SHARK BAY

REGION PLAN

STATE PLANNING COMMISSION

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

PERTH, WESTERN AUSTRALIA. MARCH 1987

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.
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SHARK BAY REGION PLAN

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

DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT,
50 Hayman Road,
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MARCH 1987

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STATEMENT BY THE PREMIER OF WESTERN AUSTRALIA

Shark Bay is an area uniquely endowed with features of historic and scientific interest and outstanding natural beauty. Some of these are the site of the first recorded European landing in Western Australia, the many rare, beautiful and fascinating natural features ranging from the friendly dolphins at Monkey Mia to the stromatolites of Hamelin Pool, and the unique combination of isolated marine waters, islands, flora and fauna and pastoral lands.

The residents of Shark Bay have long made their living through an intimate interaction with the renewable natural resources of the area, including the valuable fisheries and pastoral areas. More recently, solar salt extraction has provided a major economic boost to the region and tourism has expanded rapidly.

Naturally the residents are very proud of Shark Bay and all it has to offer. Many have become concerned that the attractiveness of the area and their way of life could be reduced by unmanaged resource development or tourism. At the same time, other residents of the State and interstate and overseas tourists have wanted to visit the area in ever greater numbers and conservation interests have sought to protect its tremendous conservation values.

This proposed Region Plan has been developed by 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. The proposed strategy creates vast new national and marine parks, and bolsters tourism developments, whilst providing a means of maintaining or improving the accessibility of Shark Bay's resources and features to all residents of the State and providing for conservation needs and improved recreational facilities for residents and visitors alike. Furthermore, it provides a way of doing this without relying directly on government funds. I regard these proposals as a major conservation and planning initiative for Western Australia which is of worldwide importance.

I urge you to read this Shark Bay Region Planning Report as I believe that those associated with this Plan have produced innovative solutions to the very difficult problems found at Shark Bay. I congratulate them for their work.

I hope that you will send your comments on these proposals to the State Planning Commission, or other bodies listed in Chapter One, so they can be considered before the final Region Plan is adopted.

BRIAN BURKE
PREMIER OF WESTERN AUSTRALIA

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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 may also pose constitutional difficulties.

- 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 goat husbandry and 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 systems is the major theme.

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.

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 14 multiple purpose areas. These are as follows:

Historic Reserve, Mining, Pastoral Uses, Urban Uses, Vegetation Protection, Environmental Protection and

Recreation, Protection of Stromatolites and Sedimentary Deposits, Dugong Habitat Protection, Commercial Fishing and Trawling and Recreation, Prawn Nursery and Seagrass Protection, Recreation and Commercial Fishing, Protection of Coastal Landforms, Existing National Parks and Nature Reserves, and Dolphin Protection.

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 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 areas of cattle, goats and 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.

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.

- In view of the importance to the State of the snapper industry, strict quality control measures should be maintained and regularly monitored by the industry to ensure that returns are maximised and products are competitive with imports.

- 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 estuarine 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.

- Further access for mineral exploration can be permitted in accordance with State Government Policy, except in areas exempted from mining and exploration by the Hon. Minister for Mines.

Strategies for Achieving Tourism Development:

- 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.

- 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.

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.

- The waters east of Bernier and Dorre Islands below the high water mark to the 6 metre isobath should be declared a Marine Park.

- The waters east of Dirk Hartog Island below high water mark to the 6 metre isobath should be declared a Marine Park.

- 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.

- 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 should be declared a Marine Nature Reserve.

- The Wooramel Seagrass Bank should be made a Marine Park for its conservation values and its importance as a nursery area for prawns and fish. The continuation of beach seine fishing is to be provided for.

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 provide Denham based visitors easy access to a range of sightseeing, fishing and swimming options not at present available.

- 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.

Strategy for Monkey Mia:

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

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:

- Establish 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)

- Provide explicit management provisions to be administered by the Department of Conservation and Land Management similar to those included in the Waterways Conservation Act for that part of Shark Bay's marine environment not able to be included in currently declared Marine Parks and Marine Nature Reserves.

- 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.

- Provide a basis for State/Commonwealth agreement to take advantage of possible World Heritage Nomination and Listing.

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 (Appendix 5). These documents can be made available on request.

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 are now invited.

All public submissions to any of the Authorities listed below will be considered before the final plan is adopted for Shark Bay.

Please send your comments in by July 10, 1987, to:

The Executive Secretary
State Planning Commission
22 St George's Terrace
PERTH WA 6000
(09) 425 7333

or

The Executive Director
Department of Conservation and Land Management
P O Box 104
COMO WA 6152
(09) 367 6333

or

The Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000
(09) 222 7000

or

Shire Clerk
Shire of Shark Bay
P O Box 126
DENHAM WA 6537
(099) 48 1218

or

Shire Clerk
Shire of Carnarvon
P O Box 459
CARNARVON WA 6701
(099) 41 1708

The Environmental Protection Authority will conduct an environmental assessment of the effects of the study proposals as part of this consultation process.

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 km^2, 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 1 500 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 false

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

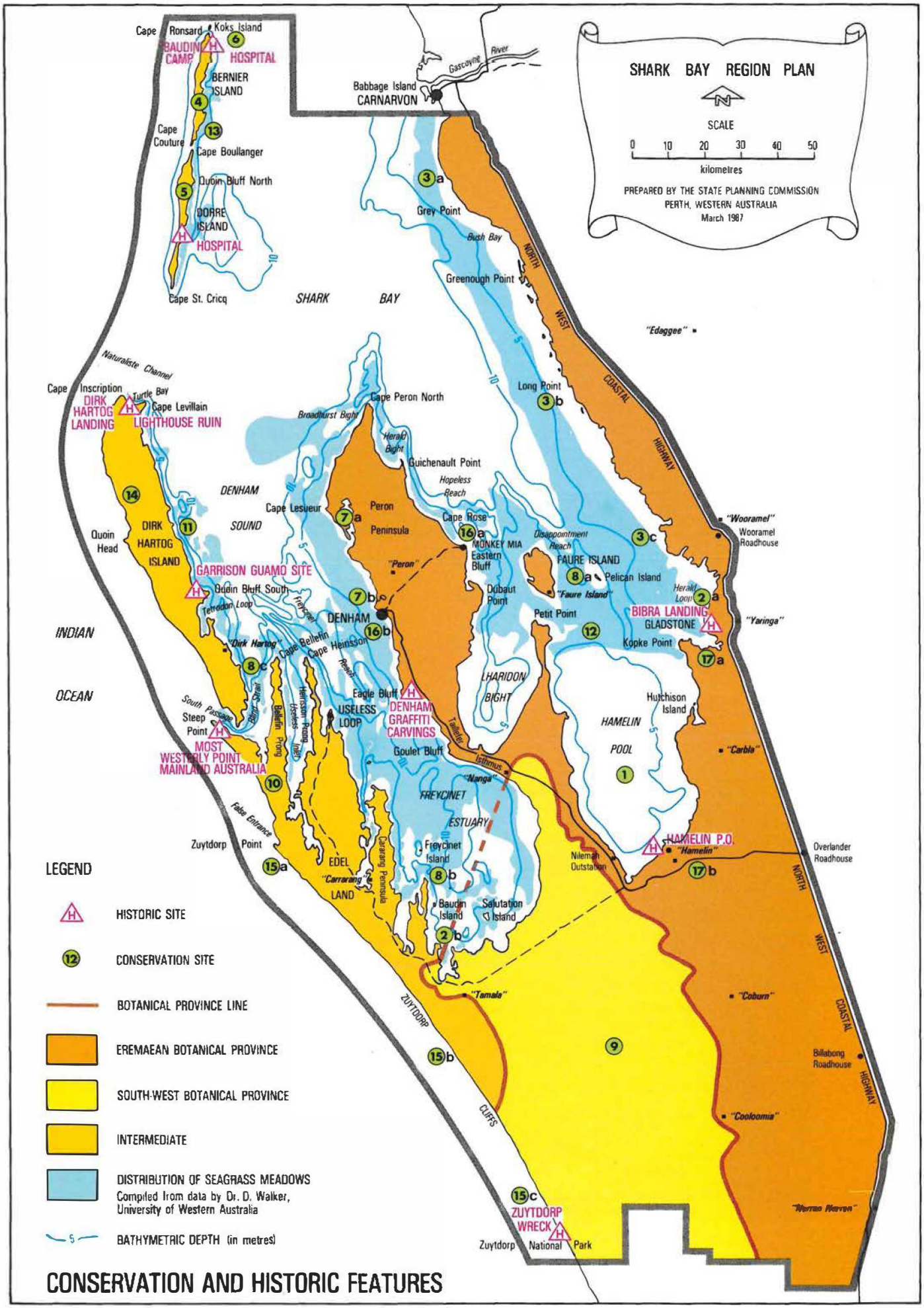
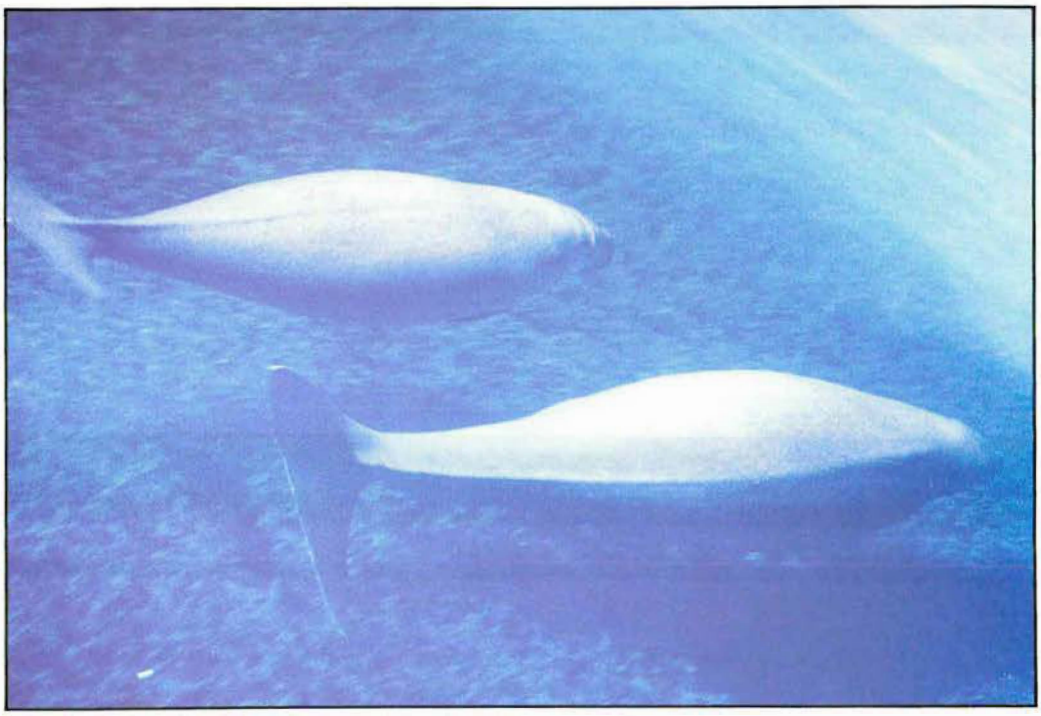

SHARK BAY REGION PLAN
SCALE
0 10 20 30 40 50
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
Cape Ronsard
Koks Island
BAUDIN CAMP
HOSPITAL
BERNIER ISLAND
Cape Couture
Cape Boullanger
Quoin Bluff North
DORRE ISLAND
HOSPITAL
Cape St. Cricq
SHARK BAY
Babbage Island
CARNARVON
Gascoyne River
Grey Point
Bush Bay
Greenough Point
NORTH WEST COASTAL HIGHWAY
"Edaggee"
Long Point
Naturaliste Channel
Cape Inscription
Turtle Bay
DIRK HARTOG LANDING
Cape Levillain
LIGHTHOUSE RUIN
Broadhurst Bight
Cape Peron North
Herald Bight
Guichenault Point
Hopeless Reach
DENHAM SOUND
Cape Lesueur
Peron Peninsula
Cape Rose
MONKEY MIA
Eastern Bluff
Disappointment Reach
FAURE ISLAND
Pelican Island
"Faure Island"
Dubaut Point
Petit Point
Herald Loop
BIBRA LANDING
GLADSTONE
"Wooramel"
Wooramel Roadhouse
"Yaringa"
Quoin Head
DIRK HARTOG ISLAND
GARRISON GUAMO SITE
Quoin Bluff South
Terrodon Loop
Freycinet
DENHAM
"Peron"
"Dirk Hartog"
Cape Bellefin
Cape Heinsson
Reach
Kopke Point
INDIAN OCEAN
LHARIDON BIGHT
Eagle Bluff
DENHAM GRAFFITI CARVINGS
USELESS LOOP
Hutchison Island
HAMELIN POOL
South Passage
Steep Point
MOST WESTERLY POINT MAINLAND AUSTRALIA
Bellefin Prong
Heirisson Prong
Useless Inlet
Goulet Bluff
Tailfeet
Isthmus
"Carbla"
"Nanga"
FREYCINET ESTUARY
False Entrance
Zuytdorp Point
EDEL LAND
"Carrarang"
Cararang Peninsula
Freycinet Island
HAMELIN P.O.
"Hamelin"
Nilemah Outstation
Overlander Roadhouse
Baudin Island
Salutation Island
"Tamala"
"Coburn"
ZUYTDORP CLIFFS
Billabong Roadhouse
"Cooloomia"
ZUYTDORP WRECK
Zuytdorp National Park
LEGEND
HISTORIC SITE
CONSERVATION SITE
BOTANICAL PROVINCE LINE
EREMAEAN BOTANICAL PROVINCE
SOUTH-WEST BOTANICAL PROVINCE
INTERMEDIATE
DISTRIBUTION OF SEAGRASS MEADOWS
Compiled from data by Dr. D. Walker, University of Western Australia
BATHYMETRIC DEPTH (in metres)
CONSERVATION AND HISTORIC FEATURES

Figure 1.

Photograph courtesy of Mr J. Bannister



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

Zuytdorp Cliffs, Tamala station.

paperbark (*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.

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 km^2 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 Aboriginals, 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

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 system has a limited capacity to cater for future residential and tourist developments.

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 re-supplies of water by explorers and early marine resource users, such as whalers. Guano miners and pearlers 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 1950s when Denham supported four fish processing plants, but then collapsed due to over exploitation. As a result, Denham's population was greatly reduced in the 1950s. 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.

At the present time the value of industrial activity in the area is about $45 million per year*, comprised of:

Commercial Fishing:	$25 million
Mining:	$16 million
Pastoral:	$ 1 million
Tourism:	$ 1 million
Other:	$ 2 million

*Note: This is not total economic worth.

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 collapse of the industry which occurred in the 1950s 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 collapse of the scale fishing industry in the 1950s, 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.

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.

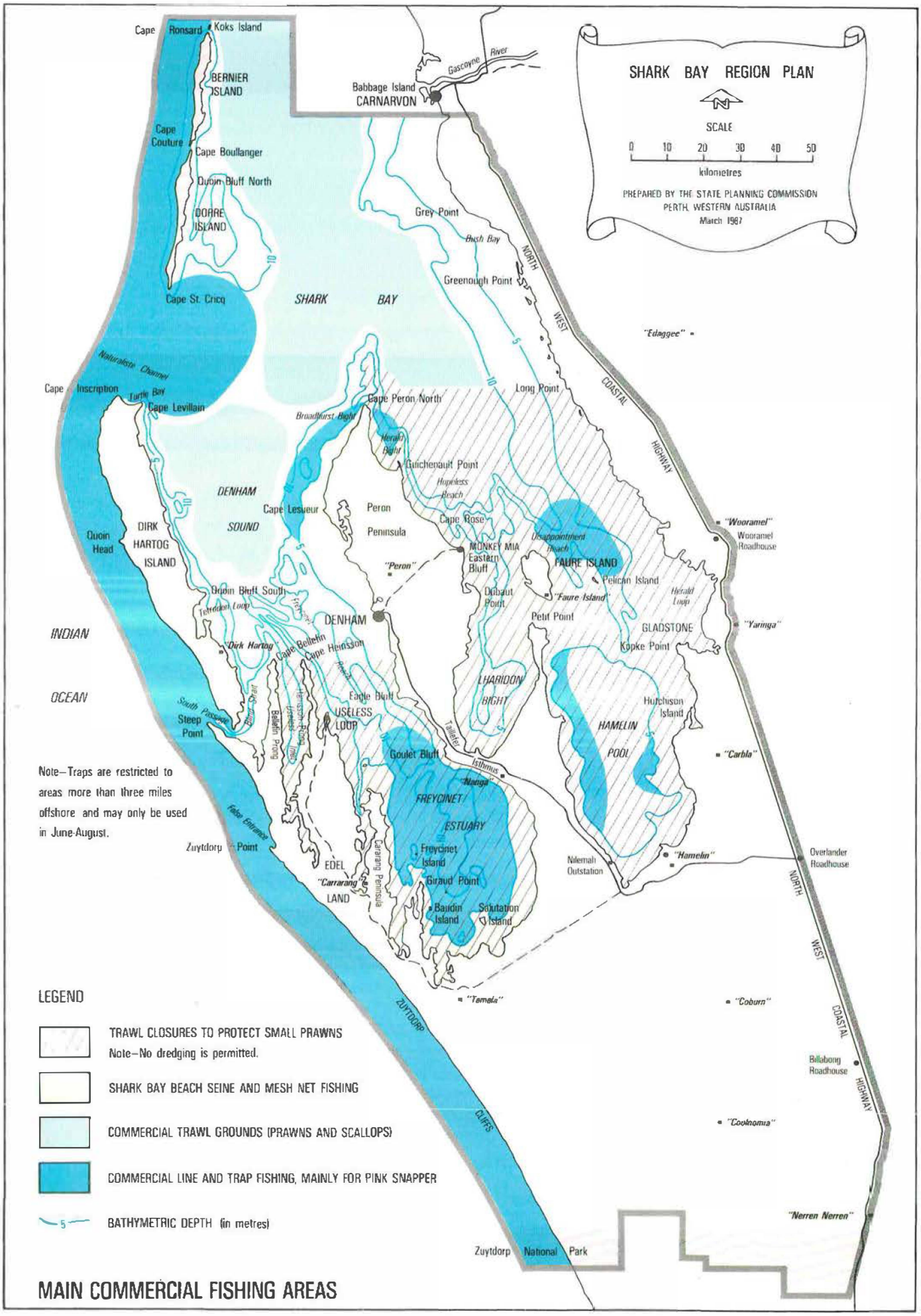
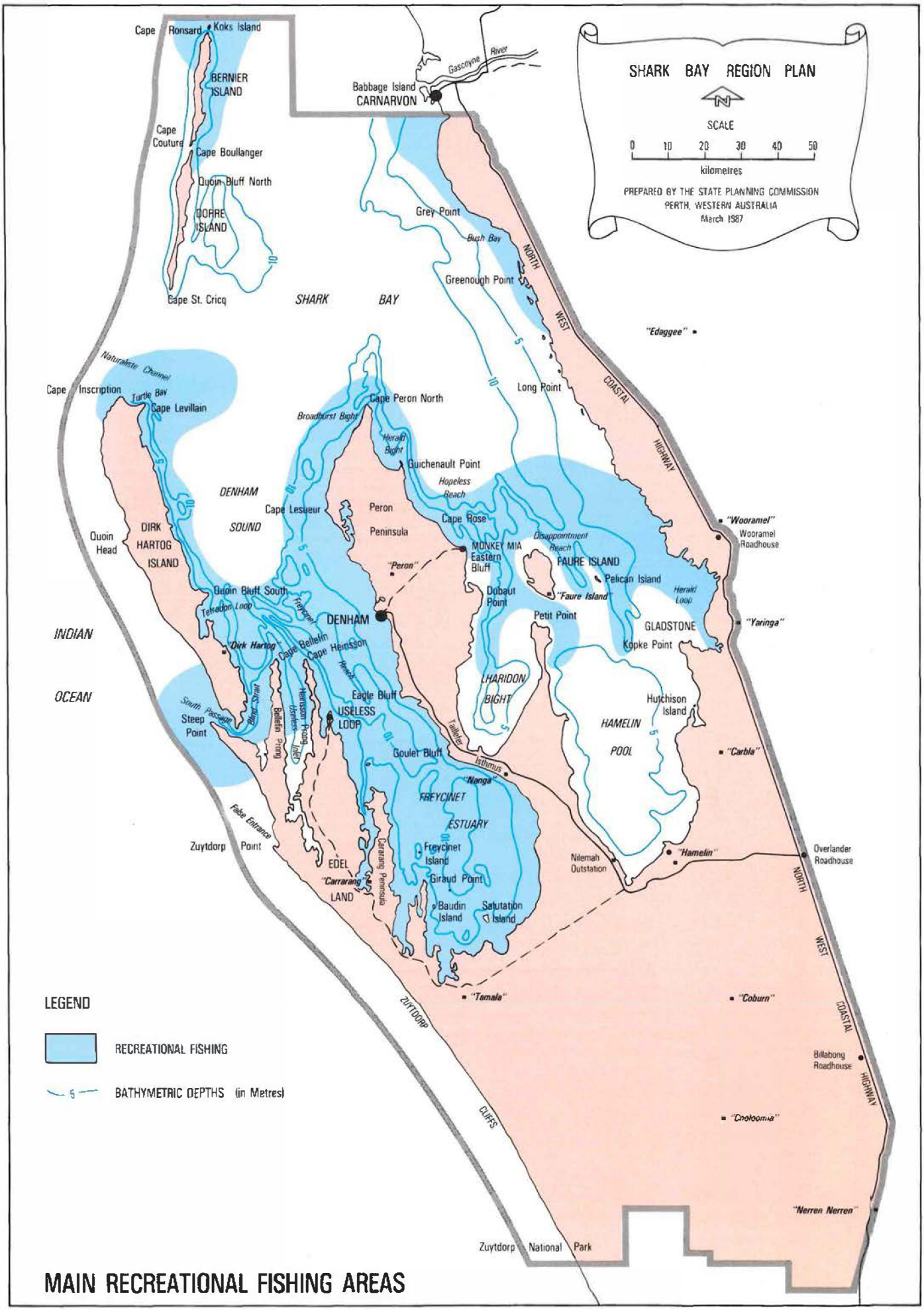

SHARK BAY REGION PLAN
SCALE
0 10 20 30 40 50
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
Cape Ronsard
Koks Island
BERNIER ISLAND
Cape Couture
Cape Boullanger
Quoin Bluff North
DORRE ISLAND
Babbage Island
CARNARVON
Gascoyne River
Grey Point
Bush Bay
Greenough Point
NORTH WEST COASTAL HIGHWAY
Cape St. Cricq
SHARK BAY
"Edaggee"
Naturaliste Channel
Cape Inscription
Turtle Bay
Cape Levillain
Broadhurst Bight
Cape Peron North
Long Point
Herald Bight
Gutchenault Point
Hopeless Reach
DENHAM SOUND
Cape Lesueur
Peron Peninsula
Cape Rose
Quoin Head
DIRK HARTOG ISLAND
MONKEY MIA
Eastern Bluff
Disappointment Reach
FAURE ISLAND
Pelican Island
"Faure Island"
Herald Loop
"Wooramel"
Wooramel Roadhouse
"Peron"
Dubaut Point
Petit Point
Quoin Bluff South
Tetradon Loop
DENHAM
GLADSTONE
"Yaringa"
Kopke Point
INDIAN OCEAN
"Dirk Hartog"
Cape Bellefin
Cape Heirisson
Prong
Eagle Bluff
USELESS LOOP
LHARIDON BIGHT
Hutchison Island
HAMELIN POOL
Steep Point
South Passage
Flour Strait
Bottom Rocks
Heirisson Prong
Goulet Bluff
Taillefert
Isthmus
"Carbla"
"Malinga"
FREYCINET ESTUARY
Zuytdorp Point
Faber Entrance
Freycinet Island
Giraud Point
Nilemah Outstation
"Hamelin"
Overlander Roadhouse
EDEL LAND
"Carrarang"
Careening Peninsula
Baudin Island
Solitude Island
"Temala"
"Coburn"
ZUYTDORP CLIFFS
Billabong Roadhouse
"Coolnoma"
"Nerren Nerren"
Zuytdorp National Park
Note—Traps are restricted to areas more than three miles offshore and may only be used in June-August.
LEGEND
TRAWL CLOSURES TO PROTECT SMALL PRAWNS
Note—No dredging is permitted.
SHARK BAY BEACH SEINE AND MESH NET FISHING
COMMERCIAL TRAWL GROUNDS (PRAWNS AND SCALLOPS)
COMMERCIAL LINE AND TRAP FISHING, MAINLY FOR PINK SNAPPER
5 BATHYMETRIC DEPTH (in metres)
MAIN COMMERCIAL FISHING AREAS

Figure 2.


SHARK BAY REGION PLAN
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SCALE
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kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
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Gascoyne River
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Greenough Point
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"Edaggee"
Long Point
Cape Inscription
Turtle Bay
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Naturaliste Channel
Broadhurst Bight
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Herald Bight
Guichenault Point
Hopeless Reach
DENHAM SOUND
Cape Lesueur
Peron Peninsula
Cape Rose
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Wooramel Roadhouse
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Tetradon Loop
Freycinet
DENHAM
Dubaut Point
Petit Point
GLADSTONE
Kopke Point
"Yaringa"
INDIAN OCEAN
"Dirk Hartog"
Cape Bellefin
Cape Heirisson
French
Eagle Bluff
USELESS LOOP
Steep Point
South Passage
Blind Strait
Bellefin Prong
Heirisson Prong
Useless Inlet
LHARIDON BIGHT
Hutchison Island
HAMELIN POOL
Goulet Bluff
Tailles
Isthmus
"Nanga"
"Carbla"
FREYCINET ESTUARY
False Entrance
Zuytdorp Point
Freycinet Island
Nilemah Outstation
"Hamelin"
Overlander Roadhouse
EDEL LAND
"Carrarang"
Cararang Peninsula
Giraud Point
Baudin Island
Salutation Island
"Temala"
"Coburn"
ZUYTDORP CLIFFS
Billabong Roadhouse
"Cheloomia"
"Nerren Nerren"
Zuytdorp National Park
LEGEND
RECREATIONAL FISHING
BATHYMETRIC DEPTHS (in Metres)
MAIN RECREATIONAL FISHING AREAS

Figure 3.

Bush camping - well equipped for the catch.

On the jetty at Monkey Mia.

(d) Some fish are sought by both professional and recreational fishermen. Adequate and fair restrictions must be placed 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.

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.

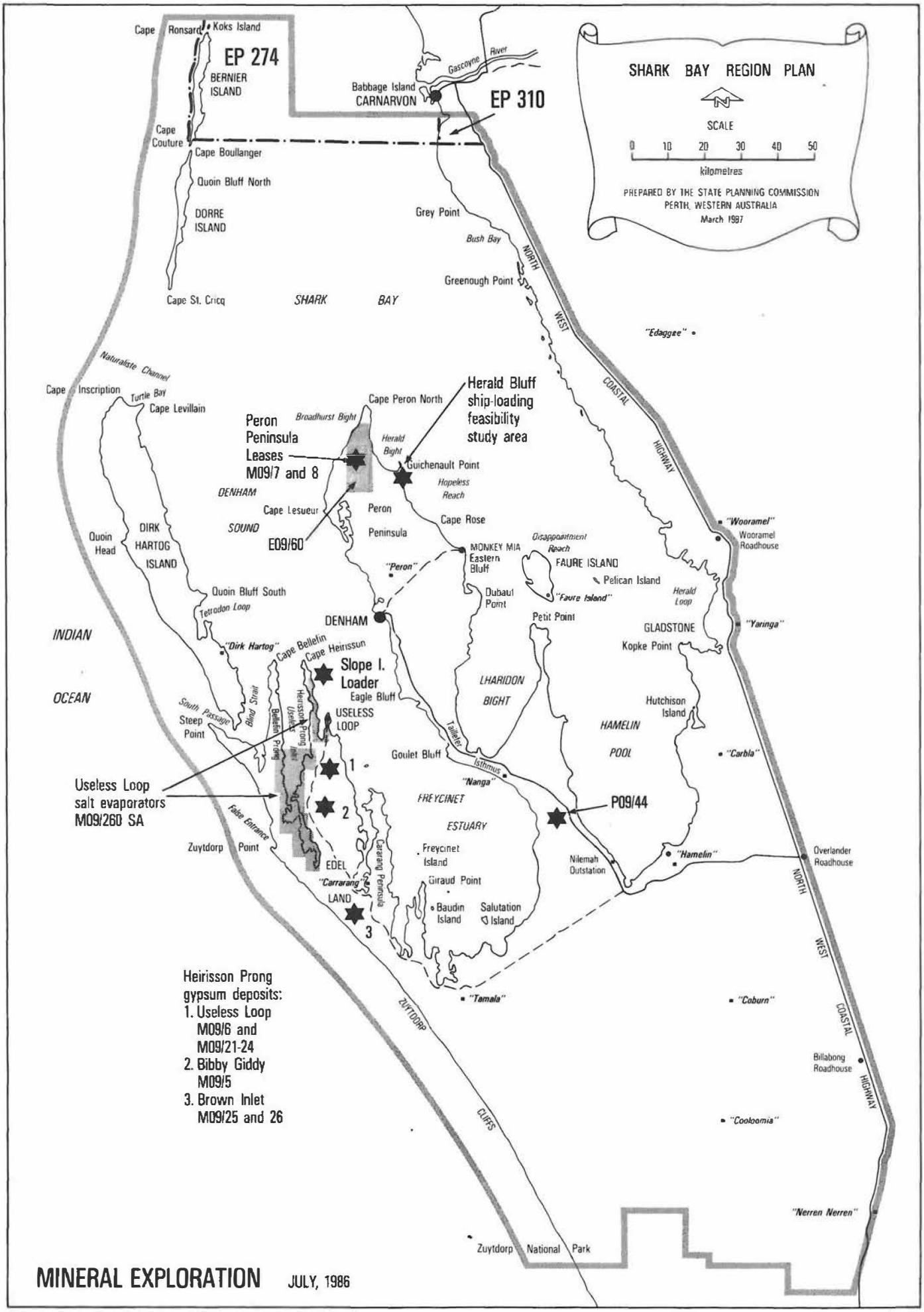

SHARK BAY REGION PLAN
SCALE
0 10 20 30 40 50
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
EP 274
EP 310
Herald Bluff ship-loading feasibility study area
Peron Peninsula Leases M09/7 and 8
E09/60
Useless Loop salt evaporators M09/260 SA
P09/44
Heirisson Prong gypsum deposits:
1. Useless Loop M09/6 and M09/21-24
2. Bibby Giddy M09/5
3. Brown Inlet M09/25 and 26
MINERAL EXPLORATION JULY, 1986

Figure 4.

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.

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.

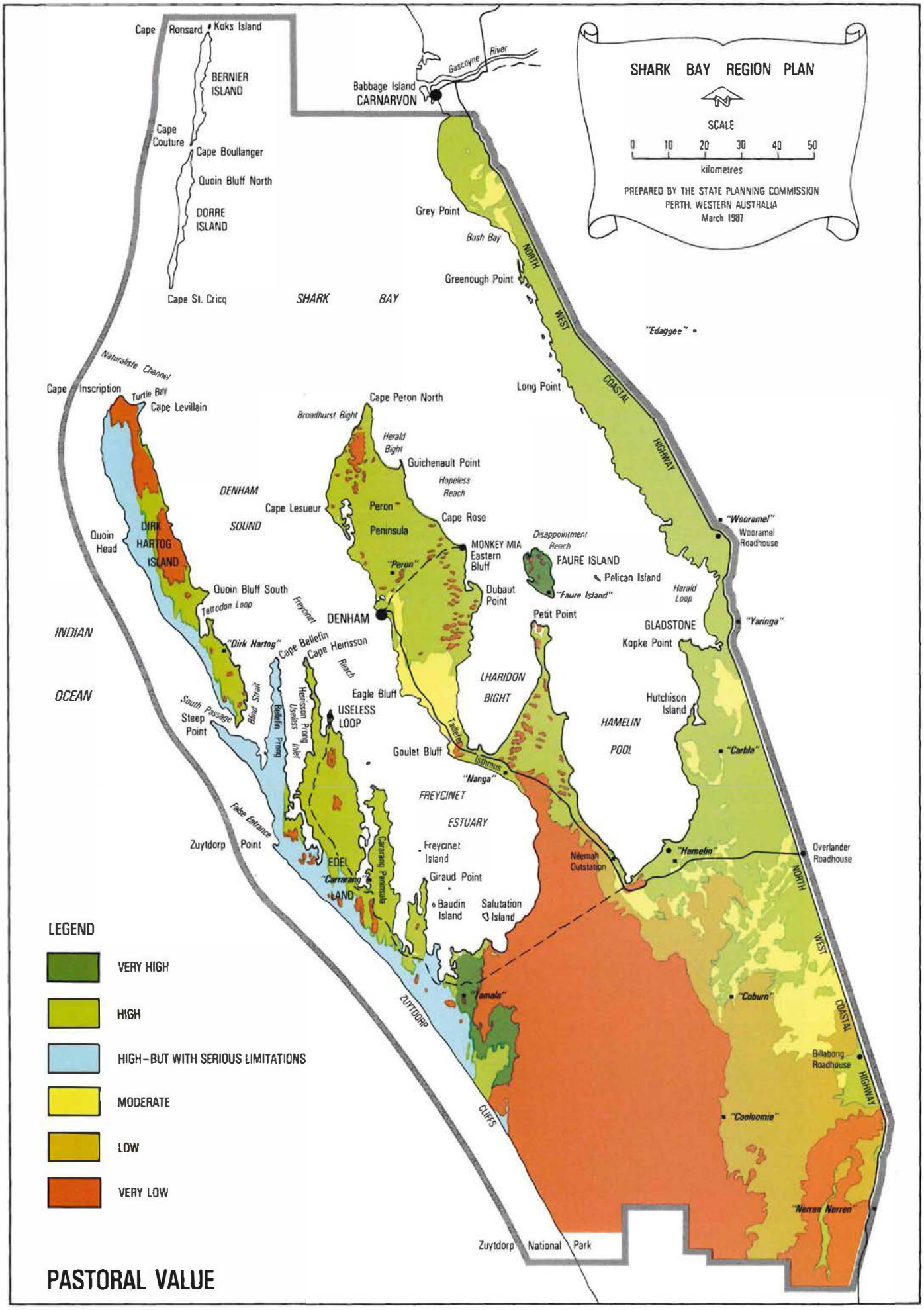
Pasture Management: Livestock rely mainly on shrubby pastures which consist of complex and varying mixtures of roughly 1 000 species of native perennial and annual plants. Some are favoured by stock, but others are unpalatable. Pasture quality varies with the season, the soil type, the topography and 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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Freycinet
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Petit Point
GLADSTONE
"Yaringa"
INDIAN OCEAN
"Dirk Hartog"
Cape Bellefin
Cape Heirisson
Reach
LHARIDON BIGHT
Kopke Point
Eagle Bluff
USELESS LOOP
Heirisson Prong
Useless Inlet
Bellefin Prong
Blind Strait
South Passage
Steep Point
Hutchison Island
HAMELIN POOL
Goulet Bluff
Tailletou Isthmus
"Nanga"
"Carbla"
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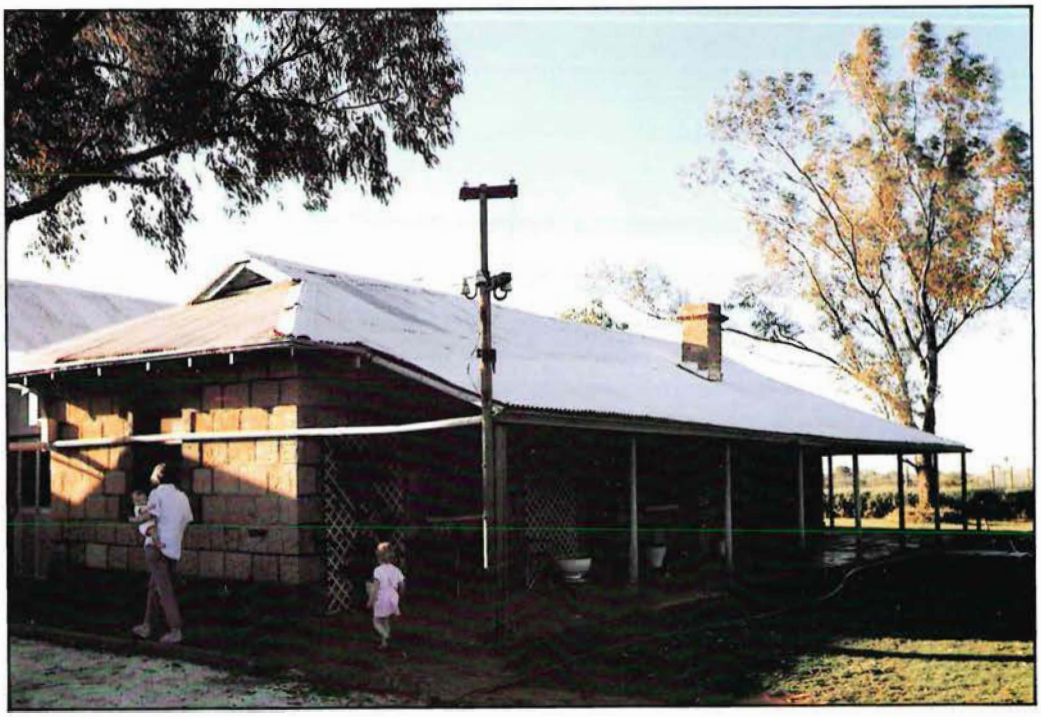
Overlander Roadhouse
"Tamala"
ZUYTDORP CLIFFS
"Coburn"
Billabong Roadhouse
"Cooloomia"
"Nerren Nerren"
Zuytdorp National Park
LEGEND
VERY HIGH
HIGH
HIGH–BUT WITH SERIOUS LIMITATIONS
MODERATE
LOW
VERY LOW
PASTORAL VALUE

Figure 5.

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. The total revenue generated by tourism in Shark Bay in 1985/86 is estimated conservatively at $820 000, not including day trip visitors and private guests. This means that tourism is as economically important to the region as the pastoral industry.

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 and nine self contained residential accommodation cottages, incorporating 44 rooms and 100 beds, 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.

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 and 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. There are some problems and State rights issues with this proposal. The matter is dealt with in Appendix 1.

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.

In line with the brief and on the basis of the discussion of the foregoing sections, three major objectives for the study area are appropriate. They are stated and briefly elaborated in this section.

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.

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

TABLE 3—LAND USE ZONES

PROPOSED LAND USE	LOCATION	MULTIPLE USES	MANAGEMENT EMPHASIS	PUBLIC ACCESS	TOWN PLANNING SCHEME	PROPOSED TENURE
1. MINING	Shell Beach Useless Loop Peron Peninsula Brown Inlet	Mining. Pastoral uses. Residential. Ship-loader proposed at Herald Bluff.	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, Narren Narren, 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. VEGETATION PROTECTION	Parts of Nanga and Tamala Stations.	Limited pastoral use. Protection of vegetation.	Protection of vegetation. Major part of area to be amalgamated with Cooloomia Nature Reserve and Zuytdorp National Park.	*Present:* Access by invitation of pastoral lessees. *Future:* Proposed nature reserve, managed access.	Rural. Nature reserve.	Pastoral lease. Nature reserve.
5. ENVIRONMENT PROTECTION AND RECREATION	Peron Peninsula North, Edel Land Steep Point, Big Lagoon	Protection of environment. Recreation. Limited pastoral uses.	Proposed staged acquisition for national park. Protection of vegetation and wildlife. Control of public use and mining operations.	New road for public access to some beaches. Controlled access to areas of environmental interest.	Rural. Proposed future national park.	Pastoral lease. National park.
6. PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS	Hamelin Pool Faure Sill	Stromatolite and sedimentary deposit protection. Limited recreation. Scientific research.	Management and protection of stromatolites and sedimentary deposits. Prohibit dredging and mining, except for restoration of historic buildings.	Limited public access.	Marine nature reserve.	Marine nature reserve.
7. DUGONG HABITAT PROTECTION	Waters near Dirk Hartog Island Freycinet Estuary Wooramel Delta Bernier and Dorre Islands	Dugong protection. Recreational fishing General recreation. Controlled commercial fishing at Dirk Hartog Island.	Protection and management of dugong habitats. Control of boat access and speed in certain seasons.	Dirk Hartog Island and Freycinet Estuary—Managed public access. Bernier and Dorre Islands and Wooramel Delta—Limited public access.	Marine park. Marine nature reserve.	Marine park. Marine nature reserve.
8. 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.
9. PRAWN NURSERY AND SEAGRASS PROTECTION	Wooramel Seagrass Bank	Seagrass and marine habitat protection. Prawn nursery. Recreation 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.	Marine park.	Marine park.
10. 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.	Waterway. Includes 40 metres above high water mark.
11. PROTECTION OF COASTAL LANDFORMS	Dirk Hartog Island; Zuytdorp Point to Womerangee Hill.	Landform protection. Historic site protection. Recreation. Limited pastoral use of fragile areas.	Protection and conservation of coastal landforms. Management of erosion. Limited pastoral use of fragile areas.	Public access to recreation sites by consent of pastoral lessees.	Rural.	Pastoral lease.
12. EXISTING NATIONAL PARKS AND NATURE RESERVES	Zuytdorp National Park, Cooloomia Nature Reserve. Bernier and Dorre Island—Small island nature reserves.	Wildlife conservation. Fauna observation and scientific research.	Management of wildlife to enhance survival. Protection of rare species' habitats.	Limited public access.	Nature reserve. National park.	Land Act reserves.
13. DOLPHIN PROTECTION	Monkey Mia	Dolphin protection. Boat launching and mooring. Recreation.	Protection and management of dolphin population.	Controlled boat access.	Marine park.	Marine park.
14. HISTORIC RESERVE	Cape Inscription	Historic and cultural uses. Recreation. Protection of sites, buildings and relics. Maintenance of lighthouse operations.	Protection of historic landing place by Dirk Hartog in 1616. Protection of sites, buildings and relics associated with Cape Inscription Lighthouse.	Controlled public access.	Historic reserve.	Historic Reserve. Land Act.

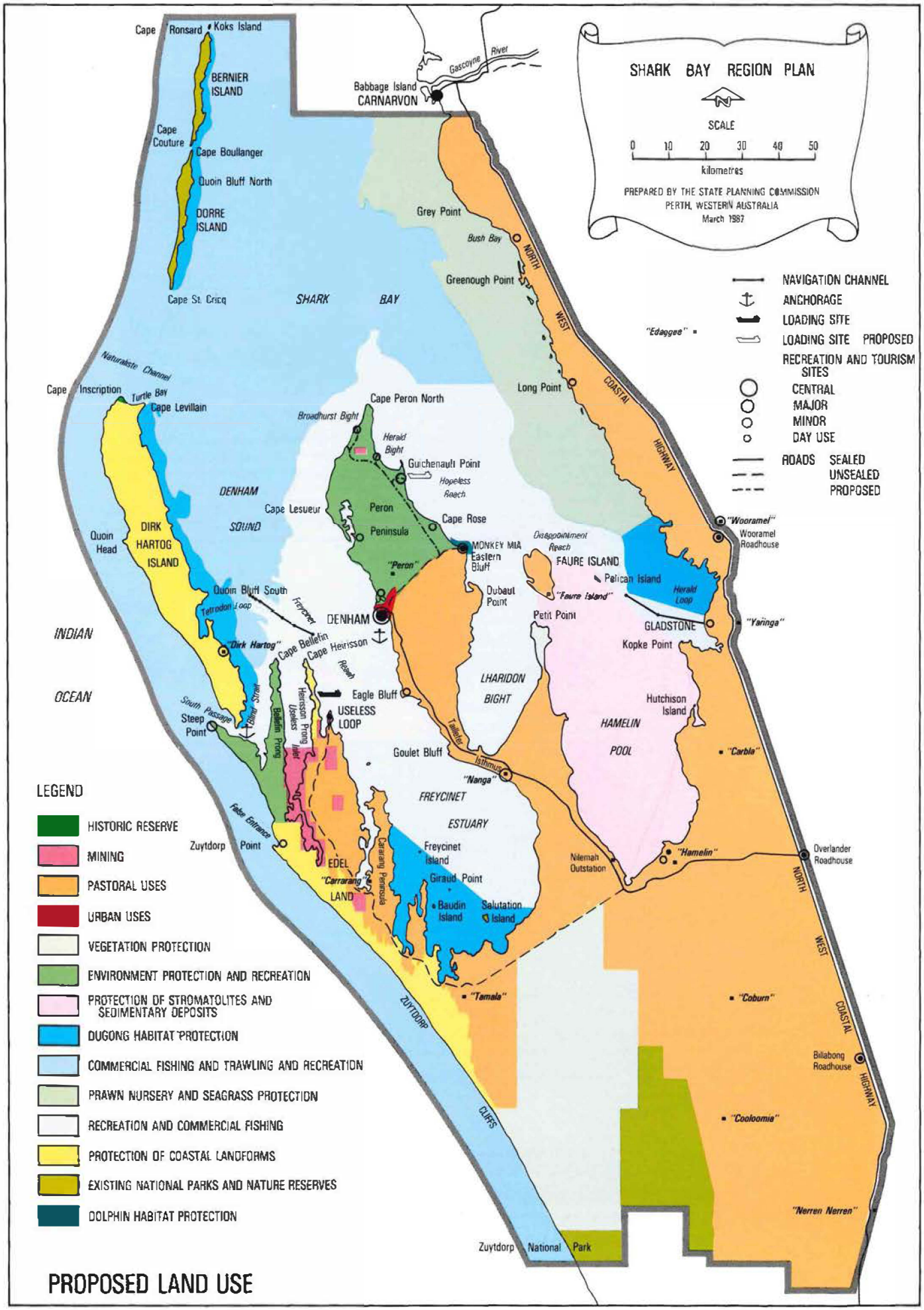

SHARK BAY REGION PLAN
SCALE
0 10 20 30 40 50
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
NAVIGATION CHANNEL
ANCHORAGE
LOADING SITE
LOADING SITE PROPOSED
RECREATION AND TOURISM SITES
CENTRAL
MAJOR
MINOR
DAY USE
ROADS SEALED
UNSEALED
PROPOSED
Cape Ronsard
Koks Island
BERNIER ISLAND
Cape Couture
Cape Boullanger
Quoin Bluff North
DORRE ISLAND
Cape St. Cricq
SHARK BAY
Babbage Island
CARNARVON
Gascoyne River
Grey Point
Bush Bay
Greenough Point
NORTH WEST COASTAL HIGHWAY
"Edaggee"
Long Point
Naturaliste Channel
Cape Inscription
Turtle Bay
Cape Levillain
Broadhurst Bight
Cape Peron North
Herald Bight
Guichenault Point
Hopeless Reach
DENHAM SOUND
Cape Lesueur
Peron Peninsula
Cape Rose
Quoin Head
DIRK HARTOG ISLAND
"Peron"
MONKEY MIA
Eastern Bluff
Disappointment Reach
FAURE ISLAND
Pelican Island
Herald Loop
"Faure Island"
Dubaut Point
Petit Point
"Wooramel"
Wooramel Roadhouse
"Yaringa"
GLADSTONE
Kopke Point
Quoin Bluff South
Tetrodon Loop
Freycinet
DENHAM
INDIAN OCEAN
"Dirk Hartog"
Cape Bellefin
Cape Henisson
Reach
LHARIDON BIGHT
Eagle Bluff
USELESS LOOP
South Passage
Steep Point
Blind Street
Bellefin Prong
Henisson Prong
Useless Inlet
Hutchison Island
HAMELIN POOL
Goulet Bluff
Tailleter Isthmus
"Carbla"
"Nanga"
FREYCINET ESTUARY
Faure Entrance
Zuytdorp Point
EDEL LAND
"Carrarang"
Cararang Peninsula
Freycinet Island
Giraud Point
Baudin Island
Salutation Island
Nilemah Outstation
"Hamelin"
Overlander Roadhouse
"Tamala"
"Coburn"
ZUYTDORP CLIFFS
Billabong Roadhouse
"Cooloomie"
"Nerren Nerren"
Zuytdorp National Park
LEGEND
HISTORIC RESERVE
MINING
PASTORAL USES
URBAN USES
VEGETATION PROTECTION
ENVIRONMENT PROTECTION AND RECREATION
PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS
DUGONG HABITAT PROTECTION
COMMERCIAL FISHING AND TRAWLING AND RECREATION
PRAWN NURSERY AND SEAGRASS PROTECTION
RECREATION AND COMMERCIAL FISHING
PROTECTION OF COASTAL LANDFORMS
EXISTING NATIONAL PARKS AND NATURE RESERVES
DOLPHIN HABITAT PROTECTION
PROPOSED LAND USE

Figure 6.

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.

5.2.1 HISTORIC RESERVE ZONE

It is proposed that Dirk Hartog's Landing Place, the old Cape Inscription Lighthouse buildings and horseworks be zoned as an Historic Site. The Commonwealth lands, except the current lighthouse site, should be transferred to State control.

Hamelin Post Office, established in 1884, should be purchased by the State and could be included in the proposed Hamelin Pool Marine Nature Reserve for stromatolite interpretation and research purposes.

5.2.2 MINING ZONE

Three 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 on Peron Peninsula and 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.

5.2.3 PASTORAL USES ZONE

Approximately 35% 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.

5.2.4 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.

5.2.5 VEGETATION PROTECTION ZONE

This zone 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.

TABLE 4

PASTORAL LEASES AFFECTED BY OTHER USE ZONES

PASTORAL LEASE	OTHER PROPOSED ZONES AFFECTING THE LEASE
Tamala	Protection of coastal landform zone. Vegetation protection zone.
Dirk Hartog Island	Protection of coastal landform zone. Historic Zone.
Peron	Environmental protection and recreation zone. Mining zone.
Nanga	Protection of stromatolites and sedimentary deposits zone. Vegetation protection zone.
Carrarang	Protection of coastal landform zone. Mining zone.
Carbla	Protection of stromatolites and sedimentary deposits zone.
Yaringa	Protection of stromatolites and sedimentary deposits zone.
Hamelin	Protection of stromatolites and sedimentary deposits zone.
Coburn	Vegetation protection zone.
Brickhouse	Prawn nursery and seagrass protection zone.
Edaggee	Prawn nursery and seagrass protection zone.
Wooramel	Prawn nursery and seagrass protection zone.

Protection of the vegetation is the main objective of this zone. 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.

5.2.6 ENVIRONMENT PROTECTION AND RECREATION ZONE

This zone 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 zone includes Big Lagoon and the zoning implies closure to commercial fishing.

5.2.7 PROTECTION OF STROMATOLITES AND SEDIMENTARY DEPOSITS ZONE

This zone 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.

5.2.8 DUGONG HABITAT PROTECTION ZONE

Three of the four areas proposed for Dugong Habitat Protection near Dirk Hartog Island, Wooramel Delta and Bernier and Dorre Islands 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 fourth Dugong Habitat Protection 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 generally known. Measures proposed for management of marine areas will provide a mechanism to ensure their safety.

5.2.9 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.

5.2.10 PRAWN NURSERY AND SEAGRASS PROTECTION ZONE

The Wooramel Seagrass Bank is a major nursery area for prawns and fish and a major dugong feeding area. This zone 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 zone 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 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 4).

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.

5.2.12 PROTECTION OF COASTAL LANDFORMS ZONE

This zone 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 zone, 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 zoning, while allowing for pastoralism to continue, reflects the wider community aspiration to ensure that these lands are very carefully husbanded into the future. This zone can be seen as a 'sub-zone' of pastoral uses requiring special management planning. These areas will remain as pastoral leases with provision for appropriate recreation use, however, the use of four wheel drive vehicles should be strictly controlled.

5.2.13 EXISTING NATIONAL PARKS AND NATURE RESERVES ZONE

This zone 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 4).

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 zoned 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 Zone, that Marine Parks be declared adjacent to Bernier and Dorre Islands and that the small island Nature Reserves be retained.

5.2.14 DOLPHIN HABITAT PROTECTION ZONE

This zone is proposed for Monkey Mia to 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.

5.3 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).

Strategies for Pastoral Development:

(1) *The pastoral industry should investigate options available for diversification on pastoral properties, particularly in the areas of cattle, goats and 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.*

5.4.2 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) *In view of the importance to the State of the snapper industry, strict quality control measures should be maintained and regularly monitored by the industry to ensure that returns are maximised and products are competitive with imports.*

(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 estuarine 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 developments are an increase in solar salt production at Useless Loop and the proposed gypsum mine at Peron Peninsula. 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) *Further access for mineral exploration can be permitted in accordance with State Government Policy, except in areas exempted from mining and exploration by the Hon. Minister for Mines.*

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
- Peron Peninsula
- Overlander Roadhouse
- Billabong Roadhouse
- Wooramel Crossing

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

. 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 Management should consult Main Roads Department 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.*

5.4.5 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 control fishing effort 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 Waterways Conservation Act provides for the declaration of water and land areas as management areas and for the establishment of locally based authorities to manage them under the administrative control of the Waterways Commission and the Minister for the Environment. The Act provides for the control of development, pollution, use and destructive acts. It permits multiple land uses and does not impede navigation, commercial and amateur fishing or other activities occurring in accordance with their respective Acts. It provides for the preparation of management plans, research, education and staffing as means to achieve the management aims for the area concerned. It has previously been applied to estuaries rather than to embayments, but it could be appropriate for Shark Bay also.

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.

The EPA System 9 recommendation was for Shark Bay to be declared a Marine Park. The Department of Conservation and Land Management supports this view, but acknowledges that the present definition of Marine Park does not provide adequately for full multiple use, including commercial fishing. The Shire of Shark Bay, the Denham Fishermen's Association and local people, including amateur fishermen, have generally opposed a marine park on the grounds that it could limit recreational fishing or even cause the closure of professional fishing to the detriment of the local economy. This fear results from misunderstanding.

A multiple-use marine park established at Shark Bay through an amended Conservation and Land Management Act incorporating explicit provisions outlined in the Waterways Conservation Act would resolve any difficulty.

Areas which need greater protection or which should not be subject to commercial fishing should be made Marine Parks and Marine Nature Reserves, pursuant to the Conservation and Land Management Act 1984. These areas include:

Marine Parks

- Monkey Mia Dolphin Protection Zone
- Big Lagoon Environment Protection and Recreation Zone.
- Bernier and Dorre Islands Dugong Protection Zone.
- Dirk Hartog Dugong Protection Zone (with provision for commercial beach seine fishing - requires amendment of the Conservation and Land Management Act).
- Wooramel Seagrass Bank (with provision for commercial beach seine fishing - requires amendment of

Conservation and Land Management Act).

Marine Nature Reserve

- Hamelin Pool
- Gladstone Dugong Protection Area

Strategies for Conservation of Marine Environments:

(1) *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.*

(2) *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.*

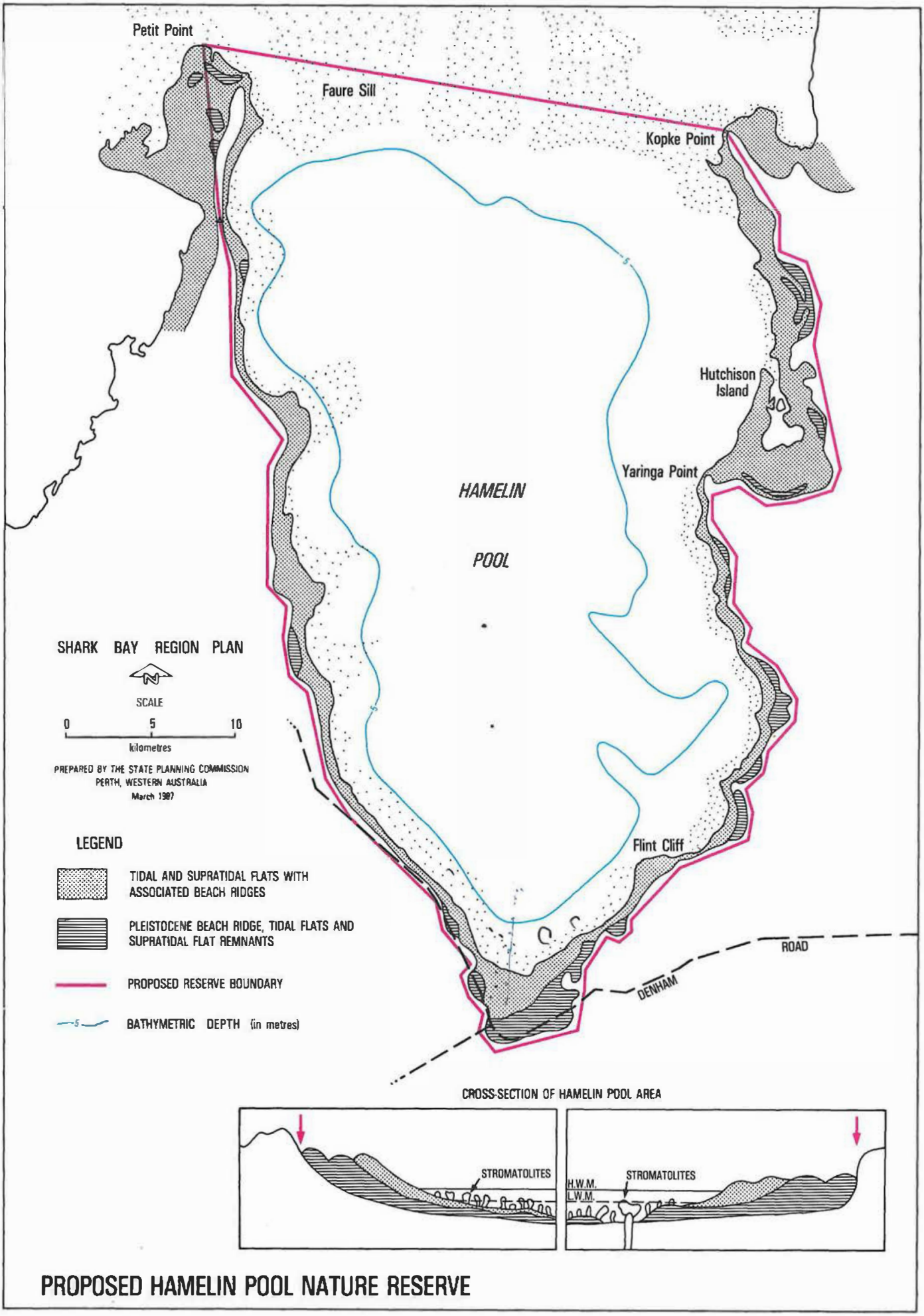
For the present, a convenient reserve boundary would be the boundary at the adjacent pastoral leases, 40 metres above the high water mark.

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.

(3) *The waters east of Bernier and Dorre Islands below the high water mark to the 6 metre isobath should be declared a Marine Park.*

It would 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,


Petit Point
Faure Sill
Kopke Point
Hutchison Island
Yaringa Point
HAMELIN
POOL
Flint Cliff
ROAD
DENHAM
SHARK BAY REGION PLAN
SCALE
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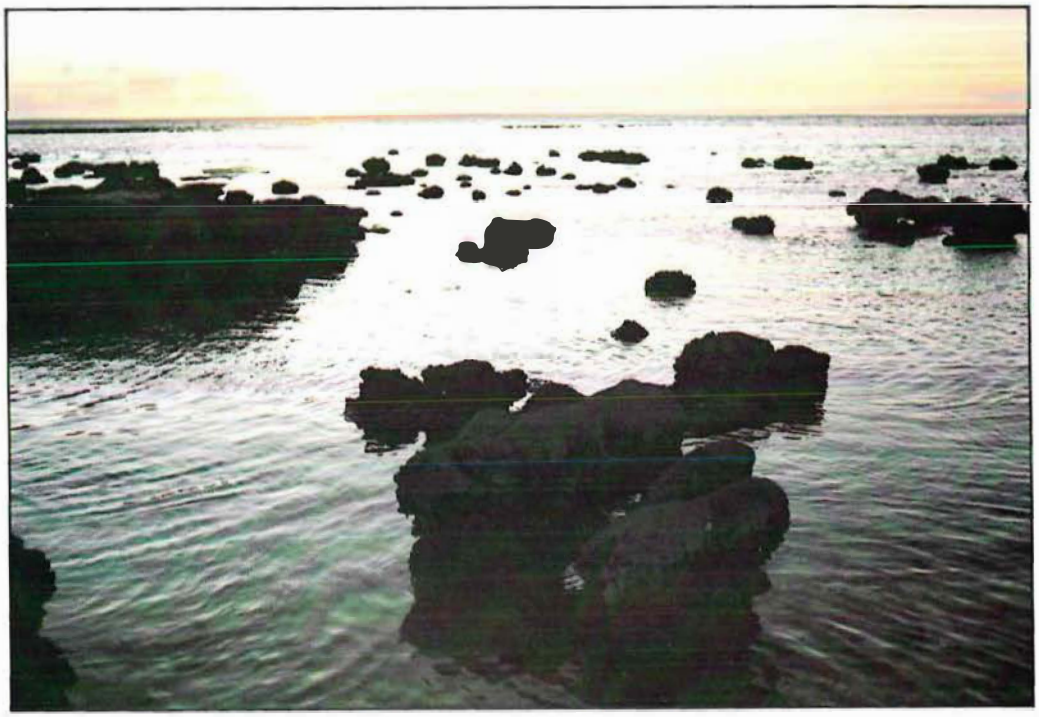
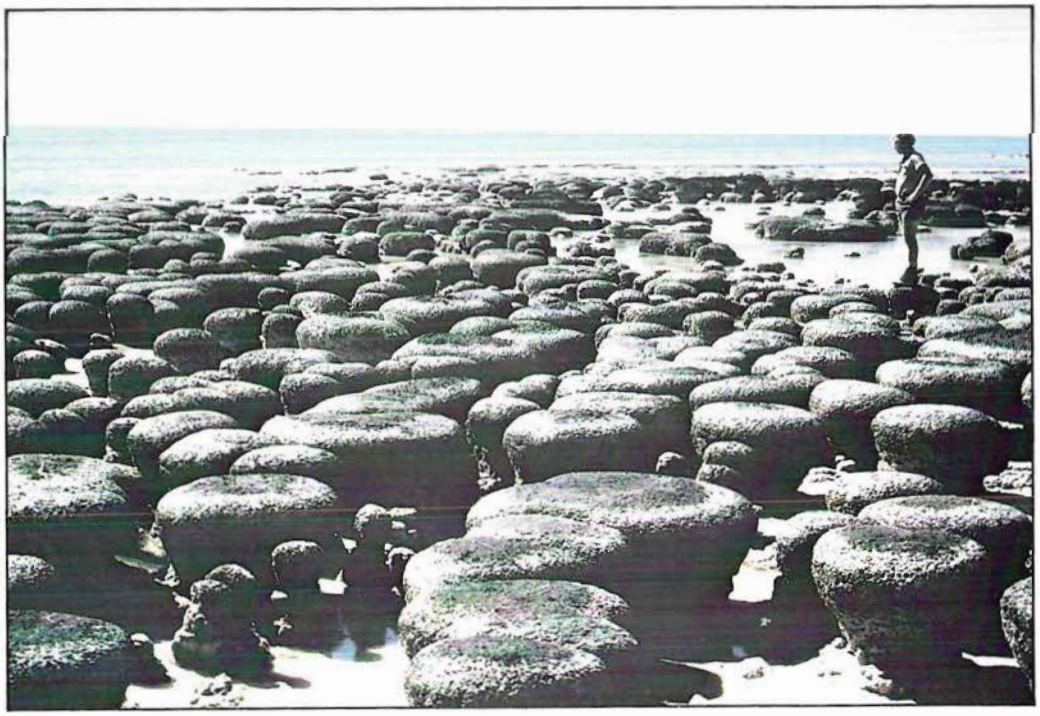
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
LEGEND
TIDAL AND SUPRATIDAL FLATS WITH ASSOCIATED BEACH RIDGES
PLEISTOCENE BEACH RIDGE, TIDAL FLATS AND SUPRATIDAL FLAT REMNANTS
PROPOSED RESERVE BOUNDARY
BATHYMETRIC DEPTH (in metres)
CROSS-SECTION OF HAMELIN POOL AREA
STROMATOLITES
H.W.M.
L.W.M.
STROMATOLITES
PROPOSED HAMELIN POOL NATURE RESERVE

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.

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.

(4) *The waters east of Dirk Hartog Island below high water mark to the 6 metre isobath should be declared a Marine Park.*

The park 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.

(5) *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.*

(6) *Big Lagoon should be declared a Marine Park and managed as part of the proposed Francois Peron National Park.*

(7) *Waters zoned for Dugong Habitat Protection at the Wooramel Delta should be declared a Marine Nature Reserve.*

(8) *The Wooramel Seagrass Bank should be made a Marine Park for its conservation values and its importance as a nursery area for prawns and fish. The continuation of beach seine fishing is to be provided for.*

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 reservations for National Park or heritage area.

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. The park would be staged in accordance with Figure 8.

(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 to points of interest, to provide Denham based visitors easy access to a range of sightseeing, fishing and swimming options not at present available.*

Location and construction will be in accord with necessary planning 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.*

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:

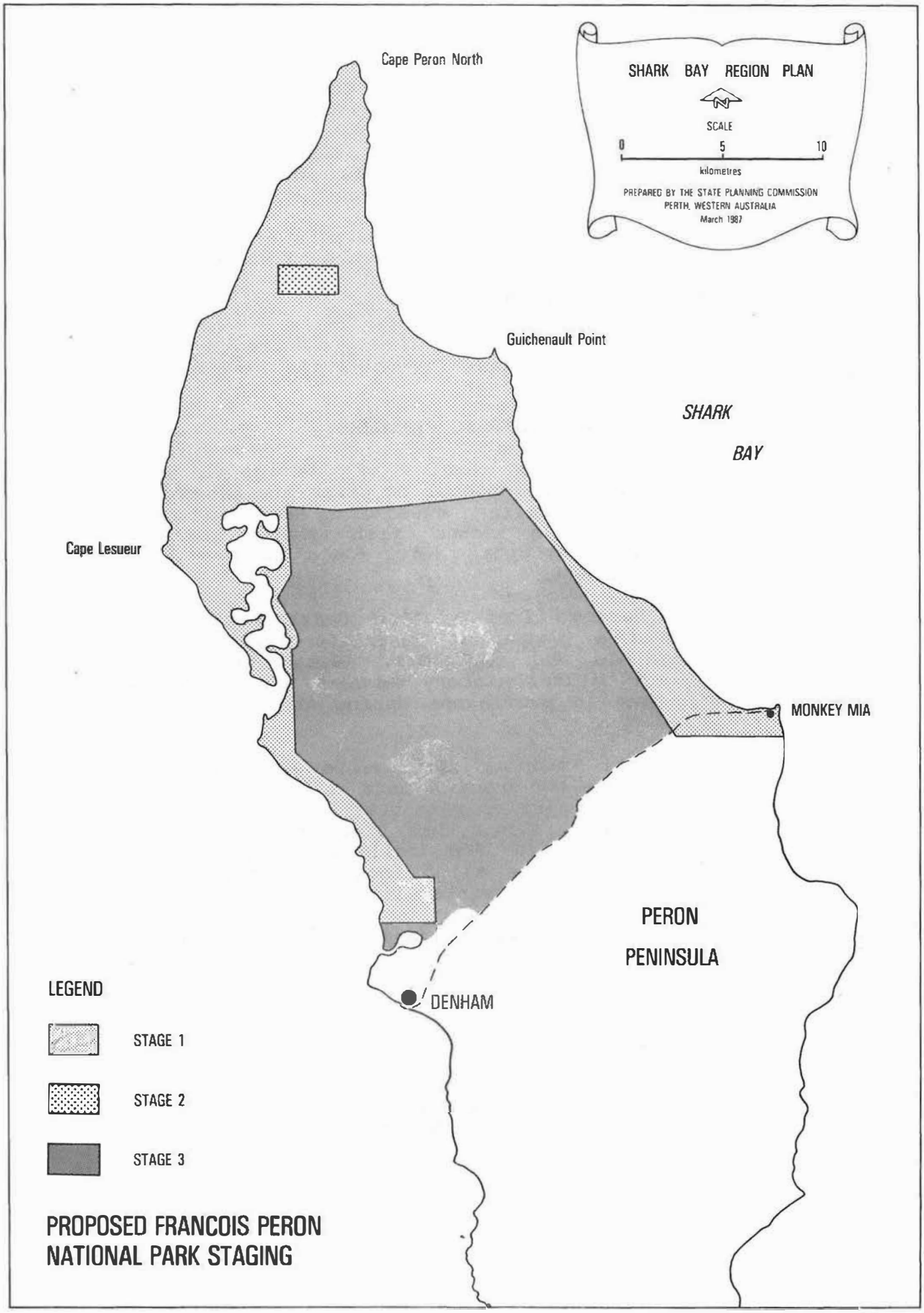
- Relocation of the existing access road and provision of separate entries to the caravan park, interpretation centre and jetty areas.

- 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.


SHARK BAY REGION PLAN
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PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
Cape Peron North
Guichenault Point
SHARK
BAY
Cape Lesueur
MONKEY MIA
PERON
PENINSULA
DENHAM
LEGEND
STAGE 1
STAGE 2
STAGE 3
PROPOSED FRANCOIS PERON
NATIONAL PARK STAGING

Figure 8.

- 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.

- 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.

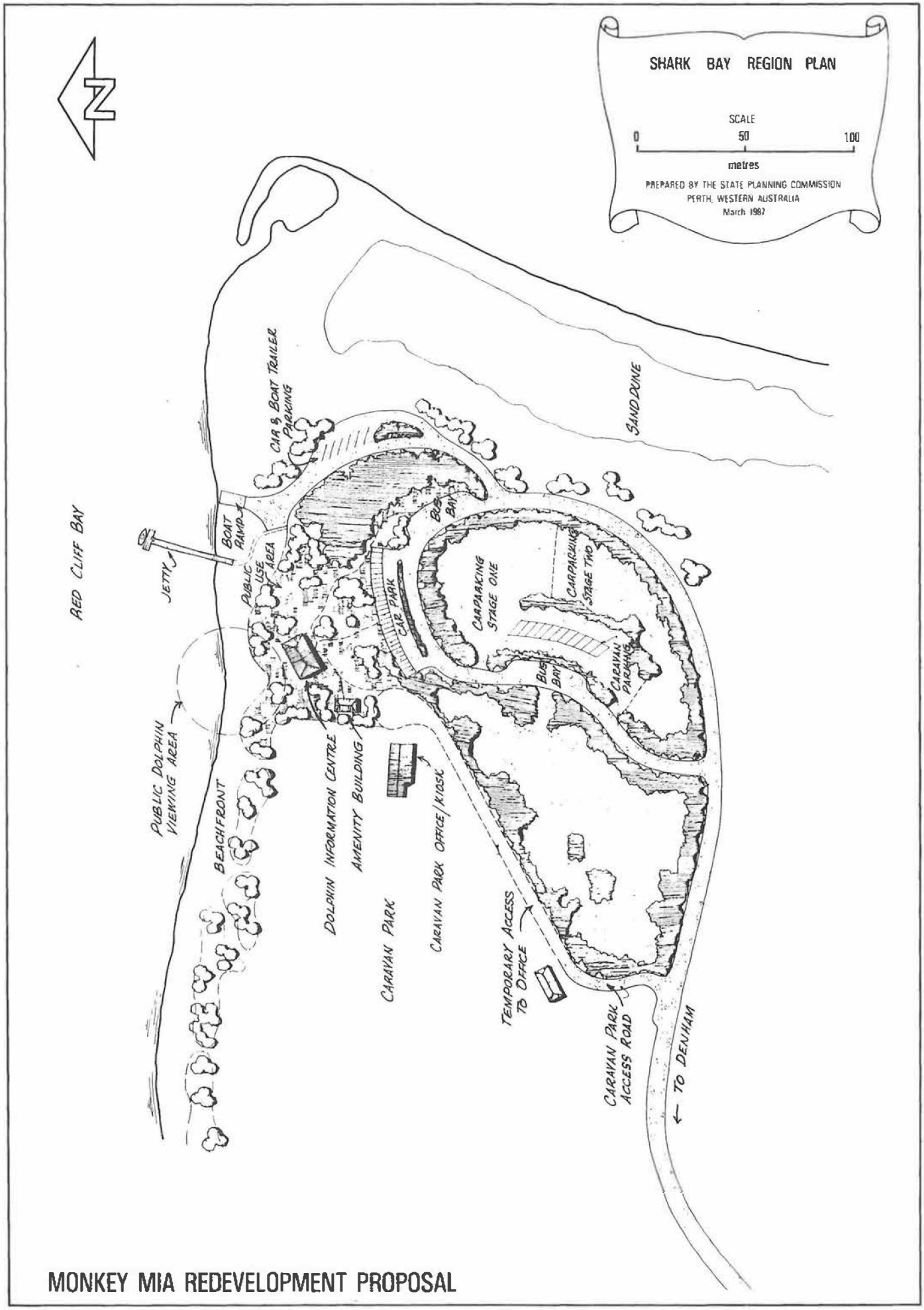
The first European settlements were established by pearlers and guano miners in the mid 1800s and pastoral properties were taken up starting in the late 1800s. Since that time the population of Shark Bay rose and fell in line with the viability of the major local industries of the past, fishing and pastoralism.

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.*


SHARK BAY REGION PLAN
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PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
N
RED CLIFF BAY
JETTY
BOAT RAMP
PUBLIC USE AREA
CAR & BOAT TRAILER PARKING
BUS BAY
CAR PARK
CARPARKING STAGE ONE
CARPARKING STAGE TWO
BUS BAY
CARAVAN PARKING
SAND DUNE
PUBLIC DOLPHIN VIEWING AREA
BEACHFRONT
DOLPHIN INFORMATION CENTRE
AMENITY BUILDING
CARAVAN PARK
CARAVAN PARK OFFICE/KIOSK
TEMPORARY ACCESS TO OFFICE
CARAVAN PARK ACCESS ROAD
TO DENHAM
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 discussed fully in Appendix 1 and recommendations for detailed investigation of the issues at Government level are made.

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 4). 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.

This option does not adequately recognise the significance of the region, nor would it cater for possible World Heritage Listing. The region could thus fail to benefit from associated funding and tourism advantages.

The application of such measures as an Environmental Protection Policy under the Environmental Protection Act 1986 and Statutory Planning Policy under Section 5AA of the Town Planning and Development Act 1928 could partly redress these concerns and could be applicable under other options.

Under the Environmental Protection Act 1986, provision exists for the declaration of Environmental Protection Policies.

Such Policies, once approved, have statutory backing and can provide an overall co-ordination function for different land uses. Implementation of Policy objectives could be through existing mechanisms or alternatively, new procedures could be determined for this purpose.

The formulation of Environmental Protection Policies involves extensive public consultation. Approved Policies are in reality State Policies and may be initiated by other government agencies through the EPA.

Environmental Protection Policies are reviewed within seven years.

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 would 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 would experience social and economic change in accommodating a rapid change of role from servicing several industries to servicing a single tourism industry.

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, tourism and fishing industries.
- 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 four 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 and to include new provisions for management of waters akin to some provisions of the Waterways Conservation Act.

- Planning legislation to provide for a Statutory Region Plan.

iv. In the event of any portion of the region being considered for nomination for World Heritage Listing, measures are required to provide the basis for any agreement between Governments.

This could be achieved by using a combination of administrative methods and amendments to existing Acts, or by new legislation, which is preferred by the local community.

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:

Establish 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.)

Provide explicit management provisions to be administered by the Department of Conservation and Land Management similar to those included in the Waterways Conservation Act for that part of Shark Bay's marine environment not able to be included in currently proposed Marine Parks and Marine Nature Reserves.

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.

Provide a basis for State/Commonwealth agreement to take advantage of possible World Heritage Nomination and Listing.

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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

THE WORLD HERITAGE CONVENTION

The 'Convention Concerning the Protection of the World Cultural and National Heritage, November 16, 1972' is a Convention established under the auspices of UNESCO to which 89 countries, including Australia, are signatories.

The Convention aims to promote co-operation amongst nations to protect important elements of the world's natural and cultural environments, which are seen to contribute substantially to our understanding of the earth and its resources and man's better use of them. In this regard nations which are a party to the Convention agree to adopt general policies aimed to give cultural and natural heritage a function in the life of the community, and to integrate the protection of this heritage through comprehensive planning programmes. Signatories to the Convention also undertake to refrain from any deliberate measures which may damage that heritage as well as taking appropriate legal, scientific, technical, and financial measures as necessary to ensure that protection.

The World Heritage Convention is administered by a group consisting of representatives from 21 nations known as the World Heritage Committee. Australia has served continuously on this Committee since 1976.

Within the terms of the Convention, the Committee has established a "World Heritage List" of properties having outstanding universal value which form part of the cultural and natural heritage of contributing countries. They include, for example, the Pyramids of Egypt, the Grand Canyon in the United States, the Taj Mahal of India, Chartres Cathedral in France and Sagarmatha National Park (containing Mt Everest) in Nepal. At present there are 247 places on the list.

In Australia there are six World Heritage properties, namely:

- Kakadu National Park in the Northern Territory
- The Great Barrier Reef
- The Willandra Lakes Region of western New South Wales
- The Lord Howe Islands Group off New South Wales
- The Western Tasmania Wilderness National Parks

The Australian East Coast Temperate and Subtropical Rainforest Parks (N.S.W.)

The World Heritage Committee has developed some rigorous criteria for assessing natural and cultural values of heritage properties, based on Articles 1 and 2 of the Convention.

For cultural property, each property nominated must:

"(a) (i) represent a unique artistic achievement, a masterpiece of the creative genius; or

(ii) have exerted great influence, over a span of time or within a cultural area of the world, on developments in architecture, monumental arts or town-planning and landscaping; or

(iii) bear a unique or at lease exceptional testimony to a civilisation which has disappeared; or

(iv) be an outstanding example of a type of structure which illustrates a significant stage in history; or

(v) be an outstanding example of a traditional human settlement which is representative of a culture and which has become vulnerable under the impact of irreversible change; or

(vi) be directly and tangibly associated with events or with ideas or beliefs of outstanding universal significance; and

(b) meet the test of authenticity in design, materials, workmanship or setting."

For natural property, properties nominated must:

"(i) be outstanding examples representing the major stages of the earth's evolutionary history; or

(ii) be outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment; as distinct from the periods of the earth's development, this focuses upon ongoing processes in the development of communities of plants and animals, landforms and marine and freshwater bodies; or

(iii) contain superlative natural phenomena, formations or features or areas of exceptional natural beauty, such as superlative examples of the most important

ecosystems, natural features, spectacles presented by great concentrations of animals, sweeping vistas covered by natural vegetation and exceptional combinations of natural and cultural elements; or

(iv) contain the most important and significant natural habitats where threatened species of animals or plants of outstanding universal value from the point of view of science or conservation still survive".

It is the World Heritage Committee which decides, following the nomination of a property by a participatory nation, that a property is suitable to be inscribed on the World Heritage List. For this purpose a number of inter-government procedures have been set up to allow nominations to proceed.

Within Australia arrangements exist whereby properties within states or territories are nominated to the Commonwealth Government by the representative government of the state or territory concerned. It is then up to the Commonwealth to ensure that the property fulfils the criteria set down by the World Heritage Convention.

In this context, the Commonwealth Government is committed to the preservation of Australia's natural and cultural heritage and considers that this aim can best be achieved through co-operation and consultation with states and territories. When the Commonwealth is convinced that a property or place contains features which should be conserved in perpetuity, and those features are sufficient to fulfil the major criteria for listing as a World Heritage property, the Commonwealth makes a formal nomination to the World Heritage Committee.

As a major facet of the World Heritage Convention is to ensure protection of inscribed properties, it becomes mandatory for a nation to manage such places to the best of its ability. In Australia, to do this, management plans have been developed for all six of Australia's World Heritage properties and to assist this purpose substantial Commonwealth Government financial assistance has been provided.

Moreover, in Australia, the Commonwealth Government has enacted "The World Heritage Properties' Conservation Act 1983" with the intent of ensuring the conservation and management of those places in Australia or under Australian control which have been included on the World Heritage List.

SHARK BAY

With respect to Shark Bay, the area as a whole is seen to fit a number of natural values indicated in the criteria suitable for it to be included in the World Heritage List.

For example, the stromatolites of Hamelin Pool are a significant natural phenomenon, as is the hypersaline embayment of the Pool itself.

Additionally, the Wooramel Seagrass Bank and nature reserves of Bernier and Dorre Islands are also significant. Other natural features, including the dugong population, seagrass meadows and the dolphins of Monkey Mia, are also relevant.

With respect to its cultural values, Shark Bay contains sites of the earliest known European landings in Western Australia, particularly that of Dirk Hartog in 1616 at Cape Inscription. Furthermore, the detailed historic documentation of the geography and natural science of Shark Bay by the early explorers de Freycinet, Baudin, Dampier, Hamelin and Peron is of international interest.

World Heritage listing has real merit for Shark Bay in a number of ways, viz:

- prestige
- tourism
- funding
- research, management and presentation
- conservation and protection

Increased 'prestige' would be met through the international recognition of both the importance and the uniqueness of Shark Bay. This then flows into the arena of tourism, and the funding resources which accrue for the management and maintenance of the area.

World Heritage places are centres of major tourist interest. Moreover, the Commonwealth Government is committed to assist financially in the management of such places, which in itself would be of great value to Shark Bay.

On the other hand, listing may be seen to have some disadvantages, mainly:

- Perceived unwarranted scrutiny from an external party - eg. UNESCO. However, this is unlikely to happen to a properly managed area.
- Concern that the Commonwealth's role under the World Heritage Properties Conservation Act can be used in a way to sway unreasonably, or to dominate the State and the people of Shark Bay, in the management of the area. This problem can be overcome by ensuring at the outset that the management plan and any relevant State

legislation is consistent with the objectives of a World Heritage Property, primarily one which is to be managed for a range of purposes including the promotion of free enterprise in a conserved landscape. The basic thrust, therefore, in both the State's and the Commonwealth's aims should be toward complementary goals.

Recommendation

It is considered that the State Government should appoint a special committee composed of Ministers of the relevant portfolios and representatives of Local Government, to investigate the benefits and implications of World Heritage Listing for Shark Bay.

The Committee would have discussions and negotiations with the Commonwealth, the Australian Heritage Commission, and State and Local Government bodies affected by areas currently listed.

The Committee should be empowered to travel to World Heritage areas and receive evidence from other persons and bodies before reporting to Government.

Reference

UNESCO (1983). 'Convention Concerning the Protection of the World Cultural and Natural Heritage, November 16, 1972,' In 'Conventions and Recommendations of UNESCO Concerning the Protection of the Cultural Heritage.' Pp. 75-98. (UNESCO: Paris; reprinted and updated 1985.)

Legislation

World Heritage Properties' Conservation Act 1983 (Commonwealth of Australia)

APPENDIX 2

ENVIRONMENTAL REVIEW OF PROPOSED REGION PLAN

Implications on the System 9 Recommendations

In 1975 the Environmental Protection Authority (EPA) made a number of recommendations concerning conservation issues in Shark Bay. These recommendations were subsequently endorsed by Government in 1976. In making these recommendations (See Appendix 3), the EPA not only recognised that the Bay had high terrestrial and marine conservation values, but also that it supported a commercial fishing operation and had potential for increased recreation. Accordingly, the EPA recommendations covered four types of reservation for conservation purposes:

- Reserves for conservation of flora and fauna and natural features.
- National Parks for conservation and recreation.
- Marine Reserves for conservation of flora, fauna and natural features.
- Marine Parks for management of marine activities and aquatic recreation (Figure 9.0, EPA Red Book 1975).

From the conservation angle, these recommendations were highly appropriate. They not only accounted for those separate elements of the Bay which are recognised as being of scientific, cultural and historic interest, but also indicated the importance of the whole system which included and supported those elements.

Little action to implement most of these Government endorsed EPA proposals has occurred due to legislative difficulties. The opportunity to acquire several pastoral leases as suggested had arisen in the intervening period, but lack of funds prevented such acquisition.

From the point of view of the people of Denham and the pastoralists and fishermen who live and work in the area, the implications of the recommendations were far from agreeable, as it appeared that the system of reserves and parks proposed under existing legislation may have made the town of Denham redundant and jeopardised the livelihood of the region. Given the incompatibility between current use practices in the Bay and those allowed in National Parks, full implementation of the EPA recommendations would be very difficult.

Implementation of the major recommendations relating to Marine Parks and Reserves has also been restricted due to lack of suitable legislation, though with passage of the Conservation and Land Management Act 1984, this restriction has in part been removed.

In recognition of the problems involved with fully implementing the EPA recommendations, confirmation was sought from the EPA as to the intent of their recommendations in light of the Study Brief.

By letter of September 22, 1986, the Chairman of the EPA stated that its intent was:

"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. In our view, the exceptional attractions of the region should be managed in such a way that they are available for the enjoyment of all people."

The guidelines noted above, together with the assembled knowledge of the Shark Bay area and the relevant existing legislation, was used as a basis for devising the planning strategy described in the foregoing report. In broad terms, this strategy has attempted to define appropriate management objectives for each part of the area and to accommodate, where possible, existing uses which are compatible with those management objectives. Where current use and/or management is not compatible with the appropriate objective, it is recommended that the current use change or cease.

The current review of Shark Bay conservation needs has produced a set of proposals which do differ from the relatively straight forward 1975 proposals of the EPA, but the proposed plan does meet the requirements of Cabinet's Study Brief and in our view satisfies the intention of the EPA recommendation.

The Plan presented is consistent with the intent of the EPA, which is to ensure long term conservation, whilst accommodating appropriate levels of uses, and proposes means of achieving those objectives. Implications of the planning strategy in regard to the specific EPA recommendations are detailed below:

ANALYSIS OF SYSTEM 9 RECOMMENDATIONS

Recommendation 9.1.1 - Bernier and Dorre Islands

This plan endorses and extends this recommendation. The EPA recommended extension to the low water mark; this plan further suggests a marine reserve extension to a line approximating the six metre isobath on the eastern side of both islands.

Recommendation 9.1.2 - Dirk Hartog Island

This plan endorses the intent of this recommendation, but also acknowledges that present use of part of the island for pastoral purposes is compatible with the management objective of *protection of coastal landforms*. As such, the report proposes that so long as the lease holder manages the property without detriment to the landforms and their stabilising vegetation cover, there is no need for the State to purchase or cancel the lease in order to secure conservation interests. Potential tourist usage can also be accommodated without change of tenure. The plan does, however, recommend that land at Cape Inscription be transferred to the State from the Commonwealth for the purpose of an Historic Reserve.

The immediate intent of the EPA recommendations for Dirk Hartog Island can be achieved as proposed.

Recommendation 9.1.3 - Edel Land and Inlets and Loops

This plan endorses the intent of Recommendations 1 and 2.

The northern part of Edel Land is not suitable for grazing, though it does have significant recreation potential. Accordingly, that part of Edel Land lying north of Zuytdorp Point and including Bellefin Prong and Steep Point should be excised from the pastoral lease and managed for purposes of environmental protection and recreation. Recommended tenure is National Park.

Present use of other parts of Edel Land for *pastoral uses* is considered a suitable long term use and is compatible with further management objectives for *protection of coastal landforms* in that the present level of use with conservative management does not unduly compromise conservation or scenic values. Accordingly, the majority of these land areas are proposed to remain as pastoral lease. For the remainder, including the coastal ridge and Heirisson Prong, the management objective would be *protection of coastal landforms*.

The Useless Loop mining tenement, which was not specifically mentioned by the EPA, remains a mineral lease with its associated urban area. The report notes, however, that some of the evaporating ponds are important for transequatorial wading birds and makes a number of recommendations in this regard.

The plan also endorses the intent of Recommendation 3, but recognises the existence of the Conservation and Land Management Act 1984 which now enables declaration of Marine Parks. The report recommends that these water bodies be set aside as part of a Marine Park for fisheries management,

conservation and recreation, with special attention given to protection of dugong habitats.

It is considered that these proposals satisfy the intent of the EPA recommendations for Edel Land and the associated Inlets and can be achieved.

Recommendation 9.1.4 - Peron Nanga Area

The plan endorses the intent of the recommendations.

The northern part of the Peron Peninsula, north of the Denham/Monkey Mia road, is recognised as having significant recreation and conservation values. The management objective for this area, including Big and Little Lagoons, is *environmental protection and recreation*. Proposed tenure is National Park to be created in three stages (See Figure 7). The existing tenement for gypsum mining is acknowledged in the Plan with the recommendation that it be the subject of the EPA's environmental assessment procedures.

Present use of the southern parts of Peron Peninsula and the northern Nanga Peninsula for pastoral purposes is a viable long term use. The present level of use with conservative management does not unduly compromise major conservation or scenic values. Denham, the designated administrative and tourist centre for the region, is a viable and expanding urban area.

Accordingly, the proposed management objective for the central part of the Peron Nanga Peninsula area is pastoral use, with Denham set aside for urban use.

The southern parts of Nanga and Tamala stations and the western parts of Cockburn station are recognised as poor pastoral country, with significant botanical and zoological values and having no competing uses. The proposed management objectives for this area are *vegetation protection* and *protection of coastal landforms*. The area described adjoins the existing undeclared Zuytdorp National Park and the Cooloomia Nature Reserve. It is recommended that this land be excised from the pastoral leases and amalgamated with the existing conservation reserves to form the proposed Zuytdorp Nature Reserve of some 251,800 ha.

The northern most extremity of Nanga Peninsula and Petit Point ties the western end of Faure Sill. It should be managed for *vegetation protection* in conjunction with the Hamelin Pool system.

The proposals outlined above satisfy the intent of the EPA recommendations for the Peron Nanga area and can be achieved.

Recommendation 9.1.5 - Small Islands of Shark Bay

The plan endorses this recommendation, though note is made that Slope Island no longer supports nesting of the Wedgetailed Shearwater. Meade Island is proposed to be included in this Nature Reserve system.

Recommendation 9.1.6 - Hamelin Pool/Faure Sill

The plan endorses the intent of these recommendations, noting also that the passage of the Conservation and Land Management Act 1984 supersedes Recommendation 3. The report notes, however, that Recommendation 1 has not been implemented and that the Holocene sedimentary deposits, in some cases, extend inland more than 40 metres. Accordingly, the plan recommends that where Holocene deposits extend more than 40 metres inland from Hamelin Pool, these lands be acquired for addition to the Marine Nature Reserve proposed for Hamelin Pool.

Interim protection of these lands could be afforded by exemption from mining and exploration by proclamation under Section 19(1) of the Mining Act 1978.

The plan designates Hamelin Pool and Faure Sill as an area to be managed for *protection of stromatolites and sedimentary deposits*. It is recommended that the area south of a line eastward from Petit Point to Kopke Point be set aside as a Marine Nature Reserve under the Conservation and Land Management Act 1984. It is proposed that the Faure Sill and areas beyond the 40m pastoral boundary be excluded from exploration and mining under Section 19(1) of the Mining Act 1978. It is considered that the intent of the EPA recommendations for the Hamelin Pool/Faure Sill area is satisfied and can be achieved by the measures outlined.

Recommendation 9.1.7 - Wooramel Seagrass Bank

The plan endorses the intent of these recommendations, but acknowledges that an important boat launching facility exists at Gladstone and that recreational fishing in the area is a legitimate long term use. Accordingly, the plan allows for a boating access corridor between Gladstone and Hopeless Reach.

The plan also recognises the particular importance of various parts of the Bank, such as the dugong summer refuge area off Wooramel Delta, the prawn and fish nursery area to the north, and the low impact commercial beach seine fishing that occurs in other places. Accordingly, the plan recommends that the appropriate management objectives for this area include *dugong habitat protection* and *prawn nursery and seagrass protection*. The area should be set aside as part of a Marine Park with permitted beach seine

fishing use under amended CALM Legislation. The area should also be the subject of exclusion of mining under Section 19(1) of the Mining Act 1978 as an interim measure.

It is considered that the intent of the EPA recommendations for the Wooramel Seagrass Bank can be achieved as proposed.

Recommendation 9.1.8 - Denham Sound/Freycinet Reach and Estuary/Hopeless Reach and Lharidon Bight

The plan endorses the intent of these recommendations in that it recognises that a range of different types and levels of fishing activity can be supported within the area in the long term. In addition, the plan recognises that some parts of the Bay are important dugong habitats (including the shallow waters to the east of Bernier and Dorre Islands) and that dolphins congregate in the shallow waters around Monkey Mia. Accordingly, the plan has subdivided the water areas of the Bay into four types with different management objectives. These are:

- *Commercial fishing, trawling and recreation*
- *Recreation and commercial fishing*
- *Dugong habitat protection*
- *Dolphin habitat protection*

In addition, the management objective for the waters adjacent to the Wooramel Seagrass Bank is *prawn nursery and seagrass protection.*

The plan recommends that the water areas of the Bay, up to 40 metres above high water mark, be set aside as a Marine Park, under amended Conservation and Land Management legislation and/or the provisions of relevant sections of the Waterways Conservation Act 1976, to allow for the multi-purpose use envisaged by the EPA and endorsed by this plan. In this manner, we consider that the intent of the EPA recommendations for the water areas for the Bay can be achieved.

Additional Supporting Material

In addition to the above EPA recommendations, the plan attempts to treat Shark Bay as a whole and accordingly, it embraces an area far greater than that covered by the EPA.

The plan includes the lands and waters that surround Shark Bay proper, including its mainland shore and outer islands. An attempt has been made to reinforce the fact that not only are certain features in Shark Bay important, but that the system as a whole is vital in maintaining those features.

In recognising the importance of the eastern shore, the land areas adjacent to Hamelin Pool and the Wooramel Seagrass Bank have also been included in an attempt to define appropriate management objectives for land abutting these sensitive intertidal and supratidal zones.

Similarly, the presence of commercial fishing to the north of the area considered by the EPA has also been the subject of study and an attempt made to define appropriate management objectives so that a balanced fish management programme for the Shark Bay area as a whole can be achieved.

The end result of the plan, which covers a much greater area of land and water than that covered by the EPA, is that management objectives for various parts of the area have been defined. Adoption of this plan will not pose any risk to the Shark Bay environment; on the contrary, it will provide an effective conservation framework for the area. The plan draws on the best knowledge available and takes into account not only the current use of parts of the area, but also the importance of various parts of the Shark Bay system in maintaining the system as a whole.

In order to achieve the intent of the EPA recommendations, those parts of the Bay which have undisputed conservation values are recommended as reserves, with the management objective for conservation. In those parts where there is legitimate long term use, such as grazing, professional fishing or recreation, multi-purpose use, governed by conservative management objectives, is recommended. In this manner, we consider that not only will the intent of the EPA recommendations be achieved and implemented, but also that the legitimate use of some parts of the Bay will continue and that the economic base of the area will be retained within a framework of maintaining the Shark Bay system as a whole.

On September 22, 1986, the Chairman of the Environmental Protection Authority advised of several aspects of environmental concern which should be addressed in the planning strategy for Shark Bay. These include:

". a clear statement concerning the plan's impact on the Red Book Recommendations 9.1 (See Appendix 3);

. the key features of the area's terrestrial and marine ecosystems;
(If significant changes are made to the land use Red Book recommendations, then these should be formulated with the benefit of a detailed understanding of the terrestrial ecology of the area)

. the growing impact of tourism on the entire Shark Bay environment including both the aquatic and terrestrial systems;

- the need to protect the Faure Sill from increasing public activity, particularly the use of boats;

- the need to define an effective boundary between Hamelin Pool and neighbouring pastoral activity;

- a need to protect the important historic, geological, and aboriginal sites in the study area;

- the implications of the possible expansion of the Useless Loop salt mining operation;

- the measures to overcome the existence of some poor grazing practices on pastoral leases;

- the need to clearly define the areas of the Bay in which prawn trawlers may operate in;

- the possible need to designate migratory pathways used by Dugongs during their movements around the Bay;

- The possible designature of Shark Bay as a World Heritage Area.

In addition the Report should contain:

- predictions of the anticipated environmental risks and impacts which will arise from interactions as a result of the implementation of the Plan and the local ecological systems;

- an evaluation of the significance of such risks and impacts, and their acceptability;

- detailed information about the security of tenure and purpose for each of the identified land and marine uses;

- an outline of requirements for the preparation of management plans."

We consider that all of these have been addressed in the text and are properly dealt with.

Deficiencies in Conservation Legislation

Perhaps the main difficulty for the study has been the facility of suitable conservation legislation to provide for a multiple land-use situation at Shark Bay. The measures available are cumbersome and some require amendment.

The report concludes that at least the marine areas of Shark Bay must be considered at risk.

The application of legislation is considered to be a priority to enable a management structure and programme to be implemented immediately

In conclusion, the plan acknowledges that knowledge on the Shark Bay system is incomplete and that, like all plans, change in knowledge can be accommodated by a change in the plan. Just as the EPA based their proposals on the knowledge at their disposal in 1974/75, this plan is based on the knowledge available today.

It is believed that the Shark Bay Region Plan is capable of implementation with strong local support.

APPENDIX 3

CONSERVATION RESERVES FOR SHARK BAY AS RECOMMENDED BY THE ENVIRONMENTAL PROTECTION AUTHORITY 1975

SYSTEM 9 - CENTRAL WEST COAST

9.1 SHARK BAY

9.1.1 Bernier and Dorre Islands

The EPA endorses the present status (A24869), purpose (Conservation of Flora and Fauna) and vesting (WA Wild Life Authority) of Bernier and Dorre Islands. It recommends that the reserve boundaries be extended to low water mark, and that public access to the islands be strictly controlled.

9.1.2 Dirk Hartog Island

The EPA recommends that:

1. the Department of Lands and Surveys be requested that attempts be made to purchase Dirk Hartog Island, should it come on the market, thus facilitating the reservation of the land as a Class A reserve for the purpose of "National Park", vested in the National Parks Board, otherwise the land be reserved when the lease expires, in which case it is assumed that the lessee will be paid the value of improvements on the land;

2. the Department of Lands and Surveys be requested that the lessee not be given authority at any time to clear or chain any of the land or to do anything to disturb the land other than is provided in the lease.

9.1.3 Edel Land

The EPA recommends that:

1. the Department of Lands and Surveys be requested that attempts be made to purchase Carrarang Station and Tamala Station, should they come on the market, thus facilitating the reservation of the land as an A Class reserve for the purpose of "National Park", vested in the National Parks Board, otherwise the land be reserved when the leases expire, in which case it is

assumed that the lessees will be paid the value of improvements on the land;

2. the Department of Lands and Surveys be requested that the lessees not be given authority at any time to clear or chain any of the land or to do anything to disturb the land other than is provided in the leases;

3. that Boat Haven, Depuch and Disappointment Loops and Blind Strait be set aside for fisheries management and aquatic recreation placed under the control of the Director of Fisheries and Wildlife;

9.1.4 Peron-Nanga Area

The EPA recommends that:

1. the Department of Lands and Surveys be requested that attempts be made to purchase leases in the Peron-Nanga area, should they come on the market, thus facilitating the reservation of the land as a Class A reserve for the purpose of "National Park", vested in the National Parks Board, otherwise the land be reserved when the leases expire, in which case it is assumed that the lessees will be paid the value of the improvements on the land;

2. the Department of Lands and Surveys be requested that the lessees not be given authority at any time to clear or chain any of the land or do anything to disturb the land other than is provided in the leases;

3. the proposed reserve comprises the interdune lagoons in the vicinity of Denham and Cape Lesueur and extend to low water mark.

9.1.5 Small Islands, Shark Bay

The EPA endorses the status, purpose (Wildlife Sanctuary) and vesting (WA Wild Life Authority) of the small islands currently reserved in Shark Bay, and recommends that, should Slope Island be released in the future, it be included in the reserves and causeway severed.

"The importance of the bird population in Shark Bay, can be illustrated by the Wedge-tailed

Shearwater *Puffinus pacificus* which show a variation of plumage unknown elsewhere in Western Australia or indeed in any other nesting station in the Indian ocean. The Shearwater example suggests that there may be unknown and less obvious, but comparable variations as yet unstudied in other species."

(Serventy, D L 1972)

9.1.6 Hamelin Pool and Faure Sill

The EPA recommends that:

1. the existing Class A reserve 30885, be extended to 40m above high water mark, have its purpose amended to protection of Sedimentary Deposits and Conservation of Flora and Fauna, and be vested in the WA Wild Life Authority;

2. the area of Hamelin Pool and Faure Sill below low water mark as designated in Figure 9.4, be declared an aquatic reserve for the purpose of protection of Sedimentary Deposits and Conservation of Flora and Fauna, vested in the WA Wild Life Authority;

3. until legislation is enacted to allow conservation reserves to include submarine lands, the Fisheries Act be employed to protect the marine areas designated in recommendation 2 and the Director of Fisheries and Wildlife be made responsible for their protection.

9.1.7 Wooramel Seagrass Bank

The EPA recommends that:

1. the Wooramel Seagrass Bank be reserved in a manner which will protect the seagrass and its environment. When appropriate legislation is available, the seagrass bank should be reserved for the purpose of Fisheries Management and Recreation under the control of the Director of Fisheries and Wildlife who should be required to manage it as though it were a "National Park";

2. the boundaries of the reserve include the area below high water mark extending

seaward to the 25 metre isobath, between latitudes 25° S and 26° S, including adjacent tidal flats.

9.1.8 Denham Sound, Freycinet Reach and Estuary, Hopeless Reach and Lharidon Bight

The EPA recommends that the area of Denham Sound, Freycinet Reach and Estuary, Hopeless Reach and Lharidon Bight as shown in figure 9.2 be set aside for Fisheries Management and aquatic recreation and placed under the control of the Director of Fisheries and Wildlife.

NOTE:

1. The functional roles of both the 'National Parks Board' and the 'WA Wild Life Authority' are now assumed by the 'National Parks and Nature Conservation Authority' established pursuant to Section 22 of the Conservation and Land Management Act 1984.

2. Wildlife conservation matters are now under the control of the Executive Director, Department of Conservation and Land Management.

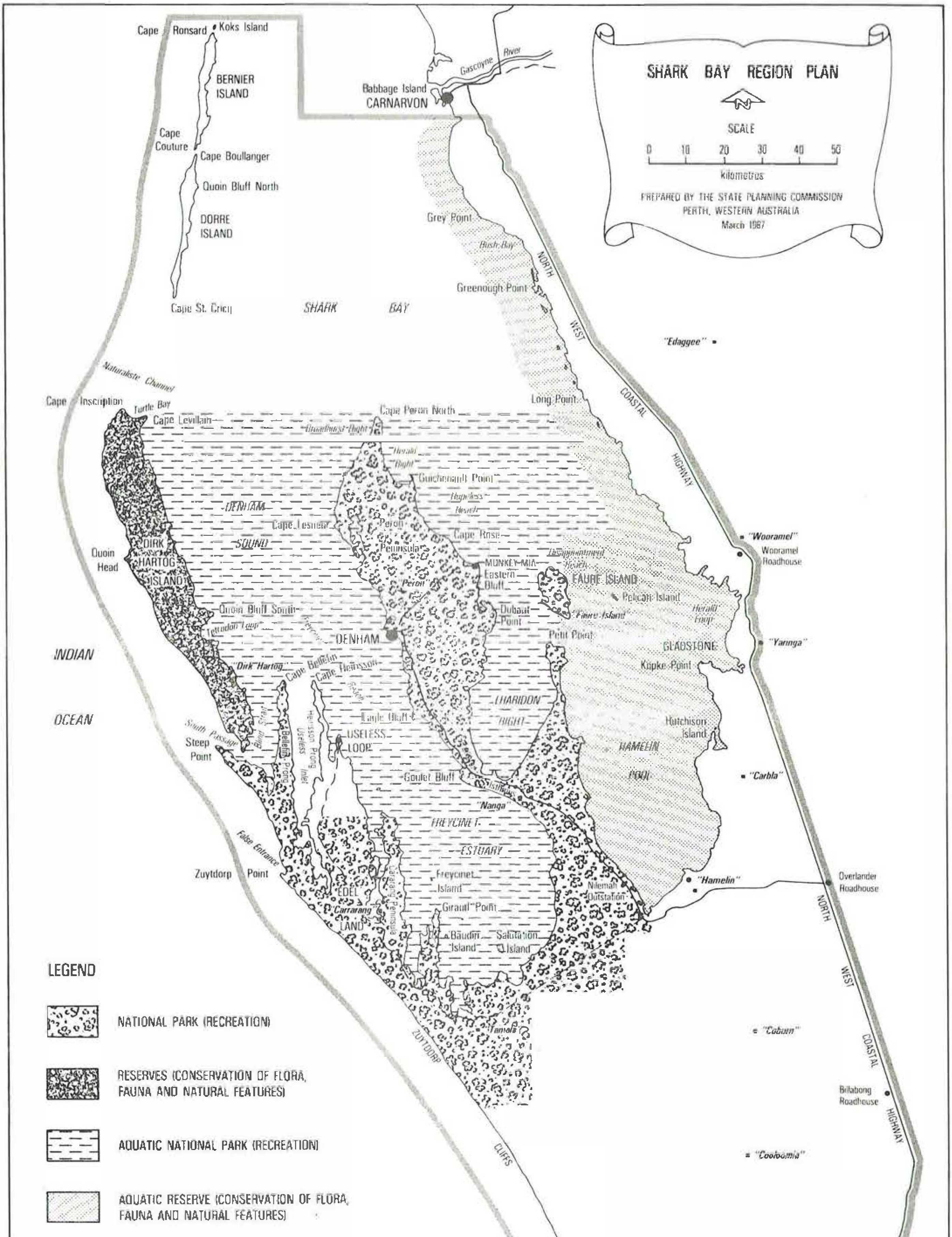
SHARK BAY REGION PLAN
SCALE
0 10 20 30 40 50
kilometres
PREPARED BY THE STATE PLANNING COMMISSION
PERTH, WESTERN AUSTRALIA
March 1987
Cape Ronsard
Koks Island
BERNIER ISLAND
Cape Couture
Cape Boullanger
Quoin Bluff North
DORRE ISLAND
Cape St. Cricq
SHARK BAY
Babbage Island
CARNARVON
Gascoyne River
Grey Point
Bush Bay
Greenough Point
NORTH WEST COASTAL HIGHWAY
"Edaggee"
Naturaliste Channel
Cape Inscription
Turtle Bay
Cape Levillain
Cape Peron North
Long Point
Herald Bight
Guichenault Point
Hopeless Reach
DENHAM SOUND
Cape Lesueur
Peron Peninsula
Cape Rose
DIRK HARTOG ISLAND
Quoin Head
MONKEY MIA
Eastern Bluff
FAURE ISLAND
Pelican Island
"Wooramel"
Wooramel Roadhouse
Quoin Bluff South
Dubaut Point
Petit Point
DENHAM
GLADSTONE
"Yaringa"
Kopke Point
INDIAN OCEAN
"Dirk Hartog"
Cape Bellefin
Cape Heirisson
L'HARIDON BIGHT
Eagle Bluff
Hutchison Island
South Passage
Steep Point
Bellefin Prong
Heirisson Prong
Useless Inlet
USELESS LOOP
HAMELIN POOL
"Carbla"
Goulet Bluff
"Nanga"
FREYCINET ESTUARY
False Entrance
Zuytdorp Point
EDEL LAND
"Carrarang"
Freycinet Island
Giraud Point
"Hamelin"
Nilemah Outstation
Overlander Roadhouse
Baudin Island
Salutation Island
"Tamala"
ZUYTDORP CLIFFS
"Coburn"
Billabong Roadhouse
"Coolloomia"
"Nerren Nerren"
Zuytdorp National Park
LEGEND
NATIONAL PARK (RECREATION)
RESERVES (CONSERVATION OF FLORA, FAUNA AND NATURAL FEATURES)
AQUATIC NATIONAL PARK (RECREATION)
AQUATIC RESERVE (CONSERVATION OF FLORA, FAUNA AND NATURAL FEATURES)
E.P.A. SYSTEM 9 RECOMMENDATIONS

Figure 10.

APPENDIX 4

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	Disappoint-ment Reach

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

APPENDIX 5

LIST OF WORKING PAPERS AND RELATED SUBMISSIONS

GOVERNMENT

Commonwealth

Australian Customs Service

Australian Tourist Commission

Department of Aviation (WA Region)

Department of Employment & Industrial Relations (WA State Office)

Federal Department of Transport

State

Department of Conservation and Land Management

Education Department

Environmental Protection Authority

Gascoyne Regional Development Advisory Committee

Department of Industrial Development

Keep Australia Beautiful Council (WA)

Fisheries Department

Department of Land Administration

Main Roads Department

Department of Marine and Harbours

Department of Mines (Geological Survey of WA)

Pastoral Board of WA

Department of Agriculture

Department of Regional Development and the North West

Department of Sport and Recreation

WA Tourism Commission

Department of Transport

WA Heritage Committee

WA Police

Western Australian State Emergency Service

Water Authority of WA

Local

Shire of Carnarvon Council

Shire of Shark Bay Council

Other

Mr G M Gare - Consultant for Shire of Shark Bay

Dr P J Woods - Environmental Consultant

PRIVATE

Groups:

Australian Mining Industry Council

Conservation Council of WA Inc.

Denham Fishermen's Association

Fund for Animals Ltd., Australia

Pastoralists and Graziers Association of WA (Inc.) - Shark Bay District Committee

Shark Bay Chamber of Commerce WA

Shark Bay Tourist Committee

The Chamber of Mines of WA (Inc.)

The Tree Society

WA Naturalists' Club (Inc.)

WA Recreational Fishing Council
(Australian Anglers Association (WA Division) Inc.)

Western Walking Club (Inc.)

Individuals:

Dr P K Anderson

Mr J W Andrews

Mr M G Brooker

Mr L Brown

Mr L K Burton - Oldham Boas Ednie-Brown

Mr W H Clough

Dr D H Dale

Mr & Mrs T Gosling

Mr R O Hoult

FA and EM Love

WE and HS Mason

Mr P Moore

Mr E Scott

Messrs J L Sellenger and I G Pinnegar

Mr I Shann - General Prawn (WA) Pty Ltd

The Angliss Group

Mr D P Steadman - Wooramel Pastoral Co

Other:

CSIRO (WA)

University of WA - Geology Department
- Centre for Pre history
- Botany Department

WA Museum

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