. This land could be developed into an attractive landscaped area containing public amenities such as rest areas and offer scenic views of the Bay. Without some attraction to the area, it will remain depressed, the civic quality of the townscape will remain unattractive and the visitor will not be encouraged to remain long. Redevelopment of Denham should take advantage of its interesting history.

Strategies for Community Services:

- (1) All major development should be encouraged to locate in Denham.
- (2) The State Planning Commission, in conjunction with the Council and Department of Regional Development should

commission an economic study of the region with special reference to determining the future development of tourism.

- (3) The Shark Bay Council should adopt a planning strategy which provides for the long term planning needs of Denham and is approved by the State Planning Commission.
- (4) The State Planning Commission should advise Government of the need for a change in legislation to provide for land, the subject of a Land Use Strategy, to be alienated and vested in a relevant management body.
- (5) Adequate land should be zoned in the Council's Town Planning Scheme for industrial, residential, commercial and tourist purposes.
- (6) The Shark Bay Shire Council, in conjunction with the Denham Chamber of Commerce and State Planning Commission, should prepare a foreshore plan and undertake a programme to redevelop the foreshore land for public amenity.

5.3.3 RECREATION

Recreation at Shark Bay is primarily water-based or water-oriented, the facilities being boat ramps, access to fishing spots and beaches, picnic grounds and so on.

Because these forms of recreation are so closely associated with tourism, they are discussed in the following section.

5.4 STRATEGIES FOR ACHIEVING ECONOMIC DEVELOPMENT

The strategies outlined in this section will help towards achieving appropriate types and levels of economic development at Shark Bay.

5.4.1 PASTORAL DEVELOPMENT

The improved availability and distribution of stock water is a most significant factor in

determining the short-term viability of a pastoral operation at Shark Bay. The quality of vegetation management is the key to the long term viability of the industry. Future conservation and sustainable use of these pastoral lands requires observant and responsive management. Opportunities for further expansion in pastoral development and land use are limited by the nature of the resources. Diversification of the enterprises is the major option.

Locally, substitution of cattle for sheep has occurred. Elsewhere, pasture composition and water quality generally militate against such substitution. Goat production is another option, but limited tourism development seems the most promising proposal.

Future tenure and permissible uses of pastoral lands have been dealt with in the report of the Pastoral Tenure Study Group (1986).

There is a need for pastoral management to take account of conservation objectives and specify the kinds of measures which could apply.

Three issues are pertinent:

- . conservative management of pastoral leases requires security of tenure to enable the investment of adequate capital to ensure proper control and management of stock and prevent the tendency to over-exploit land as leases approach expiry.
- . the following measures exist for the protection of pastoral areas:
 - (i) Pastoral Act - control of grazing, vermin and weed.
 - (ii) Soil Conservation Act - control of soil degradation and erosion.
 - (iii) Wildlife Conservation Act - protection of rare Flora.

Pastoralists need to be informed and monitored and legislation needs to be enforced where necessary.

- . pastoralists need to be advised of the conservation values of their lands and the objectives for them. The plan recommends a biological survey to establish these values and monitor them.

Strategies for Pastoral Development:

- (1) The pastoral industry should investigate options available for diversification on pastoral properties, particularly in the area of tourism.
- (2) Tenure and management proposals for pastoral leases should be effected as recommended in the Pastoral Land Tenure Review Report (1986).
- (3) Monitoring and research of pastures within the study area should be continued by the Rangeland Management Branch of the Department of Agriculture in consultation with pastoralists and the Pastoral Board.
- (4) Initiatives directed at identifying and developing technological innovations for the pastoral industry should be promoted, both by the Authorities directly responsible for pastoral lands and the industry itself.
- (5) Establish conservative Pastoral Land Management Practices on lands within the watershed draining into Shark Bay, particularly within the catchment of the Wooramel River.

5.4.2 FISHERIES DEVELOPMENT

The fishing industry faces difficulties because of rising costs (fuel, machinery, labour) and some competition from recreational fishermen and 'shamateurs'. In addition, requirements for maintenance of fish stocks has recently necessitated further regulation of some fisheries.

Advice from the Fisheries Department and the industry itself indicate stocks of scallops, prawns and rock lobster are fully exploited. Scale fisheries are similarly placed. Alternative developments in the areas of tuna, mackerel, squid and bait fish provide avenues of possible future expansion. Development of various forms of aquaculture fisheries is also possible.

Strategies for Fisheries Development:

- (1) The long term sustainability of the fishing industry at Shark Bay should be ensured by ongoing management by the Department of Fisheries and by members of the industry, and by protection of marine habitat, especially those areas which serve as breeding and nursery areas for juvenile fish.
- (2) Recent improvements in the handling of snapper leading to better overall quality of catch should be maintained.
- (3) The viability of diversifying the fisheries within the region to include other species such as tuna, mackerel, squid and bait fish should be investigated and where economically and environmentally feasible, should be pursued.
- (4) Future conflict between the amateur fishery and professional beach seine and line fisheries in the embayment waters should be resolved on the basis of a nexus between the two to ensure the long term viability of both fisheries.

5.4.3 MINING DEVELOPMENT

Presently, the only foreseeable mining development is an increase in solar salt production at Useless Loop. Continuation of the shell mining at Lharidon Bight is appropriate, provided this can be done unobtrusively. Limited coquinite mining to fulfil special needs may also be accommodated. Such mining activities should proceed under guidelines laid down by the Environmental Protection Authority.

Strategies for Mining Development:

- (1) The solar salt mining operation at Useless Loop should be continued in accordance with the Shark Bay Solar Salt Agreement Act 1983.

- (2) Prior to any further expansion of the salt mining operations at Useless Loop which would result in further closure of Useless Inlet, it is essential that the operator undertake a study to determine the potential effects on existing beach seine and other fishing activities and recreational potential. This needs to comply with the assessment procedures of the EPA.
- (3) The new shell quarry recently established in a less visually obtrusive area, with the advice of the EPA, should continue under EPA guidelines to ensure that shell extraction is not excessive. Coquinite mining should be similarly managed.
- (4) Commencement of mining of the gypsum resource at the northern end of Peron Peninsula should not proceed until environmental assessment procedures of the EPA have been satisfied.
- (5) Access for mineral exploration should be permitted in accordance with the Mining Act.

5.4.4 TOURISM DEVELOPMENT

Tourism holds the greatest potential for economic development at Shark Bay, with significant potential for job creation. The expansion of this industry requires the development of tourist infrastructure, further recreational facilities and the protection of the resources which attract tourists to the area.

In the past, several areas have been proposed for major tourist development including the Steep Point-South Passage area, Big Lagoon, Dirk Hartog Island, Dorre and Bernier Islands, Hamelin Pool, Gladstone and Monkey Mia. Few of these areas are suitable for development. As noted earlier in Section 5.3.2, a consumer demand study should precede development of major facilities and Denham should remain the primary service and commercial centre for the area. As a tourist centre, Denham should incorporate all levels of tourist infrastructure, including hotel/motel and resort/holiday village complexes.

The only major tourism and recreation site shown in the plan is at Nanga. It offers accommodation and other facilities, including boat launching facilities, and is capable of further expansion.

Sites suitable for minor recreation and tourism use or developments are:

- . Steep Point
- . Monkey Mia
- . Dirk Hartog Island
- . Wooramel Roadhouse
- . Overlander Roadhouse
- . Billabong Roadhouse

Of these, Steep Point and Monkey Mia have received the most attention. Steep Point is presently used for camping, but could be developed for boat access and chalet use. No further development, apart from that necessary to achieve existing management goals, should occur at Monkey Mia because of congestion and the need to protect the dolphins there.

Sites suitable for day use access (see Figure 6) include:

- . Big and Little Lagoon
- . Eagle Bluff
- . Herald Bight
- . Broadhurst Bight
- . Gladstone
- . False Entrance
- . Cape Rose
- . Hamelin Pool
- . Bush Bay
- . Peron Peninsula
- . Wooramel Crossing

- . New Beach

In addition, boat launching facilities could be provided at the following centres:

- . Herald Bight
- . Gladstone
- . Bush Bay
- . New Beach

Gladstone is not suitable for accommodation and caravan facilities because of servicing difficulties and the nearby critical summer refuge for dugong.

Measures should be introduced to ensure boats use the main channel from Gladstone to deeper waters to minimise effects on dugong and the Faure Sill.

Further development of the Wooramel Roadhouse caravan park is seen as a better option.

Bush camping at day use areas should continue in accordance with the provisions of the Health Act and other Acts. Generally, a flexible approach to bush camping ought to be adopted by the Shires of Shark Bay and Carnarvon, pastoralists affected and, where appropriate, by the Department of Conservation and Land Management. Basic hygiene facilities should be provided.

Some impacts of tourism are already being experienced on many pastoral stations. These include trespassing, use of off-road vehicles in sensitive environments, requests for petrol sales and provision of accommodation. Tourism could provide an opportunity to diversify the pastoral economy.

The Tourism Development Plan for the Gascoyne Region prepared by Planning Collaborative Australia Pty Ltd, consultants for the WA Tourism Commission, identified many areas for the promotion and development of tourism. These include:

- Several areas of tourism product development including:
 - . the development of facilities and attractions which will extend the length of stay of visitors in the region;
 - . the improvement of access to and information on the natural resources of

the region, particularly the marine environment;

- . the development of the pastoral tourism experience;
 - . the promotion of the elements of historical and cultural significance in the region, particularly relating to the early mariners and pastoralists;
 - . improvement of the availability and visibility of local produce, including seafood;
 - . the development of thematic tourist trails;
 - . encouragement of the development of the gamefishing and charter boat industry.
- Specific market products which should be promoted such as:
- . promotion of the sports fishing potential of the region, including fishing holidays and tours;
 - . the packaging and promotion of diving holidays, including the development of diving trails and a diving brochure;
 - . the establishment of bare-boat charters at Shark Bay;
 - . the development of horse-back treks and tours;
 - . the packaging of aerial tours of the region.

Many of these strategies are suitable for Shark Bay.

The protection of resources which attract tourists to the area is considered in the next section.

Strategies for Achieving Tourism Development:

- (1) The Denham Tourist Bureau, in association with the Shark Bay Shire Council, the Tourism Commission and local tourist operators should develop a tourism infrastructure for the planning and marketing of the industry. This should include funding of essential interpretive facilities and products.

- (2) Opportunities for the widest range of tourist related activities which do not conflict with the environmental significance of the region or other existing industries should be developed.
- (3) New areas for tourism on Peron Peninsula will be opened by the provision of a new road to Herald and Broadhurst Bights and links to other proposed day use areas. The Shire of Shark Bay and Department of Conservation and Land Mangement should consult Main Roads Depoartment on funding options. Road construction and related developments should be consistent with proper management planning.
- (4) The tourism industry should consider implementation of the strategies proposed in the tourism development plan for the Gascoyne.
- (5) The Western Australian Tourism Commission in conjunction with other relevant bodies should prepare a tourism development and management plan for Shark Bay which reflects conservation priorities, recreation and education opportunities and management constraints of the region.

5.4.5 POTENTIAL NEW INDUSTRIES

Research: The unique marine environment of the Shark Bay region and its scope and need for many forms of study and research make it a logical future base for marine research and extension.

The location of a research facility in Denham would:

- . Enable the closer documentation of marine species in the study area as an aid to formulating future management provisions for commercial and recreational fishing.
- . Serve as a centre for marine research between Geraldton and the Pilbara Coast.
- . Play a vital role in monitoring ecological change to north west coast marine environments, and in formulating and implementing adequate measures to protect those environments.

- . Become a centre of world focus and information for rare local phenomena such as stromatolites, coquina shell, dugong, dolphin and others.
- . Assist surveillance and enforcement of environmental protection measures in Shark Bay and environs.
- . Form the basis for the development of aquacultural and associated industries in the region.

Education: Denham could also serve as a centre for education and training facilities.

The region is ideally located and suited to the practical training of many categories of students, ranging from youth groups, rangers and inspectorial staff, to field staff and fishing industry employees.

Courses of world-class interest could relate to multiple land-use planning within a delicate environmental region as well as to the unique marine, terrestrial and historic features.

Construction: The demand for building and service industries related to the development of tourism and other industries in the region can be expected to boost commercial investment in Denham, and to increase the centre's base population.

Included in the range of associated industries would be building and construction, earthmoving, transport, hardware retailing and wholesaling and other retail and service industries.

Sandalwood: The Consultative Committee resolved in February, 1987 to record its strong support for a renewal of the sandalwood cutting permit, subject to proper control and research into regeneration.

Strategies for New Industries:

- (1) The State Planning Commission should approach representatives of the Education Department, appropriate research institutions and organisations to assess the practicability of establishing a marine research facility in Denham.

- (2) The Education Department should instigate a study of the prospects for the development of further educational opportunities in the Shark Bay region.
- (3) The Department of Conservation and Land Management and the Sandalwood Export Committee should reassess the question of a limited sandalwood industry at Shark Bay.

5.5 STRATEGIES FOR CONSERVING THE NATURAL ENVIRONMENT

The strategies outlined in this section will help towards conserving the natural environment for its values and because it is the basis for future regional prosperity through tourism and other industry.

5.5.1 INTENT OF THE EPA'S SYSTEM 9 RECOMMENDATIONS

The intent of the EPA's System 9 recommendations was clarified in a recent letter from the EPA Chairman as being "to ensure the long term conservation of the natural features and systems in Shark Bay, whilst accommodating appropriate levels of use consistent with the area's varied resources and capacity. The exceptional attractions of the region should be managed in such a way that they are available for the enjoyment of all people".

The natural features and systems of Shark Bay have been described in summary form in Section 2.1.9. There is substantial knowledge about some aspects of the natural environment of Shark Bay, but a much better understanding is required for good management of the area to be assured.

5.5.2 INFORMATION FOR CONSERVATION

Perhaps the most serious limitation to the conservation of Shark Bay is the lack of a detailed inventory of the natural and cultural values of the area, and their condition, status and management requirements. It is therefore, essential that a detailed survey be undertaken of the cultural, historic and natural features of the Shark Bay study area and that an inventory of their condition, status and management requirements be maintained.

A limited system of monitoring the composition and condition of vegetation and soils over the areas used for grazing has been in use by pastoralists and the Department of Agriculture since 1981.

Strategies for Providing Information for Conservation:

- (1) The Department of Conservation and Land Management should commission a detailed survey of biological, cultural and historic resources of Shark Bay and establish and maintain an inventory of their condition and status.
- (2) A call for further scientific research work in Shark Bay should be made by the Environmental Protection Authority.

5.5.3 CONSERVATION OF MARINE ENVIRONMENTS

It is a finding of this study that Shark Bay's marine resources must be considered at risk. This concern is based more on an assessment of community and scientific concern and opinion than on definite knowledge. However, it is clear that public use of Shark Bay will increase and that measures to protect the basic marine resources and to manage their use are essential if deterioration due to over-use is to be prevented.

Management is required for:

- protection of the habitats used by commercial and recreational fisheries species;
- protection of marine animals and plants which have conservation values, but which are not commercial or recreational fisheries resources;
- protection of marine formations which have scientific, educational or conservation values.

In order to overcome difficulties of communication or liaison between various government agencies, the management of environments and resources should be accomplished through as few Acts and agencies as possible.

It is clear that no existing Act or Acts provides for all of the uses which have been proposed for the estuarine environments of Shark Bay.

The Fisheries and related Acts provides for Conservation and Management of all Aquatic Animal and Plant Life and protect the basic fisheries resources only from threats by fishing effort or gross events and practices which may affect the fishery. They are not concerned with comprehensive environmental and use management of marine resources generally. The Fisheries Act, therefore has a fundamental, but not comprehensive role in the management of Shark Bay's marine fisheries resources.

The Conservation and Land Management Act provides for the declaration and management of Nature Reserves, National Parks, Marine Parks and Marine Nature Reserves, and management of certain Crown land and other categories of land, as well as providing for conservation of wildlife in general.

Marine Nature Reserves are reserved for the conservation of:

- "(a) aquatic or terrestrial flora and fauna generally and their habitats;
- (b) marine and freshwater flora and fauna generally; or
- (c) any specified marine or freshwater:
 - (i) animal; or
 - (ii) plant life,or class thereof, or a combination of any of those purposes."

Marine Parks are reserved for one or more of the purposes described above as well as for public recreation. Recreational fishing, subject to existing control measures under the amateur fishing provisions of the Fisheries Act is permissible in Marine Parks.

The Conservation and Land Management Act could be applied to Shark Bay, but in its existing form it cannot provide for the full range of current or projected uses, particularly those involving commercial resources use, such as commercial fishing. The Act provides for the preparation of Statutory Management Plans for land vested in the National Parks and Nature Conservation Authority and managed by the Department and for research, education and staffing.

A Bill to amend the CALM Act is likely to be put to Parliament in the Autumn Session (1988) including an amendment providing for Multiple Use Marine Parks. This Amendment will need to be in place before the proposed Shark Bay Multiple Use Marine Park can be declared.

Strategies for Conservation of Marine Environments:

- (1) The whole of Hamelin Pool, including the foreshore areas to the edge of the Holocene deposits and part of the Faure Sill as shown on Figure 7, should be made a Marine Nature Reserve for the purpose of Protection of Stromatolites and Sedimentary Deposits.

For the present, a convenient reserve boundary would be the boundary at the adjacent pastoral leases, 40 metres above the high water mark.

The Faure Sill and the Holocene deposits on the foreshore of Hamelin Pool should be excluded from exploration, dredging and mining under Section 19(1) of the Mining Act 1978.

Areas of pastoral stations within the proposed Hamelin Pool Marine Nature Reserve should be purchased from the relevant pastoral leases when they are sold.

- (2) A multiple use marine park should be established at Shark Bay, which permits commercial and recreational fishing while providing for comprehensive environmental and use management of the waters affected. (Fig.8)

The Marine Park would include the following Special Areas:

- . The waters east of Bernier and Dorre Islands below the high water mark to the 6 metre isobath.

This is to protect the shallow water marine environment adjacent to the islands, particularly the seagrass banks which are important dugong habitats.

It would also give greater security to the area and enable the Department of Conservation and Land Management to control boating access to the islands and within the shallows, should boating activity or island landings increase to levels where such control is required. Such measures might include the identification of suitable access points and boat speed limitations at certain times of the year.

- . The waters east of Dirk Hartog Island below high water mark to the 6 metre isobath would be managed for dugong habitat protection in a similar manner to the Bernier and Dorre Islands marine extension (above). Provision should be made for controlled commercial fishing by amendment of the Conservation and Land Management Act.
 - . Big Lagoon should be declared a Marine Park and managed as part of the proposed Francois Peron National Park.
 - . Waters zoned for Dugong Habitat Protection at the Wooramel Delta Park.
 - . The Wooramel Seagrass Bank between the 6m isobath and the boundary of the pastoral zone. The continuation of beach seine fishing is to be provided for.
- (3) As an early priority an area of water, at least one kilometre wide, adjacent to the Monkey Mia Reserve should be made a Marine Park to ensure protection of dolphins and control of boating and other activity which may endanger the dolphins.
- (4) The high energy marine environments west of Bernier and Dorre and Dirk Hartog Islands should be investigated for possible Marine Park status in consultation with the Fishing Industry.

A committee called Marine Parks and Reserves Selection Working Group established under the Department of Conservation and Land Management is presently examining the need for marine parks representative reserves in Western Australia. It should be consulted.

Areas proposed as Marine Parks and Marine Nature Reserves are shown in Fig.8.

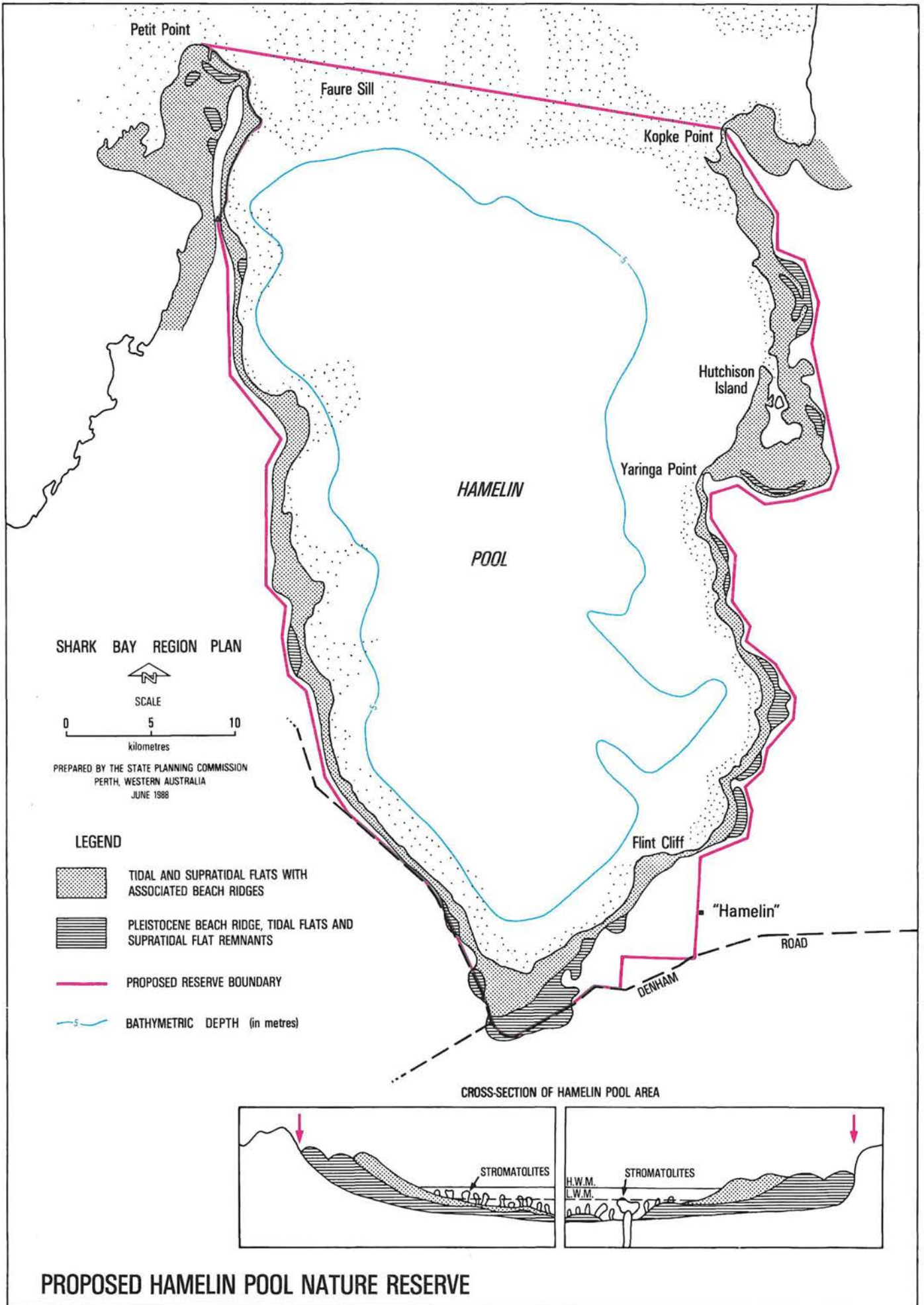
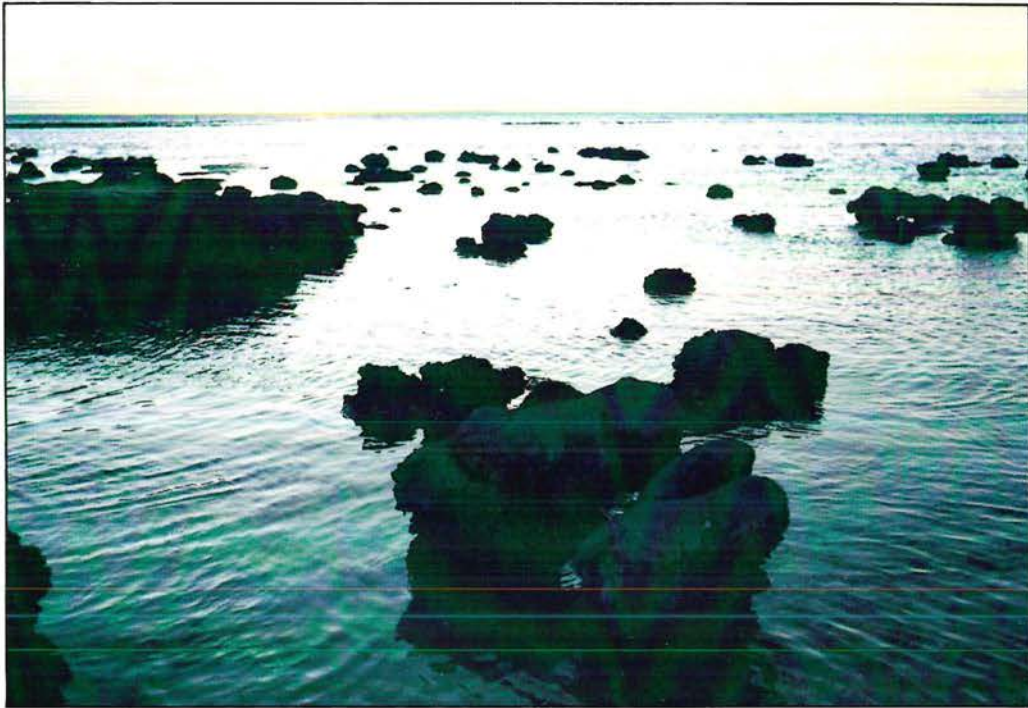
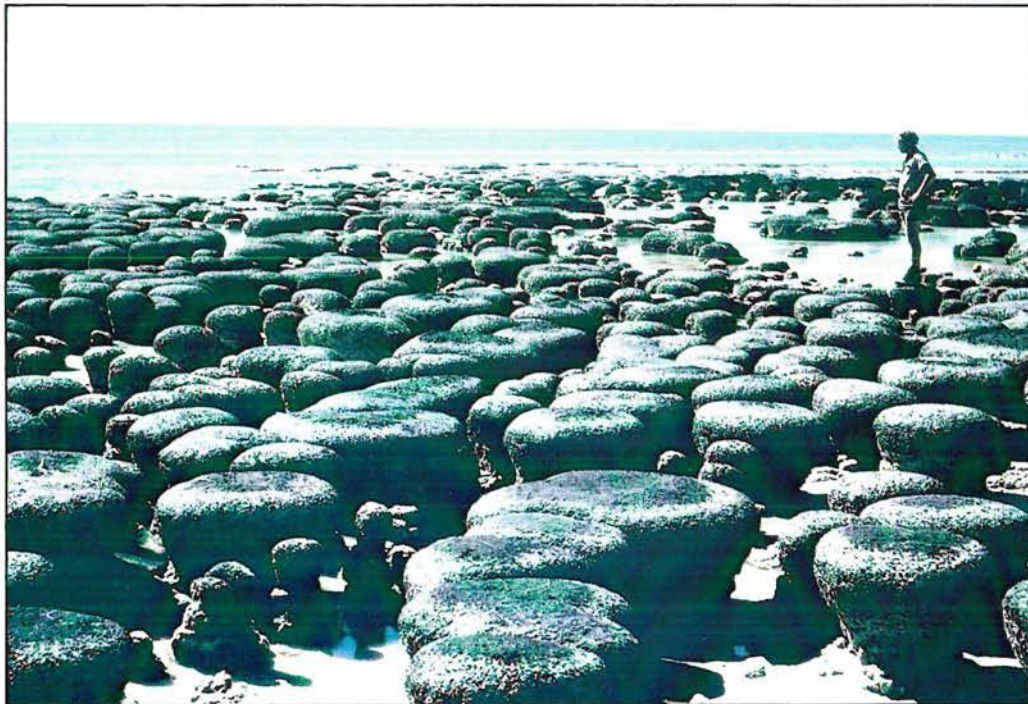


Figure 7.



Hamelin Pool - a hypersaline environment containing sedimentary deposits of scientific interest.

Photograph courtesy of Dr. P.E. Playford



Stromatolites - Algal bound sedimentary structures similar to life-forms which existed in the earliest period of life on earth.

5.5.4 CONSERVATION OF LAND ENVIRONMENTS

Most of the land area in Shark Bay has been under pastoral lease for many years, but continues to have conservation value. This plan takes the view that management by the leaseholder, in accordance with appropriate regulations, will be the best management strategy for these areas in the future, except where there are significant conservation or recreational values or very sensitive environments. These latter areas should be National Parks or Nature Reserves, as appropriate.

As noted earlier, there is inadequate detailed information about the biological resources of much of Shark Bay. This must be rectified to enhance management by pastoral leaseholder and government agency alike.

The management of Dirk Hartog Island is of specific interest as it is an area of great conservation and cultural interest and was proposed for acquisition by the Government in the 1976 EPA System 9 recommendations.

Dirk Hartog Island is currently in public ownership, except for 100 ha of freehold land, because of its status as a pastoral lease. It is not proposed that Dirk Hartog be acquired by Government in the proposed Plan, because current ownership results in essentially conservative management and the cost of replacing the existing management presence in this remote location is greater than elsewhere in the Bay. Need for management services in the mainland areas also appears greater.

The main tourist potential for Dirk Hartog Island appears to lie in increased use of the beaches and adjacent marine areas. Charter cruises and ferry type operations provide appropriate access and further opportunity for wilderness experience which would be enhanced by limited on-island accommodation. Provision of such accommodation is possible without any adjustment of existing tenures.

There is reasonably detailed knowledge of the island flora and fauna, and in view of the above, the best result for immediate management of conservation, recreation, cultural and historic values can be achieved by liaison between the lessee and Government agencies with provision of special purpose reservations to cover the navigation aids and historic site at Cape Inscription.

In the longer term, community consensus may favour reservation for National Park.

Strategies for Conservation of Land Environments:

- (1) Areas of high conservation value should be identified to enable pastoralists and other land managers to take appropriate conservation management actions.**
- (2) Specific conservation measures should be implemented where necessary on pastoral lands.**

Ultimately, these should be in accord with the recommendations of the Pastoral Land Tenure Review Report (1986), and the Soil and Land Conservation Act. Implementation will be in liaison with pastoralists affected.

- (3) The northern part of Peron Peninsula should be made a National Park.**

The many attractions of this area include red sand dunes and sea cliffs, long beaches with sweeping curves, birridas and samphire flats, land-locked embayments and sandy sheltered beaches.

- (4) A carefully designed and located road from the Denham-Monkey Mia road to the northern tip of the peninsula should be constructed, with spurs east and west of points of interest, to relieve congestion at Monkey Mia and to provide Denham based visitors easy access to a range of sightseeing, fishing and swimming options not at present available, or only available at Monkey Mia.**

Location and construction should be in accord with necessary planning and environmental requirements.

- (5) Edel Land should be made a National Park from Zuytdorp Point to Steep Point and Cape Bellefin because of its recreation and scenic values.

It is part of Carrarang Station, but is not used for grazing because of difficulties in managing such a remote area.

- (6) Zuytdorp Nature Reserve should be created by amalgamating the existing Cooloomia Nature Reserve, the undeclared Zuytdorp National Park and intervening land which should be acquired in the future from Tamala and Nanga Stations.

The vegetation within this area is rich, varied and undisturbed. The area includes part of the Zuytdorp Cliffs which comprise a significant landscape element of the area.

- (7) Existing Nature Reserves should retain their current vesting and use.

- (8) Meade Island should be afforded Nature Reserve status.

- (9) Action should be taken to identify Representative Reserves of those Vegetation Systems not included in existing reserves and in the proposals for reserves in this Plan, by way of a biological survey in consultation with land owners.

- (10) There is a need for consultation with the lessees of Dirk Hartog Island in order to negotiate the Island's future with the objective of reserving it for a National Park.

Areas proposed as National Parks and Nature Reserves are shown in Fig.8.

5.5.5 MONKEY MIA

Monkey Mia is the only place known in the world where wild dolphins regularly interact with humans to the extent that they tolerate human contact.

This phenomena has been widely publicised both nationally and internationally and in the future will undoubtedly generate significant interest in Monkey Mia from both the scientific and general tourist aspects.

There is already evidence of conflict between swimmers, sight-seers and boat fishermen, mainly due to the intense use of a small area and lack of regulation of users. The frequency of such conflicts will undoubtedly increase if management of the area does not occur.

The State Planning Commission and the Department of Conservation and Land Management have prepared a Development Plan for Monkey Mia in accord with decisions arising from the consultative process which will involve the re-organisation of vehicle and boat access, parking facilities and modification of the existing caravan park layout. The essential features of the Plan (See Figure 9) are:

- . Relocation of the existing access road and provision of separate entries to the caravan park, interpretation centre and jetty areas.
- . Closure of the present boat ramp and relocation to a new site east of the jetty. This relocation would be accompanied by the provision of a boat and trailer parking area. Commercial vehicles would also be permitted access to the jetty area.
- . Provision of defined areas for car, bus and caravan parking south east of the interpretation centre to accommodate day use visitors, for example, sightseers, picnickers and swimmers.
- . Relocation of those caravan sites nearest the interpretation centre and immediately adjacent to the beach further westwards to provide greater physical and visual separation between campers and visitors to the centre and beach area.
- . Delineation of a boat-free zone immediately west of the jetty in the present dolphin contact area.
- . Joint management of the Monkey Mia Reserve by the Department of Conservation and Land Management and the Shire of Shark Bay.
- . Establishment of a management fee for users of Monkey Mia for the ongoing management of the area.

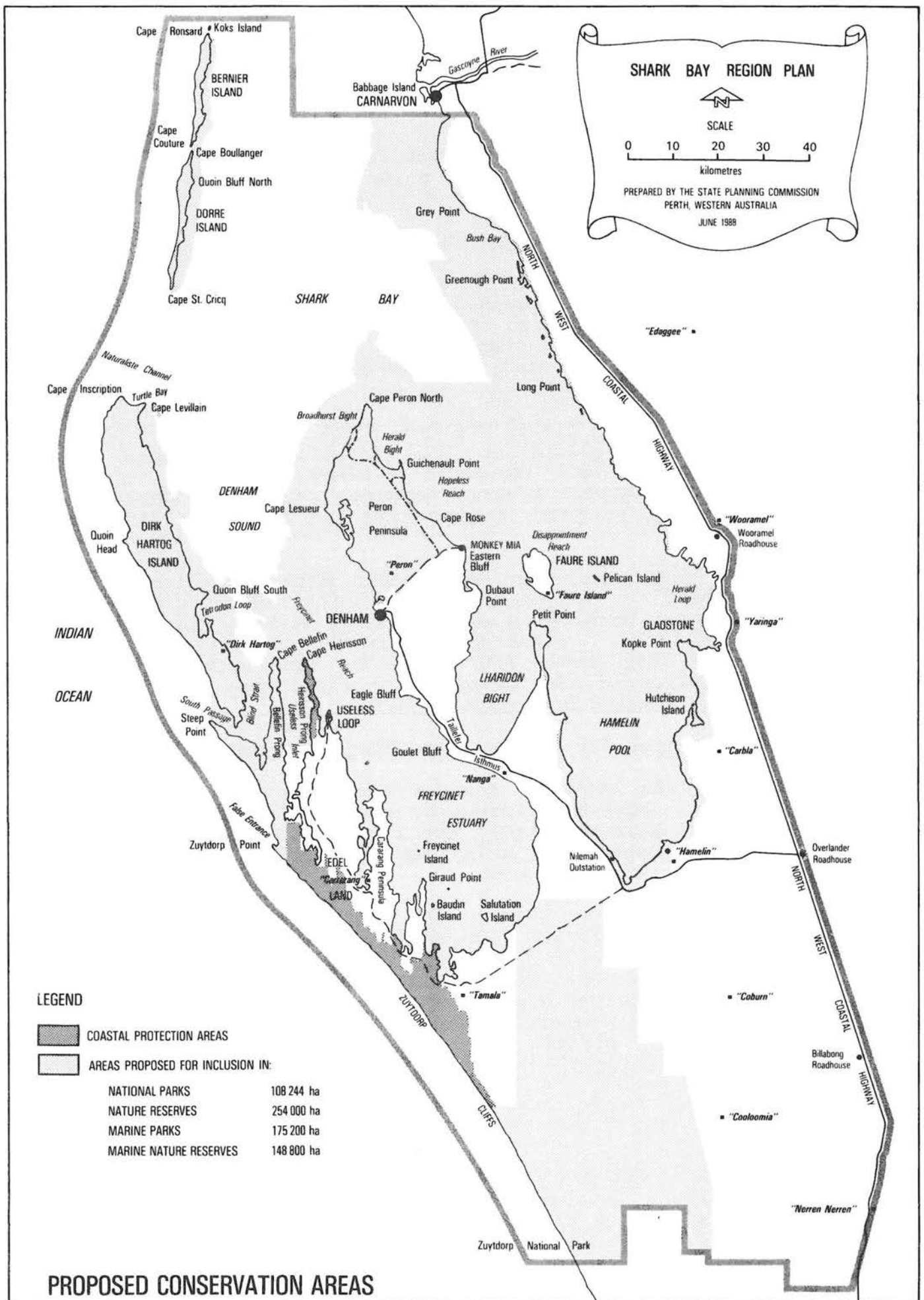


FIGURE 8

- . Establishment of a Dolphin Protection Zone for the marine areas around Monkey Mia.

Strategy for Monkey Mia

- (1) The Development Plan for Monkey Mia should be implemented prior to the 1987/88 tourist season.

5.5.6 CULTURAL AND HISTORIC FEATURES:

Little evidence remains of Aboriginal use of Shark Bay, but a number of sites are known to the Western Australian Museum. Some interesting relics are a stone fish trap, and early Aboriginal hospital settlements on Bernier and Dorre Islands.

Dirk Hartog first visited Shark Bay in 1616, leaving a plaque at Cape Inscription. Other navigators and explorers visited the area to collect natural history samples, chart the coast and take on provisions during the following 250 years.

The first European settlements were established by pearlsharers and guano miners in the mid 1800s and pastoral properties were taken up starting in the late 1800s. Since that time the population of Shark Bay rose and fell in line with the viability of the major local industries of the past, fishing and pastoralism.

Strategies for Cultural and Historic Features:

- (1) An historic reserve should be created at Cape Inscription to protect Dirk Hartog's Landing Place, the ruins of the historic lighthouse buildings and the old tramway and horseworks.

This would involve negotiations for the transfer of Commonwealth land.

- (2) The Old Hamelin Post Office should be acquired for preservation, interpretation and research purposes, should it come on the market.

MONKEY MIA REDEVELOPMENT PROPOSAL

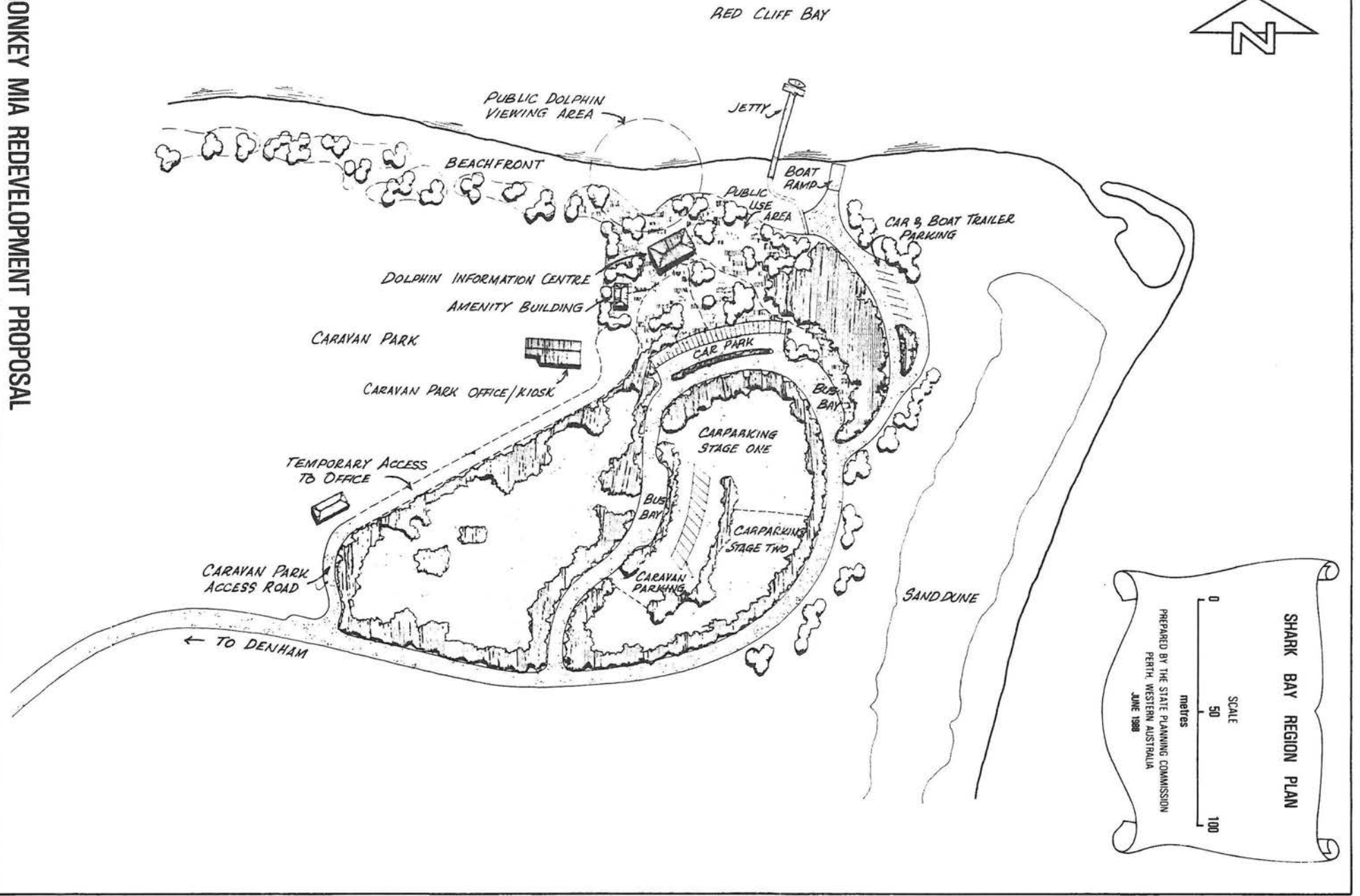


Figure 9.

- (3) Further surveys and research on prehistory and historic sites should be undertaken to determine measures for protection and interpretation of the sites.

5.5.7 NOMINATION FOR WORLD HERITAGE LISTING

Nomination of all or parts of Shark Bay for World Heritage Listing has been proposed. This concept is currently investigated at Government level.

Strategy for World Heritage Nomination and Listing:

A Government Committee comprising Ministers of the relevant portfolios and representatives of Local Government should have discussions with the Commonwealth in relation to World Heritage Listing, for advice to Government.

6.0 IMPLEMENTATION

The implementation of the strategies set out in the preceding section will require a number of integrated actions and programs. These may involve alterations to government programs and amendments to legislation, ensuring finance is available for certain public developments and other matters. These are outlined and discussed in this section.

6.1 CO-ORDINATING THE ACTIVITIES OF THREE LEVELS OF GOVERNMENT

At present a number of Local, State and Commonwealth Government agencies have a role in the management of the Shark Bay region. The proposals outlined in this report will increase the range of organisations involved. The roles need to be more precisely defined and in some cases altered, and liaison between those concerned needs to be ensured.

6.1.1 LOCAL GOVERNMENT

The Council of the Shire of Shark Bay manages the Shire area of over 2 633 000 hectares in accordance with the provisions of the Local Government Act and related Acts, the Health Act and Local By Laws. The Shire has several reserves vested in it for various purposes, removal of road material and so on (See Appendix 2). Some parts of these reserves have been leased to private interests, such as the caravan park at Monkey Mia.

The Shire employs rangers and other workers for general duties and road construction and maintenance.

At present Shark Bay has a Town Planning Scheme, but the implementation of a Region Plan with statutory powers would improve the effectiveness of Council's efforts to manage the Shire efficiently. This would require an amendment to planning legislation. The Shire of Carnarvon manages a significant area in the eastern section of the study area.

6.1.2 STATE GOVERNMENT

Several State Government Departments and Authorities have roles in Shark Bay in administering the various industries, education, welfare, health, roads, navigation and other infrastructure services, and in the regulation of development, planning, conservation and other matters.

As noted in Section 5, an increased role is seen in the area for State Government in new park and tourism proposals. An increased research presence in the area for State agencies has also been proposed.

6.1.3 COMMONWEALTH GOVERNMENT

Several Commonwealth Government Departments are involved in the provision of services in the Shark Bay area, including postal and telecommunications, welfare, customs, employment, navigation and heritage matters. Appendix 1 deals with proposals for World Heritage Listing. The Commonwealth could have an increasing role in surveillance, air navigation and heritage matters.

6.2 OPTIONS FOR ADMINISTRATION OF THE REGION

In the past the efforts of local and regional staff to co-ordinate the activities of all levels of government have not always been successful. There is a need for improved co-ordination of Government activity at Shark Bay firstly in the administration of Government services, and more particularly in the area of surveillance and protection of the land and waters of the area. A method for overall administration of the region would be desirable.

Three options are possible:

Option 1: Continue Current Arrangements

Currently land areas in this region are administered by the Shires of Shark Bay and Carnarvon. Several

Government Departments administer particular aspects such as conservation, roads, pastoralism and land use. In the marine areas several authorities administer separate functions, including commercial and amateur fishing, navigation and conservation.

This system works reasonably well, but co-ordination difficulties and inefficiencies may increase with new initiatives proposed in the Region Plan, particularly with the creation of new parks and reserves.

Option 2: Implement The System 9 Recommendations

The implementation of the System 9 Recommendations would involve the acquisition of several pastoral leases and the creation of Aquatic Reserves over most of the waters of Shark Bay. This would result in most of the land and marine areas of the region being a single unit, administered under the Conservation and Land Management Act 1984 by the Department of Conservation and Land Management. The Shire of Shark Bay would have a much reduced role in the region.

This method may have adverse economic, political and social consequences due to the loss of the pastoral industry and parts of the commercial fishing industry. The town of Denham could experience social and economic change in accommodating a rapid change of role.

Administration of the region in this way would appear to be inconsistent with the Government's brief for this study.

Option 3: Establish a New Administrative Body to Co-ordinate and Supplement Existing Administrative Arrangements

This option could achieve efficiencies in Government operation

with few economic or social consequences and could be achieved under existing administrative arrangements, by new legislation, by amendment of existing legislation or by a combination of these.

This is the method preferred in this proposed Region Plan for providing for the region's administration and is described in detail below.

6.3 CO-ORDINATION OF MANAGEMENT

A framework is required to provide for the several agencies at Shark Bay to work together on specific programs and provide efficiencies in operations. This is required by the remoteness and large size of the area, and the multiple use and tenure system proposed in the plan. This would best be done by establishing a 'Shark Bay Region Trust'.

6.3.1 RESPONSIBILITIES OF THE PROPOSED SHARK BAY REGION TRUST

These should be to:

- . Co-ordinate the management of Shark Bay according to the final Region Plan.
- . Advise the Minister for Conservation and Land Management on the disbursement of the 'Shark Bay Management Fund'. (See next section).
- . Administer the 'Shark Bay Management Fund'.
- . Provide advice to Ministers responsible for:
 - State Planning Commission Act (Region Plan)
 - Conservation and Land Management Act Marine and National Parks and Nature Reserves).
 - Fisheries Act (Recreational and commercial fisheries matters).
 - Tourism Commission Act (Tourism development)

- Land Act (Pastoral lands and land tenure matters).

and others as appropriate.

- . Promote field surveillance and management protection services for Shark Bay by co-ordinating the activities of Department of Conservation and Land Management, the Shires of Shark Bay and Carnarvon, other State agencies, pastoralists and other private citizens.
- . Acquire and maintain specialised equipment for use by all agencies in surveillance and research programs.

6.3.2 STRUCTURE OF THE PROPOSED SHARK BAY REGION TRUST

The Trust would comprise:

- . An independent chairman.
- . The President of the Council of the Shire of Shark Bay.
- . The Executive Director of the Department of Conservation and Land Management.
- . The Chairman of the State Planning Commission.

It would be supported by a consultative panel comprising representatives appointed by the Minister of:

- . Local Government.
- . State Agencies.
- . The pastoral, mining, tourism and fishing industries.
- . The Commercial Sector.
- . Recreational users.
- . The conservation movement.

The Trust would employ a Director and support staff.

6.4 PROVIDING FOR ON - THE - GROUND MANAGEMENT AND DEVELOPMENT

Funding for development of public services and facilities at Shark Bay could be available from a number of sources. Access to and use of such funds needs to be co-ordinated so that no group is unfairly disadvantaged and so that public funds are allocated in a way that best serves the public interest.

6.4.1 LOCAL GOVERNMENT FUNDING

The Shire of Shark Bay has a limited rating base, with only about \$100 000 being collected each year to provide for the management of 2 633 000 ha. Council has access to Commonwealth and State grants of various kinds, such as MRD road funds.

The rapid increase of tourism in the area is a strain on Council's resources and there is a need for extra funds to provide suitable facilities in Denham and at points of tourism and recreation interest. Equally there is a need for funds for the provision of a ranger service for the control and management of tourism and local government matters generally.

6.4.2 STATE GOVERNMENT FUNDING

The various State Government management activities proposed in this Plan will require increases in government expenditure in a time of fiscal restraint. The majority of the proposed activities pertain to enabling conservation, tourism and various resource-based industries to co-exist at Shark Bay.

6.4.3 COMMONWEALTH GOVERNMENT FUNDING

Commonwealth interest in Shark Bay has changed in recent years in response to increasing awareness of the area's heritage and environmental values. Suggestions have been made that all or parts of Shark Bay could be nominated to World Heritage Listing. This could have funding and tourism advantages.

6.4.4 POTENTIAL SOURCES OF FUNDING

The usual source of direct funding increases for the Shire is through increases in rates collected arising from tourist or other development. Any increase in development and rates would almost certainly be accompanied by increases in services being demanded, however, so that it is unlikely that funds would be available from this source for implementing the strategies proposed earlier.

Increases in economic activity at Shark Bay should result in greater tax receipts accruing to the Commonwealth and State governments. However, since these funds would enter general revenue, the benefits to Shark Bay would not be automatic. Commonwealth and State funds can be allocated according to changing priorities, so increasing interest in the values and potential of Shark Bay could be accompanied by increased funding from general revenue for management of the area through the greater involvement of State agencies, such as the Department of Conservation and Land Management and the Tourism Commission, and the Commonwealth Government.

The most direct source of funding to provide services is through implementing a 'user pays' principle. This principle currently operates elsewhere for services such as garbage collection, camping, boat ramps and other facilities. Provision for user fees for National Parks is contained in the Conservation and Land Management Act and the practice of charging fees for using areas having special interests and management requirements occurs in many parts of the world. Land owners in Shark Bay also levy access charges on visitors at present.

6.4.5 THE SHARK BAY MANAGEMENT FUND

A management fee is proposed to be collected from all visitors to Shark Bay, excluding local residents and commercial non-tourism traffic. On payment of the management fee, the visitor would be given an educational and information program, guide book and other relevant information.

A sticker style permit would be purchased at retail outlets, Government establishments and selected stations. Intending visitors would be able to obtain permits in Perth and regional centres from tourist bureaux prior to travel, and special arrangements for coaches, air travellers and boats would be made. Rangers would also issue permits as an alternative to enforcement action. A commission would be deducted from permits at point of sale.

This scheme would avoid the adverse public reaction and high cost involved in entry toll gate methods.

The fund would be used only for management services, provision of user facilities and research within the Shark Bay region. It would supplement the programs of participating bodies, particularly Department of Conservation and Land Management and the Shire of Shark Bay, and fund the staff and specific programmes of the Shark Bay Region Trust.

The Fund would include provision for receipt of private donations, bequest and grants, including any Commonwealth Funds.

6.5 LEGISLATIVE REQUIREMENTS

Legislative provisions are needed to cover three areas highlighted by the study:

- i. Enabling legislation will be necessary to apply a management fee for visitors and users of Shark Bay resources based on 'the user pays principle'.
- ii. Existing legislation to implement the multiple uses proposed in the plan is inadequate, particularly in regard to conservation of marine resources.
- iii. Amendments will be required to:
 - . The Conservation and Land Management Act to provide for a full range of multiple use in Marine Parks.
 - . Planning legislation to provide for a Statutory Region Plan.

Amendments are already contemplated to both the Conservation and Land Management Act and the State Planning Commission Act which would provide the necessary measures in relation to management of marine areas and the promulgation of statutory plans.

Co-ordination of management and the creation of a 'Shark Bay Region Trust' could be accomplished by administrative means, but it is doubtful whether a specific management fee could be applied by administrative means or through existing Acts.

Strategies for Implementation:

Action should be taken to:

Investigate options for administration of the region including a proposed 'Shark Bay Region Trust' with responsibilities as set out in Section 6.3.1.

Permit a user fee to be levied on visitors to Shark Bay and collected through retail, government and other outlets in Shark Bay and other centres (see the 'Shark Bay Management Fund' - Section 6.4.5.)

Amend the Conservation and Land Management Act to allow for commercial fishing use within particular management zones of Marine Parks.

Amend existing Planning legislation to allow for the final Region Plan for Shark Bay to have statutory authority similar to a Town Plan. This could also be achieved under new planning legislation.

REFERENCES

(Including Selected Papers and Reports for Further Reading)

- Abbott, I. (1977). New or interesting records of sixteen bird species from Bernier Island, Dirk Hartog Island, or Peron Peninsula, Shark Bay, W.A. West. Aust. Nat., 14:21-2.
- Anderson, P.K. (1986). Dugongs of Shark Bay, Australia - Seasonal Migration, Water Temperature and Forage. Nat. Geogr. Res., 2:473-90.
- Anderson, P.K. and Prince, R.I.T. (1985). Predation on Dugongs: Attacks by Killer Whales. J. Mammal., 66:554-6.
- Anon. (1985). Preliminary Draft District Coastal Management Plan. Report on the Shark Bay Region. Unpublished Report. Department of Conservation and Environment, Perth, W.A.
- Anon. (1986). Shark Bay Prawn and Scallop Fishery Notices (copies of Fisheries Notices as published in WA Government Gazette, February 28, 1986). FINS, 4:28-9.
- Australia. Committee of Enquiry into the National Estate (Chairman R.M. Hope). (1974). 'Report of the National Estate.' (Australian Government Publishing Service: Canberra.) Ref. P.26.
- Barlow, B.A. (1971). Cyto geography of the Genus Eremophila. Aust. J. Bot., 19:295-310.
- Baudin, N. (1974). The Journal of Post Captain Nicolas Baudin, Commander-In-Chief of the Corvettes 'Geographe' and 'Naturaliste'. Translated by Christine Cornell. (Libraries Board of South Australia: Adelaide.) - Ref. Pp. 206-21 and 505-12.
- Beard, J.S. (1976). 'The Vegetation of the Shark Bay and Edel area, Western Australia.' (Vegmap Publications: Perth.)
- Burbidge, A.A. and George, A.S. (1978). The Flora and Fauna of Dirk Hartog Island, Western Australia. J. Roy. Soc. West. Aust., 60:71-90.

- Burbidge, A.A. and Jenkins, R.W.G. (Eds.). (1984).
'Endangered Vertebrates of Australia and Its Island Territories.' (Australian National Parks and Wildlife Service: Canberra.)
- Butcher, B.P., van de Graaff, W.J.E. and Hocking, R.M. (1984). 'Explanatory notes on the Shark Bay - Edel geological sheet.' 1:250,000 Geological Series. (Geological Survey of Western Australia: Perth.).
- Carmody, R.W. (1970). Shark Bay - Its History 1616-1969. Unpublished Teachers Higher Certificate Thesis. Education Department, Perth, W.A.
- Carter, T. (1917). The Birds of Dirk Hartog Island and Peron Peninsula, Shark Bay, Western Australia, 1916-17. Ibis, (10) 5 : 564-611.
- Clarke, W.H.J. (1976). The feral goat herd of Faure Island. J. agric. West. Aust., 17:102-6.
- Committee on Exploration and Mining in National Parks and Nature Reserves. (1986). 'Report to the Hon. Ministers for Conservation and Land Management, and the Environment and Minerals and Energy.' Western Australia.
- Curry, P.J. (1986a). Habitat characteristics of the Thick-billed Grass-wren Amytornis textilis in grazed shrublands in Western Australia. In 'Rangelands: A Resource Under Siege.' (Eds. P.J. Joss, P.W. Lynch and O.B. Williams.) P.566. (Australian Academy of Science: Canberra.)
- Curry, P.J. (1986b). Fire induced changes in grazed wanyu (Acacia ramulosa) shrublands on the Victoria Sand Plain, Western Australia. In 'Rangelands: A Resource Under Siege.' (Eds. P.J. Joss, P.W. Lynch and O.B. Williams.) Pp.597-8. (Australian Academy of Science: Canberra.)
- Dampier, W. (1937). 'A new voyage around the world...' (Adam and Charles Black: London.) Ref. Pp.312-6.
- Davies, S.J.J.F. and Chapman, G.S. (1975). The status of birds on Peron Peninsula and Dirk Hartog Island, Shark Bay, W.A. Emu, 75:55-61.
- Denman, P.D., Hocking, R.M., Moore, P.S., Williams, I.R., and van de Graaff, W.J.E. (1985). 'Explanatory notes on the Wooramel geological sheet (Second Edition).' 1:250,000 Geological Series. (Geological Survey of Western Australia: Perth.)

- Denman, P.D. and van de Graaff, W.J.E. (1982).
'Explanatory notes on the Quobba WA geological sheet.'
1:250,000 Geological Series. (Geological Survey of
Western Australia: Perth.)
- Department of Industrial Development, Western Australia.
(1984). 'Carnarvon: An economic profile. May
1984.' (Minister for Industrial Development: Perth,
W.A.)
- Environmental Protection Authority. (1975).
'Conservation Reserves for Western Australia. Red
Book. Systems 4, 8, 9, 10, 11, 12.' (Department of
Conservation and Environment: Perth.)
- George, A.S., Hopkins, A.J.M. and Marchant, N.G. (1979).
The heathlands of Western Australia. In 'Heathlands
and Related Shrublands of the World, A. Descriptive
Studies.' (Ed. R.L. Specht.) Chapter 7. (Elsevier:
Amsterdam.)
- Heald, D.I. and Caputi, N. (1981). Some Aspects of
Growth, Recruitment and Reproduction in the Southern
Saucer Scallop, Amusium balloti (Bernardi, 1861) in
Shark Bay, Western Australia. Fish. Res. Bull. West.
Aust. 25. (Department of Fisheries and Wildlife:
Perth.)
- Hopper, S.D. (1980). Cooloomia Nature Reserve. SWANS,
10:7-10.
- Ivanovici, A.M. (1984). 'Inventory of Declared Marine
and Estuarine Protected Areas in Australian Waters.' 2
Vols. Special Publ. 12. (Australian National Parks
and Wildlife Service: Canberra.)
- Johnson, M.S., Creagh, S. and Moran, M. (1986). Genetic
sub-division of stocks of Snapper, Chrysophrys
unicolor, in Shark Bay, Western Australia. Aust. J.
Mar. Freshw. Res., 37:337-45.
- King, P.P. (1827). 'Narrative of a Survey of the
Coasts of Australia 1818 and 1822.' Vol. 2.
(Australiana Facsimile Editions No. 30, 1969.
Libraries Board of South Australia: Adelaide.) Ref.
Pp. 178-88.
- Lenanton, R.C.J. (1977). Fishes from the hypersaline
waters of the Stromatolite zone of Shark Bay, Western
Australia, Copeia, 2:1-33.
- Marchant, L.R. (1982). 'France Australe'. (Artlook
Books: Perth.)

- Nevill, J. and Lawrence, R. (1985). 'Conservation issues in the Shark Bay Region.' Research Report. (Australian Conservation Foundation: Hawthorn, Vic.)
- Payne, A.L., Curry, P.J. and Spencer, G.F. (In Press). An Inventory and Condition Survey of Rangelands in the Carnarvon Basin, Western Australia. Technical Bulletin No. 73, Western Australian Department of Agriculture, Perth.
- Pastoral Tenure Study Group (Chairman M.A.J. Cameron). (1986). 'Final Report on Pastoral Land Tenure.' (Department of Premier and Cabinet: Perth, W.A.)
- Penn, J.W. and Stalker, R.W. (1979). The Shark Bay Prawn Fishery (1970-1976). Dept. Fish. Wildl. West. Aust. Rept. No. 38. (Department of Fisheries and Wildlife: Perth.)
- Peron, F. (1809). 'A voyage of discovery to the Southern Hemisphere . . . , 1801-4.' (London. - Marsh Walsh Publ., 1975 edition.)
- Planning Collaborative Australia Pty. Ltd. (1986). 'The Gascoyne Region Tourism Development Plan'. Prepared for the Western Australian Tourism Commission, Perth.
- Playford, P.E. (1976). Conservation of modern Stromatolites at Hamelin Pool, Western Australia. Stromatolite Newsletter, 4:6-16.
- Plumb, T.W. (Ed.) (1973). Climate. In 'Atlas of Australian Resources. Second series.' (Department of Minerals and Energy: Canberra.)
- Ride, W.D.L., Mees, G.F., Douglas, A.M., Royce, R.D. and Tyndale-Biscoe, C.H. (1962). 'The results of an expedition to Bernier and Dorre Islands, Shark Bay, Western Australia, in July, 1959.' (Ed. A.J. Fraser.) (Fisheries Department: Western Australia.)
- Shark Bay Tourist Committee. (No date). 'Welcome to Shark Bay'. Information brochure. (Tourist Information Centre: Shark Bay.)
- Short, P.S. (1981). Pollen-ovule ratios, breeding systems and distribution patterns of some Australian Gnaphaliinae (Compositae: Inuleae). Muelleria, 4:394-417.
- Slack-Smith, R.J. (1978). Early History of the Shark Bay Prawn Fishery, Western Australia. Fish. Res. Bull. West. Aust. 20. (Department of Fisheries and Wildlife: Perth.)

- Smith, S.V. and Atkinson, M.J. (1984). Phosphorus limitation of net production in a confined aquatic ecosystem. Nature, Lond., **307**:626-7.
- Storr, G.M. and Harold, G. (1978). Herpetofauna of the Shark Bay Region, Western Australia. Rec. West. Aust. Mus., **6**:449-67.
- Storr, G.M. and Harold, G. (1980a). Additions to the herpetofauna of the Shark Bay Region, Western Australia. West. Aust. Nat., **14**:240.
- Storr, G.M. and Harold, G. (1980b). Herpetofauna of the Zuytdorp Coast and hinterland, Western Australia. Rec. West. Aust. Mus., **8**:359-75.
- Tyler, M.J., Roberts, J.D. and Davies, M. (1980). Field observations on Arenophryne rotunda Tyler, a Leptodactylid frog of coastal sandhills. Aust. Wildl. Res., **7**:295-304.
- van de Graaff, W.J.E., Hocking, R.M. and Butcher, B.P. (1983). 'Explanatory notes on the Yaringa geological sheet.' 1:250,000 Geological Series. (Geological Survey of Western Australia: Perth.)
- Walker, D.I., Kendrick, G.A. and McComb, A.J. (1987, Ms). Distribution of Seagrasses in Shark Bay, Western Australia, with notes on their ecology. Aquatic Botany, submitted.
- Whitlock, F.L. (1921). Notes on Dirk Hartog Island and Peron Peninsula, Shark Bay, Western Australia. Emu, **20**: 168-89.

LEGISLATION

Commonwealth

Australian Heritage Commission Act 1975 (As amended)

World Heritage Properties' Conservation Act 1983

Western Australia

Agriculture and Related Resources Protection Act 1976 (As amended)

Conservation and Land Management Act 1984 (As amended)

Control of Vehicles (Off-Road Areas) Act 1978 (As amended)

Environmental Protection Act 1986

Fisheries Act 1905 (As amended)

Land Act 1933 (As amended)

Local Government Act 1960 (As amended)

Main Roads Act 9130 (As amended)

Marine and Harbours Act 1981 (As amended)

Mining Act 1978 (As amended)

Shark Bay Solar Salt Industry Agreement Act 1983

Soil and Land Conservation Act 1945 (As amended)

State Planning Commission Act 1985

Town Planning and Development Act 1928 (As amended)

Waterways Conservation Act 1976 (As amended)

West Australian Tourism Commission Act 1983 (As amended)

Wildlife Conservation Act 1950 (As amended)

APPENDICES

APPENDIX 1

ANALYSIS OF PUBLIC SUBMISSIONS TO THE SHARK BAY REGION PLAN

1.0 INTRODUCTION

This document summarises issues raised in the public submissions to the Shark Bay Region Plan which was released in April 1987 for a three month public review period.

Comments have been assessed jointly by staff of the State Planning Commission and the Environmental Protection Authority and were referred to the Shark Bay Community Consultative Committee and the Study Steering Committee, the Country Planning Council. This resulted in many alterations to the original plan and are referred to in this report.

(i) Aims and Objectives

In March 1986 State Cabinet resolved that the State Planning Commission (SPC) and the Department of Conservation and Land Management (CALM) in conjunction with Consultative and Technical Committees prepare a Planning Strategy that identifies and provides for the regions development, community and conservation needs.

The strategy also was to:

- (i) identify the preferred and multiple uses for the land and marine environments.
- (ii) indicate reservations of the land and marine environments.
- (iii) include broad guidelines for subsequent formulation of management programmes.

The Plan prepared jointly by the State Planning Commission and the Department of Conservation and Land Management, suggested how this combination can be achieved. The strategies in the Plan provide a means of maintaining and improving the accessibility of Shark Bay's natural resources and features for all residents of the State, as well as providing improved recreational facilities for residents and visitors alike.

The Region Plan provides a resolution to many planning issues and offers a framework for resolving planning issues in the future and was not intended to address specific management issues which would be dealt with at a later management planning stage by relevant authorities. The plan provides a framework for achieving the best use of the resources of Shark Bay and for the conservation of environmental and cultural features.

The plan recommends specific actions which are required for implementing the plan. This includes co-ordinating the efforts and activities of all levels of government, providing for on-ground management and providing a statutory basis for multiple use of land and marine areas.

The Study aims and objectives were widely accepted by the public, although there were different emphases between sectors.

It is considered that these objectives are suitable for adoption by Government as part of its Policy for Shark Bay.

(ii) Submissions on the Plan

The Plan was released in April 1987, for a three month public review period. This review period was subsequently extended for a further 1 month, to August 10, 1987.

A total of 167 submissions were received, 19 from government agencies and 148 from the private sector. A late submission was also received from the EPA. All submissions were acknowledged, and SPC and CALM wishes to record their appreciation of the organisations and individuals who made submissions.

In particular the Shark Bay Action Group and Environmental Protection Authority have put together comprehensive and thoughtful submissions which consider the Shark Bay Region Plan to be deficient in many ways, particularly in relation to conservation of the terrestrial environment. Many changes to the plan resulted from these submissions and are referred to below.

Public response to the Shark Bay Region Plan indicated that there is a general lack of understanding of planning and its relation to management and management planning of the kind commonly undertaken by the Department of Conservation and Land Management.

There is thus a need to clarify the purpose, use and function of a statutory land use plan and its relationship to management.

It was proposed that there should be a Statutory Land Use Plan, based on the Land Use Plan in the Shark Bay Region Plan. This would be administered by the State Planning Commission with many powers delegated to the Local Authorities.

The purpose of a Statutory Land-Use Plan is threefold:

- Firstly it would provide security of purpose for the various land uses in that a change of land use proposed by any person, and agreed by the Local Authority and the Commission, would be the subject of a legal amendment procedure which includes a period for public submissions.
- Secondly it would provide for reservation of lands for public purposes of different kinds, and provisions for compensation for any injurious affection to the landholder.

- Thirdly it would provide development control measures for lands reserved in the plan and in other areas. Most of these powers would be delegated to the Local Authorities.

Such a statutory Land Use Plan provides a mechanism for the husbandry of land use change in the future, security of purpose and protection from capricious change, and a compensation mechanism should the process lead to injurious affection to a landholder.

Several submissions suggested that the plan was unnecessarily complicated with fourteen zones plus symbols. The plan and tables have been altered to amalgamate some zones and place them in a format of "Zones" and "Reserves for Public Purposes" which will enable the plan to be implemented as a statutory plan. These changes are detailed at the end of this report.

Two private submissions were received expressing interest in developing tourist infrastructure and facilities in some of the locations proposed for minor recreation and tourism.

Submissions were categorised and labelled 1 to 167 and a computer was used to assist with tabulation and assessment of comments.

The following is an analysis of the issues raised and comments made in the submissions. Action taken to accommodate the issues raised in the final plan is also included.

2.0 COMMENT ON THE REPORT-MATTERS NOT RELATED TO SPECIFIC ISSUES

(i) Consultation/Methodology

Generally most submissions commented favourably on the adequacy of the Public Consultation process and on the variety of methods in which people could address their views.

A small number of submissions from members of the local community, conservation groups, and commercial fishing associations were critical of their lack of representation on the Shark Bay Community Consultative Committee and Project Team.

(ii) Terms of Reference

One submission was critical that the Shark Bay Region Plan objectives have a repeated emphasis on preferred and multiple uses without specifying whose preferences were to determine land and marine uses.

(iii) General Statement of Acceptance or Rejection of the Plan

Forty seven percent of submissions indicated their varying support for the Plan, including 29% who strongly supported the Plan in its current form and eighteen percent who supported the Plan but with some modifications. Submissions in this group included individuals and groups with scientific, commerce, mining and tourist and pastoralist interests together with members of the local community. These submissions generally considered that the plan provides for a balance of conservation and development within the Shark Bay region.

Ten percent, primarily from members of the environmental movement and students, indicated they did not support the strategies in the Plan, but had a preference for implementation of the EPA System 9 recommendations.

Forty three percent, including amateur and professional fishing groups, members of the local community, students, government departments, individuals with a general interest in the region did not specifically indicate their support or otherwise for the plan but addressed particular issues of concern.

In particular a high number of the fishing industry groups expressed concern on the proposed marine Parks indicating that commercial fishing should be allowed in marine Parks and in areas zoned for Dugong protection.

(iv) Favourable Comments

Several submissions congratulated the SPC and CALM on producing an excellent plan for Shark Bay, with many individuals and organisations also commenting on the high quality of the report.

(v) Inadequacies of the Plan and/or its Presentation

Several submissions noted deficiencies in the content of the plan or inaccurate information contained within the report. In particular, it was suggested that the plan:

- fails to acknowledge the economic importance of commercial fisheries in the region, and that some minor statements concerning fisheries are inaccurate..
- does not take account of the dynamic state of mining technology which may provide the catalyst for future exploration and mining and which would add significantly to economic progress in the general region.
- does not analyse regional economic patterns and trends with regard to tourism, pastoralism and fisheries.

- significantly under estimates the number of private tourist accommodation facilities located in the region.
- is deficient in its definition of recreation in contrast to tourism.
- did not consider opportunities for wilderness recreation and tourism.
- did not openly compare the values of potential land uses relative to their total supply and the availability of substitute products at the regional, state or international levels.
- lacks environmental planning policies based on a sound biophysical data base.
- should have identified as a key planning issue that the lack of potable water is a major constraint to development of the region.
- gives the false impression that the salt industry is destroying an important bird habitat area, in fact the habitat has been created as a positive spin-off from the mining industry

One submission noted that there are several examples of inconsistent presentation of information within the report.

The inadequacies have been corrected in the Final Region Plan for Shark Bay.

3.0 COMMUNITY DEVELOPMENT

The Shark Bay Region Plan identifies the following objective for Community Development:-

"To provide for the social and recreational needs of local residents and visitors to the area consistent with land use capabilities"

Submissions dealing with community development issues came mainly from the local community and government departments who made comments on the following issues:-

(i) Airport

- Three submissions pointed out the need to upgrade the airport and its facilities and that the Shire needs to demonstrate the need for a licensed airport. On the contrary two submissions indicated that the airport should not be upgraded as there is no indicated source of funds for a larger airport.

(ii) Vehicle Access

- Eight submissions indicated the need to improve access and provide spur roads on Peron Peninsula.
- Two submissions suggested that future roads approaching Denham should be kept to a minimum.
- One submission indicated that the Main Roads Department should be involved with planning future road proposals and that priority be given to upgrading of existing roads.

(iii) Boat Launching Facilities and Channels

- Six submissions favoured provisions for boat access at some locations, whereas three submissions were specifically opposed to artificial boat ramps and channels.
- Four submissions identified the need for zoning and demarcation of boating channels and that further consideration should be given to the proposed boat launching sites.
- One submission considered there to be a need for regular boat connections between Shark Bay localities and other centres, eg Carnarvon.

(iv) Recreation Facilities

- Four submissions pointed out the need to develop an urban recreation facility plan for Denham, including funding of facilities.

(v) Water Supply

- Four submissions expressed concern on the lack of potable water supply as a major constraint for development in the Shark Bay region.

(vi) Economic Study and Foreshore Plans

- Three submissions, with local commercial interests, stressed the need for an economic and foreshore redevelopment plan for Denham.

(vii) Monkey Mia Caravan Park and Public Area

- Six submissions supported the need to relocate the Caravan Park from the beach front.

- The Plan's concept for the public area at Monkey Mia was supported by three submissions but rejected by four submissions.

Overall the major issues identified in public responses were:

- . the lack of potable water is a key planning issue
- . the need for improvement of recreational facilities and general amenity in the area, particularly Denham

There was support for a Foreshore and Amenity Study of Denham. Minor changes have thus been made to the relevant sections of the report.

4.0 ECONOMIC DEVELOPMENT

The Shark Bay Region Plan identifies the following objective for Economic Development:-

"To provide for appropriate levels and types of economic development in the area consistent with land use capabilities".

Public submissions from a variety of interest groups made comments on the following issues.

(i) Pastoralism

- Four submissions with pastoral interest pointed out that pastoral leases in Shark Bay should have equal tenure status to other pastoral leases in the State.
- Five submissions argued that pastoralism is important to the region's economy whereas one submission considered the industry's economic contribution to the local and regional economy to be insignificant.

(ii) Fisheries

- Ten submissions considered that existing fishing regulations are adequate for conserving the marine environment of Shark Bay and should be strictly enforced. However, five submissions expressed some concern about the adverse affects of current fish trapping, netting and trawling operations on marine resources in the region.
- Nine submissions stressed that commercial fisheries make a significant contribution to the local and regional economy, and were concerned that this was not fully considered in the Plan.

(iii) Mining

- Six submissions indicated that mining has important local social and economic benefits, while one submission pointed out that mining can occur but with proper buffer zones.
- Twenty eight submissions indicated that current salt mining operation should continue, but expressed concern about further expansion for environmental reasons and because the area is an important fish nursery. However six submissions supported strategies for solar salt mining and further expansion of this activity subject to environmental acceptability and provided that local by-laws are adhered to, with one submission noting that the solar salt ponds provide an important habitat for trans-equatorial migratory birds.
- Nine submissions supported strategies for gypsum mining, subject to environmental acceptability and provided that local bye-laws are adhered to. However, thirty-four submissions opposed the proposed Gypsum mine and associated loading facilities because of its adverse effects on the environment.
- Four submissions indicated that shell blocks (coquina) should continue to be extracted at Hamelin Pool for restoration of historic buildings.
- Four submissions stressed the need for the right of access for exploration and development of minerals in the region should be maintained under the terms of the Mines Act. However, two submissions argued a need for the exclusion of opportunities for oil and mineral exploration in Shark Bay.

A large number of submissions opposed the proposed gypsum mine and loader facilities on the Peron Peninsula. This proposal is unlikely to proceed in the near future and is adequately dealt with under Strategies for Mining Development. Guichenault Point on Peron Peninsula is an important conservation site as it supports the best stands of mangrove community in Shark Bay as well as forming a major habitat for wading birds. The subject area has been deleted from the Mining Zone on The Land Use Plan.

The strategy relating to mineral exploration was objected to by the mining industry who requested it be changed from "in accordance with State Government Policy" to "in accordance with the Mining Act".

These concepts and suggestions have been included with several minor text changes.

(iv) Tourism

- Eighteen submissions recognised that tourism offers the best prospect for economic and social benefits in Shark Bay, however one submission indicated that the Plan has overestimated the tourism potential for the region.
- Several submissions commented on the need for a range of tourist facilities in the Shark Bay Region, including eleven submissions which pointed out a need for more camping areas, nine submissions which supported resort developments and seven submissions perceiving a need for additional Caravan Parks and Chalets. However, two submissions considered that tourist facilities should be provided subject to demand.
- Twelve submissions supported strategies for Denham to be the main tourist centre, although four submissions considered that Tourism centres should be spread throughout the region.

(v) New Industries

- Six submissions supported the strategies for research facilities whereas two submissions indicated that there is no economic viability for research centres in the region.
- Three submissions supported the strategies for education facilities and programmes.
- Seven submissions stressed that Aquaculture should not be overlooked as a potential industry in Shark Bay as it could be economically viable and is compatible with the environment.
- Six submissions indicated support for sandalwood pulling in some locations as long as it is strictly managed and monitored. However four submissions opposed sandalwood pulling for environmental reasons and because it would only provide a short term economic benefit.
- One submission supported opportunities for pearling whereas another submission expressed some concern about the re-establishment of this activity in Shark Bay.
- Two submissions indicated that opportunities for development of secondary industries should not be overlooked in Shark Bay in preference to other centres.
- Five submissions favoured opportunities to develop a goat husbandry industry, including two submissions which supported the industry subject to its environmental effects being monitored and controlled. However, one submission opposed the industry for environmental reasons.

- One submission supported the strategies to encourage service industries in Shark Bay.

Overall there was support for the economic study (with reference to tourism) for the region, in fact much debate centred on the relative contributions of each industry to the local economy. The EPA developed the proposal further to suggest that a Tourism Development and Management Plan was necessary before large scale development occurs. A new strategy has been included that provides for the preparation of such a Tourism Development and Management Plan.

5.0 CONSERVATION ISSUES

OBJECTIVE OF PLAN: To achieve the intent of the Environmental Protection Authority's System 9 recommendations relating to the natural environment of Shark Bay and to protect cultural and historic features of the area, while allowing for appropriate industry uses and the needs of local residents and visitors.

A large number of submissions provided comment on a range of conservation issues affecting the Shark Bay region. Land and marine conservation issues attracted comments from many sectors of the community, particularly students and those with scientific and conservation interests. Individuals and groups primarily interested in commercial fishing generally restricted their comments to matters of marine conservation.

(i) System 9 Recommendations

- Support for implementation of System 9 recommendations was given in 13 submissions. Conversely, three individuals argued that the EPA recommendations should not be implemented.
- Two individuals considered that implementation of the System 9 recommendations should be given further consideration, while one group questioned whether implementation of the EPA recommendations would make the Shire of Shark Bay economically unviable.

(ii) Terrestrial Environments

- Twenty six submissions argued that the area of land in the Shark Bay region which should be reserved as national park should be greater than that proposed in the Plan. Various suggestions were made for specific areas in the region which should be included in national parks. Several of these submissions also argued the need for conservation reserves to be further protected by buffer zones.

Some of the submissions and in particular the EPA considered the terrestrial conservation proposals to be deficient because:

- . the plan proposes too few reserves to protect areas representative of all systems in the Region
- . the plan places insufficient emphasis on Conservation

A new strategy has been inserted, recognising the need to identify representative areas through the biological survey proposed, in close consultation with landholders.

"Conservation of Natural Resources" has been made more obvious in the Plan by proposing it as an overall Planning Goal and Government Policy for Shark Bay, because it is accepted by all that industry, economic activity, recreation, life style and all other values are dependant on the retention and wise management of Shark Bay's natural resources.

- Five submissions supported unequivocally the strategies for national parks proposed in the Plan. However, two submissions considered that these strategies should be re-evaluated. Three submissions all with pastoral interests disagreed with the areas proposed for zonings of land as 'Protection of Coastal Landforms'.

Several submissions urge the immediate control of grazing in the zone for protection of Coastal Land Forms. In support of Management measures to achieve this, the area has been proposed as a Public Purpose Reserve for "Protection of Coastal Landforms and Vegetation" and is recommended as a reserve in a statutory plan.

The proposed reservation while allowing for pastoralism to continue, reflects the wider community aspiration to ensure that these lands are very carefully husbanded into the future.

The long term purposes of the area should be emphasised and should be subject to adequate planning controls, that exclude pastoralism in fragile areas. In the long term the aim for Dirk Hartog Island is a complete phasing out of pastoral activity.

In the short term, whilst the appropriate areas can be used for pastoralism, the intention of management practices should be directed towards protection of coastal fragile areas and vegetation, so as to prevent any possibilities of degradation.

- Three submissions stressed the need for compensation for pastoralists whose land is resumed or acquired for reservation as national parks.

The plan recognises this need.

(iii) Marine Environment

- Twelve submissions indicated unqualified support for the strategies for marine parks proposed in the Plan, with two submissions disagreeing with the strategies and one submission arguing that there should be a re-evaluation of the strategies.
- Five submissions perceived a need for additional areas to be included in marine parks, with two submissions arguing a need for buffer zones to be placed around marine parks. In contrast, four submissions considered the area proposed for inclusion in marine parks in the Plan to be too extensive.
- Seven submissions considered there is a need for greater protection of marine environments included within marine parks.
- One submission stressed the need for compensation for commercial fishermen affected by the creation of marine parks.
- Support for commercial fishing to be permitted in marine parks was indicated in 14 submissions which were primarily from those with commercial fishing interests, while two submissions argued that commercial fishing should be prohibited in environmentally sensitive areas.
- Two submissions fully supported the dugong habitat protection zones proposed in the plan, three submissions argued for additional areas to be reserved for dugong protection while seven submissions stressed the need for protection of dugong migratory paths. Conversely, two submissions considered the area proposed for protection of dugongs in the Plan to be too extensive.
- With regard to activities which should be permitted in dugong habitat protection zones eleven submissions argued that commercial and recreational fishing should be permitted in these areas, with two submissions considering that these activities should be restricted.
- Three submissions expressed concern for the protection of particular species of marine fauna in the Shark Bay region.
- Strategies for the protection of the Dolphins at Monkey Mia were supported by two submissions, while three submissions considered that the dolphin habitat protection zone should be extended to at least 1km offshore. The importance of Monkey Mia as a suitable site for research on dolphins was noted in one submission, while another submission was concerned that the Plan did not acknowledge past and current research on the dolphins or the Dolphin Welfare Association.

The SBRP identified statutory difficulties in establishing a marine park at Shark Bay and proposed a phased implementation system involving the establishment of Marine Parks in key areas under the existing CALM Legislation, with the remainder of the embayment areas being established after substantial amendment of the CALM Act.

Discussions are occurring between CALM and Fisheries Department to clarify the position to allow the creation of a single marine park.

The concerns of the fishing industry are that commercial fishing should continue in marine parks, and that the industry should continue to be managed by Fisheries Department. Fisheries Department have expressed concern that commercial fishing should be allowed in marine parks. There is an agreement between the Department of CALM and Fisheries that the Department of Fisheries will manage both commercial and recreational fishing in marine parks.

Many submissions calling for a marine park with zoning analogous to that of the Great Barrier Reef Marine Park can be satisfied because the CALM Act provides for management planning which embodies zoning concepts.

The plan text has been altered to reflect these concepts.

(iv) Environmental Impact of Development

- Fifteen submissions argued that pastoralism has some impact on the ecology of the Shark Bay region, particularly through land degradation. However, five submissions considered the environmental impact of pastoral activities to be negligible.

The plan identified the need for pastoral management to take account of conservation objectives but did not specify the kinds of measures which could apply, other than to indicate that the co-operation of pastoralists could be expected with such a programme.

Three issues are pertinent:

- . conservative management of pastoral leases requires security of tenure to enable the investment of adequate capital to ensure proper control and management of stock and prevent the tendency to over exploit land as leases approach expiry.
- . measures exist for the protection of pastoral areas and pastoralists need to be informed and monitored and legislation needs to be enforced where necessary.

- . pastoralists need to be advised of the conservation values of their lands and the objectives for them. The plan recommends a biological survey to establish these values and monitor them.

It is considered that exclusion of Shark Bay Pastoral Leases from the option of secure tenure could prejudice conservation values. The powers of a Statutory Land Use Plan will allow an orderly change of landuse, with equitable compensation should these leases be required for Government purposes, including conservation in the future. The Plan has been altered to emphasise these matters.

- Three submissions argued that trawling, gill nets and trap fishing by commercial fisheries adversely effect the marine environment, particularly seagrasses.
- Three submissions expressed concern that mining can degrade the natural environment, while two others considered that when mining is conducted within Environmental Protection Authority guidelines the environmental impacts are minimised.
- Properly managed tourism was generally considered to be compatible with conservation objectives by five individuals and groups, although another submission was concerned that encouragement of tourism could lead to the loss of the unique features of the Shark Bay Region.

6.0 MANAGEMENT

The plan discusses provisions for on-the ground management and development at Shark Bay, and concentrates on the matters of funding. It was not the intention of the plan to provide detailed management plans for areas in the region as it was anticipated that management issues would be resolved at a later stage. However, many submissions from private individuals in particular, provided comment on management related issues.

(i) Land and Marine Conservation

- Several submissions commented on the agency or group of people which could most effectively manage the land environment in the Shark Bay region including eleven submissions, primarily from pastoralists, who considered that the pastoralists are best able to manage the land within conservation principles. Four submissions argued that CALM is the most appropriate management agency while two submissions considered that the Shire of Shark Bay should have a major role in managing the land. Where national parks are gazetted, one submission argued that the Shire of Shark Bay should be involved in management and administration under joint vesting arrangements with CALM.

- The majority of individuals and groups commenting on management of the marine environment had commercial fishing interests with 14 of these submissions arguing that the Minister and Department of Fisheries must retain their statutory powers to determine which areas shall be fished or not fished. One submission considered that CALM should assume responsibility for managing the marine environment.

The Shire of Shark Bay has expressed interest in joint management of National Parks with CALM, and discussions have been held between CALM and Fisheries Department concerning marine park management.

(ii) Proposed User Fee

- Twenty one submissions supported a fee for entry to particular sites only (eg Monkey Mia). Five submissions stressed that such a fee should only apply to visitors and should not be necessary for local residents, their families and friends.
- Four submissions generally agreed with the fee proposed in the Plan but stressed that the funds must be used to benefit the region, however one submission opposed a toll gate located at the Overlander Road turn-off.

Overall there was general support for the concept of a use fee, but most felt it should be levied at specific locations such as Monkey Mia. This is a complex matter and is under further consideration by a Working Group established by the Government.

(iii) Proposed Management Trust

- Moderate support was given to the proposed Shark Bay Region Trust including one submission which fully supported the concept, and another submission accepting it as a short term measure. Eight submissions indicated some level of support for the regional trust but recommended particular groups or government departments which should have representation including fishing, conservation, commerce, agriculture and local government associations.
- Two submissions argued that administrative responsibility should continue to be with the Shire of Shark Bay, while one submission considered that an existing government department could assume the responsibilities of the proposed trust. A regional park board or authority was considered preferable to the proposed trust by three individuals.
- Two submissions rejected the concept of the regional trust on the basis that it would be expensive and it involves the creation of additional unnecessary bureaucracy.

This matter will be considered in detail by a Working Group established by the Government.

(iv) Management of Camping

- Eleven submissions commented that management of camping is essential to protect the environment, although five submissions considered that holiday makers generally have a responsible attitude and that "bush camping" should be allowed to continue.

(v) Control of Access, Litter and Shooting

- Twenty two submissions expressed concern about uncontrolled access, litter accumulation and illegal shooting in the Shark Bay region and urged greater control of these activities.

(vi) Vermin Control

- Foxes, rabbits and goats were perceived to be a threat to the environment of Shark Bay, and the application of measures to prevent increases in the populations of these animals was recommended in six submissions.

(vii) Management of Recreational Fishing

- The impact of amateur fishing on the marine environment in Shark Bay concerned 16 submissions, which considered that recreational fishing should be managed through the enforcement of bag limits and designated fishing zones. One submission argued that hand line fishing does not damage the marine environment.

The above matters (iv) to (vii) have been referred to the relevant Authorities for consideration.

7.0 HERITAGE

The plan acknowledges that nomination of all or parts of Shark Bay for World Heritage Listing has been proposed, and recommends further investigation of this proposal at Government level.

Heritage issues, including World Heritage Listing of the Shark Bay region, and preservation of cultural and historic features, attracted comment from a variety of individuals, interest groups and government departments.

(i) World Heritage Listing

- Nineteen submissions supported World Heritage Listing for the entire Shark Bay region, while seven submissions agreed that only parts of the region (eg Hamelin Pool, Bernier and Dorre Islands, Cape Inscription and the dolphins at Monkey Mia) should be nominated for World Heritage Listing.
- Eight submissions rejected World Heritage Listing of the Shark Bay region with some considering that existing legislation can adequately conserve the region's unique features.
- Three submissions expressed concern with listing the entire Shark Bay region as a World Heritage site on the basis that it could adversely affect existing economies.
- Seven submissions agreed that the matter of nominating the Shark Bay region for World Heritage Listing requires further investigation. Specific aspects recommended for detailed consideration include a complete inventory of biological resources, definition of appropriate boundaries for World Heritage Listing, detailed management plans, State legislative and management objectives, and the benefits and cost of listing the region. Another submission argued that independent scientific advice should be sought to determine if the area meets UNESCO criteria. Public participation in further investigations into this matter was stressed in one submission.
- Three submissions expressed concern that the Shark Bay Region Plan in its current form does not meet the conditions of integrity for the natural property of World Heritage values in Shark Bay.

Several submissions warned that World Heritage Nomination could be prejudiced by inappropriate management or administrative arrangements.

It is considered that administrative objectives are secure for the time being, and in view of the relationship to the World Heritage question could be deferred for further consideration by the Working Groups on World Heritage and Administration already agreed by Cabinet.

(ii) Cultural and Historic Features

- Four submissions endorsed the strategies for the protection of cultural and historic features in the Shark Bay region, while another submission considered it may be appropriate to also create an historic precinct along the Denham foreshore.

- One submission considered that the Plan does not demonstrate a great need to protect cultural and historic features in the Shark Bay region.

8.0 IMPLEMENTATION

The plan identifies a number of specific actions that will be required to ensure the plan is properly implemented. These include co-ordinating the efforts and activities of all levels of Government and providing funding for on-the-ground management, research and recreation facilities and providing a statutory basis for multiple use of Marine parks.

A small number of submissions commented on the suitability of the three options for implementation.

OPTIONS FOR ADMINISTRATION

(i) Option One - Continue Current Operations

- Two submissions supported the option and one submission opposed the option for environmental reasons.

(ii) Option Two - Implement System 9 Recommendations

- Two submissions indicated strong opposition to this option.

(iii) Option Three - Establish a New Body

- Three submissions opposed the proposal whereas two submissions indicated support.

Few submissions commented specifically on the options proposed for the administration of the Region, but it may be inferred from general comments that those respondents who favoured the System 9 recommendations preferred Option 2 (a large national park administered by CALM, possibly with a reduced role for the Shire of Shark Bay).

Similar inference may suggest support for the Shark Bay Region Trust (option 3). Some respondents suggested the inclusion of other departments and bodies, and there were some sceptical comments suggesting it was unrealistic to expect co-ordination between Government Departments as proposed. Some respondents preferred the status quo (option 1).

9.0 E.P.A. COMMENT

The EPA has published a report entitled "Implications of the Shark bay Region Plan for Conservation in System 9" which is critical of the Region Plan, particularly in its support for continuing pastoral use, contending that the plan falls short of the conservation recommendations of the EPA. More land areas should be reserved for conservation, and some unsuitable pastoral lands protected from grazing.

The Authority recommended that the Shark Bay Region Plan be amended to clearly specify positive steps that will be taken to realise the primary objective of conservation of the important land environments in the region, and the intent of the previously endorsed framework of Conservation Through Reserves.

The compelling need for a statutory region plan at Shark Bay, as a principal strategy to provide community confidence and security, and a mechanism for equitable change in the future, has been emphasised and clarified in the revised text of the Shark Bay Region Plan.

10.0 CONCLUSION

This document reports on the issues raised in the submissions from the public and Government agencies and specialist advice on several aspects of the Plan was sought.

The text of the Shark Bay Region Plan has been amended and the alterations include the points mentioned above, with many other minor corrections of fact, interpretation or emphasis. Copies of the Final Region Plan will be available in mid 1988.

Dr Alistair Gilmore of MacQuarie University was employed as a consultant to assist in the assessment of public comments and advise on Marine Conservation Aspects. His report entitled 'Shark Bay Regional Plan as it relates to the Marine Environment' is available to interested persons and the State Planning Commission and the Department of Conservation and Land Management wish to express their appreciation for his thoughtful contribution.

The Shark Bay Community Consultative Committee, Country Planning Council (Steering Committee for the Shark Bay Region Plan), State Planning Commission and the Department of Conservation and Land Management have endorsed the final Region Plan and it has been referred to the Hon. Minister for Planning and Hon. Minister for Conservation and Land Management for consideration by the Government.

LIST OF SUBMISSIONS TO THE SHARK BAY REGION PLAN

The following individuals and organisations made submissions in response to the Shark Bay Region Plan.

NUMBER NAME

COMMONWEALTH GOVERNMENT

1 CSIRO
2 DEPARTMENT OF ASETT
3 DEPARTMENT OF AVIATION

STATE GOVERNMENT

4 DEPARTMENT OF MINES
5 DEPARTMENT OF RESOURCES DEVELOPMENT
6 DEPARTMENT FOR SPORT AND RECREATION
7 FISHERIES DEPARTMENT
8 GASCOYNE REGIONAL DEV ADV COMM
9 MAIN ROADS DEPARTMENT
10 NPNCA
11 TECHNOLOGY INDUSTRY DEPARTMENT AUTH
12 WATER AUTHORITY OF WA
13 WA DEPARTMENT OF AGRICULTURE
14 WA HERITAGE COMMITTEE
15 WA MUSEUM
16 WA TOURISM COMMISSION

LOCAL GOVERNMENT

17 SHIRE OF CARNARVON
18 SHIRE OF SHARK BAY

PRIVATE GROUPS

19 ASSOC OF MINING & EXPLOR COM INC.
20 AUSTRALIAN LITTORAL SOCIETY
21 B.A.A.S BACKING GEOLOGICAL LAB.
22 THE CHAMBER OF MINES OF WA INC.
23 CLOUGH ENGINEER GROUP
24 CONSERVATION COUNCIL OF SOUTH AUST
25 DENHAM FISHERMEN'S ASSOCIATION
26 DIRK HARTOG HYPERMARKET PTY LTD
27 DONGARA PROFESSIONAL F'MENS ASSOC
28 ESPERANCE PROF ABALONE DIVER'S ASSOC
29 ESPERANCE PROF F'MENS ASSOC
30 FREMANTLE PROF F'MENS ASSOC
31 GERALDTON FISHERMENS' CO-OP
32 GERALDTON PROF F'MENS ASSOC INC
33 GREENPEACE AUSTRALIA (NSW)LTD
34 I.U.C.N. - AUSTRALIAN COMMITTEE
35 LEEMAN PROF F'MENS ASSOC
36 NATURE CONSERVATION COUNCIL OF NSW

37 NICKOL BAY PROF. F'MENS ASSOC INC.
 38 NORWEST SEAFOODS PTY LTD
 39 PASTORALISTS AND GRAZIERS ASSOC WA
 40 THE ROCK LOBSTER AND PRAWNING ASSOC
 41 SEABIRD LEDGE POINT PROF FISH ASSOC
 42 SHARK BAY ACTION GROUP
 43 SHARK BAY CHAMBER OF COMMERCE
 44 SHARK BAY CONSERVATION ASSOCIATION
 45 SHARK BAY TOURIST COMMITTEE
 46 SOUTH COAST LICENSED F'MENS ASSOC
 47 TUNA BOAT OWNERS ASSOC OF WA
 48 TWO ROCKS PROF F'MENS ASSOC
 49 WA FISHING INDUSTRY COUNCIL
 50 WA NATURALISTS' CLUB
 51 WA PEARLS
 52 WA REC. & SPORT FISHING COUNCIL INC
 53 WORLD WILDLIFE FUND, AUSTRALIA

PRIVATE INDIVIDUALS

54 ANDERSON, PROFESSOR PAUL K
 55 ASSER, RD & MR
 56 BELL, ECK
 57 BELL, G
 58 BELL, K & J
 59 BENSON, KC
 60 BOGDANICH, I
 61 BREEN, D
 62 BRIMSON, H
 63 BROOMHALL, M. COATS, A. ROGERS, G. AND BLYTH, N.
 64 BROWN, GE
 65 BROWN, L
 66 BRUCE, EM & EA
 67 BURT, P
 68 CAMERON, R
 69 CAPEWELL, K
 70 CARMODY, R
 71 CONSIDINE, C & JACKSON, G
 72 CRAWFORD, HJ
 73 DANAHER, B
 74 DELUIL, F. LEE, S AND ALLMAN, C
 75 DICKSON (PEDLEY), V
 76 DREW, A & NESDALE, G
 77 EDWARDS, MN
 78 FACKENS, G & R
 79 FINLAY, GA
 80 FIRNS, K 7 C. COOPER, C
 81 FORSYTH, J
 82 FULLER, R
 83 GLADSTONE, L & CHAN, H
 84 GOSLING, T
 85 GOULDER (FAMILY)
 86 GRATTON, PR
 87 HALL, CM

88 HAMMOND, J & KOHN, A
89 HARGREAVES, MA
90 HARGREAVES, T
91 HARRIS, GJ
92 HAWKINS, K
93 HIPKINS, M
94 HODGKINSON, AK & ROBERTS, S
95 HOULT, DO
96 HOULT, GW
97 HOULT, HR
98 HOULT, RD
99 JAMES, DF
100 JENNINGS, Dr. P
101 KHOO, P & NG, P
102 KINNEEN, CW
103 KLOPPER, M
104 KOPKE, PAF & VA
105 KUZMANICH, A & EA
106 LARSON, CP
107 LAWRENCE, D
108 LEE, M
109 LEWIS, S
110 LOCK, H
111 LOVE, FA & EM
112 LOW, H-M. LATTO, I & TAN, V
113 MARTIN, MJ
114 MASON, WE
115 MATOLL, D
116 McCLEARY, DN
117 McCLEARY, GM
118 McCOMB, ASSOC PROF AJ
119 MEWS, W J
120 MOORE, B
121 MOORE, IR
122 MOTTOLINI & MATTABONI
123 MUELLER, D
124 MULARCZYK, Z
125 O'BRIAN, S & R
126 O'SHEA, P P
127 PANETTA, S
128 PARKHOUSE, L
129 PEET, L
130 POH, B
131 POLAND, G
132 POLAND, J
133 POLAND, M
134 POOLE, LR
135 POTTER, F
136 PURSER, EJ & CR
137 REID, J
138 REITH, S & MONTERRUBIO, J
139 SAUERACKER, G
140 SAUNDERSON, G
141 SCOTT, BL

142 SCOTT, BR & COCKERTON, GTB
 143 SEARS, E J F
 144 SELLENGER, J & PINNEGAR, G
 145 SERVENTY, V & C
 146 SHANN, ID
 147 SHEPHERD, G
 148 SMEE, M
 149 SMITH, D
 150 STAFFORD, E
 151 STANDRING, D & J
 152 STEADMAN, DP
 153 THOMSON, AM
 154 TWISS, J
 155 VAN KEULEN, M
 156 VITALE, A & CA
 157 WALKER, Dr. D
 158 WAKE, B
 159 WALTER, R
 160 WETHERELL, A
 161 WILLIAMSON, I & SCOTT, K
 162 WOODS, Dr. P J
 163 YUKICH, R
 164 ZLATNIK, D

OTHER

165 NATIONAL TRUST OF AUSTRALIA (WA)
 166 PROJECT INTERLOCK
 167 SHARK BAY DOLPHIN RESEARCH PROGRAM

LIST OF CHANGES TO LAND USE PLAN (P.51.)

A Corrections to Printed Maps

1. Pink "Protection of Stromatolites and Sedimentary Deposits" zone should extend onto land around Hamelin Pool as per figure 7 and including the Parks and Recreational Reserves near Hamelin Station.
2. Green "Prawn Nursery and Seagrass Protection Zone" should extend eastward onto land area to defined fence line.
3. Minor Recreation Site (small circle) at Steep Point should be moved (4mm east on plan).
4. Minor Recreation Site (small circle) around Wooramel Homestead should be deleted.
5. Big Lagoon (Blue) on Peron Peninsula should be in Green zone (Environmental Protection & Recreation).

B Changes Proposed in Report

1. Delete Mining zone and Proposed loader on Peron Peninsula.
2. Amalgamate "Existing National Parks and Nature Reserves" (Mid Green) with "Vegetation Protection" (Light Green) and rename "Environment Protection".
3. Amalgamate "Dugong Habitat Protection" (Dark Blue) with "Dolphin Habitat Protection" (Dark Blue/Green) and rename "Protection of Marine Mammal Habitat".
4. Delete "Historic Reserve" on Dirk Hartog Island and replace with symbol.
5. Insert Historic Site Symbol on Zuytdorp Wreck site.
6. Extend "Environment Protection" on Nanga Station northward to an east/west line between Freycinet Estuary and northern most point of zone.
7. Re-designate zones proposed in the plan to 'Zones and Public Purpose Reserve' to achieve a format suitable for a Statutory Land Use Plan viz

Zones

- . Mining
- . Pastoral Uses
- . Urban Uses
- . Commercial Fishing and Trawling and Recreation
- . Recreation and Commercial Fishing

Public Purpose Reserves

- . Environment Protection
- . Environment Protection and Recreation
- . Protection of Stromatolites and Sedimentary Deposits
- . Protection of Marine Mammal Habitat
- . Prawn Nursery and Seagrass Protection
- . Protection of Coastal Landforms and Vegetation

APPENDIX 2

LIST OF CROWN RESERVES IN THE STUDY AREA

(A) CONSERVATION

Reserve No.	Area (Ha)	Purpose	Vesting	Location
33829	0.8195	Conservation of Flora and Fauna	NPNCA	Friday Island
A24869	9 720	Conservation of Flora and Fauna	NPNCA	Bernier & Dorre Islands
33828	0.8195	Conservation of Flora and Fauna	NPNCA	Charlie Island
26004	205.5803	Conservation of Flora and Fauna and Collection of Guano	NPNCA	(Small Islands) Salutation, Baudin, Egg, Three Bays, Wilds, Mary Anne, Double, Freycinet, Pelican, White, N & S Guano Islands Nature Reserve
36127	50 305	Conservation of Flora and Fauna	NPNCA	Cooloomia Nature Reserve
33901	2.5806	Conservation of Flora and Fauna	NPNCA	Koks Island
34771	8 500	Zuytdorp National Park	Unvested	Zuytdorp
A30885		Preservation of Sedimentary Deposits	Unvested	Between High-Low Water Mark Hamelin Pool & East Faure Island

(B) CULTURAL - HISTORIC

Reserve No.	Area (Ha)	Purpose	Vesting	Location
A12715	0.3490	Government Requirements & Protection of Inscription Posts	Unvested	North end Dirk Hartog Island
1686	483.9000	Government Requirements	Shire of Shark Bay	Monkey Mia
31730	0.4047	Grave Site	Unvested	Monkey Mia
29282	7.283	Protection of 'Zuytdorp' Wreck	WA Museum	Edel Land - (Zuytdorp)

(C) OTHER

36640	9.7312	Quarry	Shire of Shark Bay	Taillefer Isthmus
37963	4.0	Coquinite Quarry	Shire of Shark Bay	Hamelin Pool Homestead
658	599.0925	Common	Shire of Shark Bay	Hamelin Pool Homestead
30899	503.8336	Recreation	Shire of Shark Bay	Little Lagoon
28774	2.4458	Caravan Park	Shire of Shark Bay 21 year sub-lease	Monkey Mia
11677	124.1804	Common	Unvested	Near Little Lagoon
14918	245 Approx.	Not Stated	Unvested Excepted from Sale	Near Cape Inscription
16534	8.0937	Water/Rabbit	Unvested	Disappointment Reach

Reserve No.	Area (Ha)	Purpose	Vesting	Location
16533	526.0913	Water/Rabbit	Unvested	Disappointment Reach
16532	258.9988	Water/Rabbit	Unvested	Disappointment Reach

Produced by the Promotions Branch of the State Planning Commission.
All photography, unless credited, is by the State Planning Commission.

