SHARK BAY

WORLD HERITAGE AREA

Draft Strategic Plan

November 1995 Version

Prepared by Department of Conservation and Land Management

PREFACE

The Shark Bay World Heritage Area was inscribed on the World Heritage list in 1991. The Area was listed on the basis of its outstanding universal natural values.

The draft strategic plan has been prepared by the Department of Conservation and Land Management (CALM). CALM is the lead agency for management of the World Heritage Area (WHA). The Shark Bay Region Plan Review Steering Committee has provided input into the preparation of this draft.

The strategic plan will provide a broad overview for management of the Shark Bay WHA. It will provide guidance for agencies, users and other interest groups in relation to the WHA. The plan will give effect to the intent of the Shark Bay Region Plan, and the subsequent revision of that plan underway in 1995.

The plan focuses on strategies which are necessary to satisfy Australia's international duty to protect, conserve, rehabilitate, present and transmit to future generations, Shark Bay's World Heritage values.

This draft plan will be released for public comment for a minimum period of two months. On review of public submissions a final plan will be adopted by the State Government which will then provide the framework for management of the WHA for the next ten years.

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1.0 INTRODUCTION

Shark Bay, located 700 kilometres north of Perth (Figure 1) on Australia's most westerly point, was inscribed on the World Heritage list in 1991 for its outstanding universal natural values. It encompasses about 22 000 sq km, is 66% marine and has about 1500 km of coastline. Figure 1 shows the boundary of the World Heritage Area (WHA). A formal description of the boundary is given in Appendix 1 [This is being negotiated with stakeholders and the Commonwealth Government, and will be incorporated in this strategic plan in due course]. At the time of listing the Shark Bay WHA was Australia's tenth and Western Australia's only World Heritage area and was one of just 11 places on the World Heritage List to satisfy all four of the natural criteria upon which a nomination is considered.

The Shark Bay WHA contains an outstanding example of the earth's evolutionary history with its microbial communities, including the stromatolites of Hamelin Pool. Significant ongoing geological and biological processes occur in both the marine and terrestrial environments of Shark Bay, including the evolution of the Bay's hydrologic system, the hypersaline environment of Hamelin Pool and ongoing evolution, succession and creation of refugia.

The Wooramel seagrass bank, Faure Sill and associated unique hydrologic structure and the Zuytdorp cliffs are examples of the many superlative natural phenomena or features found in the WHA. The WHA provides the habitat of a number of threatened species, including five mammals that have their only or major populations in the WHA: the Shark Bay Mouse, Banded Hare-wallaby, Mala or Rufous Hare-wallaby, Western Barred Bandicoot and Boodie or Burrowing Bettong. Many other species are endemic or at the limit of their range.

Although only inscribed for its natural values Shark Bay has significant Aboriginal and European cultural values. The WHA has substantial social and economic values, for example for fishing, pastoral use and tourism.

The World Heritage List is established under the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention). Australia has an international obligation to protect, conserve, rehabilitate, present and transmit to future generations the World Heritage values of Shark Bay.

World Heritage listing does not take away ownership rights or control and State and local laws still apply. [The State and Commonwealth Governments are negotiating a management agreement for the WHA and complementary legislation is proposed. When this strategic plan is finalised, it will reflect the status of the agreement and legislation.] The Western Australian Department of Conservation and Land Management (CALM) is the lead management agency for the Shark Bay World Heritage Area.

The Shark Bay WHA occurs within the Shires of Shark Bay and Carnarvon. Some highly modified enclaves are excluded from the WHA, namely the town of Denham and environs, Useless Loop saltworks and gypsum leases on Edel Land.

Australia's primary management objectives for World Heritage Areas under the World Heritage Convention are to:

- protect, conserve, rehabilitate, present and transmit to future generations the World Heritage values of the area;
- integrate the protection of the area into a comprehensive planning program;
- give the World Heritage Area a function in the life of the Australian community;
- strengthen appreciation and respect of the area's World Heritage values particularly through educational and information programs;
- keep the community informed about the condition of the World Heritage values of the area; and
- take appropriate scientific, technical, legal, administrative and financial measures necessary for achieving these objectives.

Why is a strategic plan necessary?

This strategic plan provides a broad overview for management of the Shark Bay WHA. It will give effect to the intent of the Shark Bay Region Plan (1988), and the subsequent revision of that plan (underway in 1995), in relation to protecting and managing the World Heritage values.

This plan will provide direction and guidance for agencies, users and other interest groups in relation to the WHA. More detailed management plans have been or are being prepared for specific conservation reserves (see Section 7.4 Planning) and for the management of fish resources.

Format of the Strategic Plan

The draft strategic plan includes sections on:

- Shark Bay's World Heritage values;
- goals (long term aims) for management;
- administration of the WHA (legislation, agreements, committees);
- management issues affecting the achievement of each goal; and
- strategies to manage these issues.

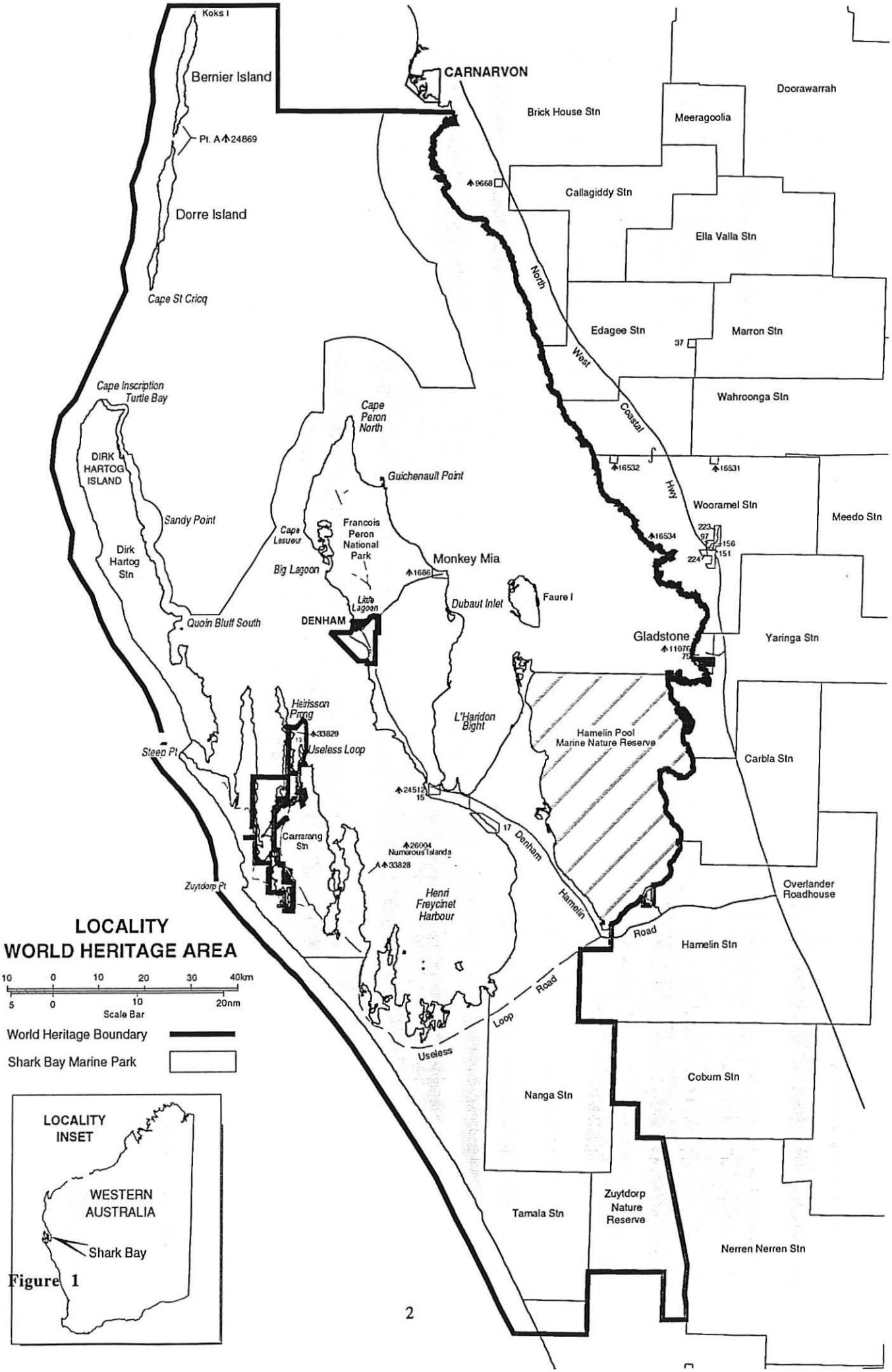

Koks I
Bernier Island
Pt. A 24869
Dorre Island
Cape St Cricq
CARNARVON
Brick House Stn
Doorawarrah
Meeragoolia
9668
Callagiddy Stn
Ella Valla Stn
North West Coastal Hwy
Edagee Stn
37
Marron Stn
Wahroonga Stn
16532
16531
Wooramel Stn
Meedo Stn
16534
223
97
156
151
224
Cape Inscription
Turtle Bay
DIRK HARTOG ISLAND
Sandy Point
Dirk Hartog Stn
Quoin Bluff South
Cape Peron North
Guichenault Point
Cape Lesueur
Francois Peron National Park
Big Lagoon
Monkey Mia
1686
Little Lagoon
DENHAM
Dubaut Inlet
Faure I
Gladstone
11076
75
Yaringa Stn
Herisson Prong
33829
13
Useless Loop
Steep Pt
L'Haridon Bight
Hamelin Pool Marine Nature Reserve
Carbla Stn
2451
15
17
Denham
Hamelin
Road
Carrarang Stn
26004
Numerous Islands
A 33828
Zuytdorp Pt
Henri Freycinet Harbour
Overlander Roadhouse
Hamelin Stn
Loop Road
Useless
Coburn Stn
Nanga Stn
Tamala Stn
Zuytdorp Nature Reserve
Nerren Nerren Stn
LOCALITY
WORLD HERITAGE AREA
10 0 10 20 30 40km
5 0 10 20nm
Scale Bar
World Heritage Boundary
Shark Bay Marine Park
LOCALITY INSET
WESTERN AUSTRALIA
Shark Bay

Figure 1

2.0 GOALS

Goals, or the long term aims for management, have been developed focussing on the natural values of the Shark Bay WHA.

PRIMARY GOAL
Provide for the implementation of Australia's international duty to protect, conserve, rehabilitate, present and transmit to future generations, Shark Bay's World Heritage values, within the meaning of the World Heritage Convention.

In achieving this primary goal due regard will be given to:

- allowing for the provision of essential services to the communities within and adjacent to the area;
- allowing for uses of the area which do not threaten the World Heritage values and integrity;
- recognising the role of current management agencies in the protection of the area's values; and
- involving the local community in the planning and management of the WHA.

PROTECTION
Protect Shark Bay's World Heritage values through effective legislation and management.

Arrangements for protection and management are detailed in the Agreement Between The State of Western Australia And The Commonwealth Of Australia On Administrative Arrangements For The Shark Bay World Heritage Property. In Western Australia. The Agreement allows for protection and management to be achieved through existing State legislation by the relevant State government agencies and local government. Reciprocal State and Commonwealth legislation will be enacted to give effect to the Agreement. [Note: this anticipates finalisation of the agreement under negotiation].

CONSERVATION
Conserve Shark Bay's World Heritage values by actively eliminating threatening processes affecting the long-term integrity of the area and its capacity for ongoing natural evolution.

The degree of threat will determine the level of management required. Research and monitoring programs will be undertaken to assist in the understanding, control and eventual elimination of threatening processes, thereby maximising the extent of self-sustaining natural areas.

REHABILITATION
Rehabilitate degraded areas where necessary to maintain the integrity of Shark Bay's World Heritage values.

In addition to eliminating threatening processes, degraded areas will be identified where active rehabilitation measures are required.

PRESENTATION
Present the Shark Bay WHA to local, national and international communities.

The Shark Bay WHA will be presented in ways which create a greater appreciation of, and support for, its outstanding universal values.

TRANSMISSION
Transmit to future generations the outstanding universal values of the Shark Bay WHA.

Transmission will only be achieved if the protection, conservation, rehabilitation and presentation goals are achieved.

3.0 SHARK BAY'S WORLD HERITAGE VALUES

3.1 WORLD HERITAGE CRITERIA

Four criteria are used to assess whether an area containing natural heritage should be included on the list of World Heritage Areas. When listed in 1991 the Shark Bay WHA was one of only eleven World Heritage sites world wide that meet all four natural criteria, out of the 84 sites listed for their natural heritage. The natural criteria (UNESCO, 1994) are:

- be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;
- be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;
- contain superlative natural phenomena or areas of exceptional natural beauty; and
- contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

A natural heritage site must also fulfil conditions of integrity (UNESCO, 1994)

3.2 WORLD HERITAGE VALUES

CRITERION 1: AN OUTSTANDING EXAMPLE REPRESENTING THE MAJOR STAGES OF THE EARTH'S EVOLUTIONARY HISTORY.

Shark Bay contains the most diverse and abundant examples of stromatolitic microbiolites in the world. Analogous structures were the dominant benthic ecosystem on Earth for 3000 million years. All life has evolved from a prokaryotic ancestor, the earliest record is in 3500 million year old rocks in the Pilbara area of Western Australia. .

For the next 2930 million years (ie, 85% of the history of life) only microbes populated the Earth. The only macroscopic evidence of their activities is preserved by stromatolites which reached their greatest diversity 850 million years ago. The stromatolites encrypt evidence of the biology of the microbial communities that created them and the nature of the environments in which they grew. They dominated the shallow seas and formed extensive reef tracts rivalling those of modern coral reefs.

Over this period microbes modified the earth's atmosphere by producing oxygen, evolved the ability to respire oxygen, emerged from the sea to colonise the land and evolved most of the survival techniques that life uses today.

Although microbes have not declined in importance, their activity in building organo-sedimentary structures has, it being more efficient to occupy niches in reefs constructed by faster growing organisms, or indeed to occupy positions within the organisms themselves. Consequently stromatolites and other microbiolites have declined in importance over this period, though they have remained locally significant in environments such as Hamelin Pool, where biotic diversity has been limited for one reason or another.

The stromatolites and microbial mats of Hamelin Pool were the first modern, living examples to be recognised as comparable to those that inhabited the early seas. Other occurrences have since been discovered including in Lake Clifton, Western Australia, and in the Exuma Cays of the Bahamas. These, however, augment rather than duplicate those at Shark Bay with Hamelin Pool remaining the most significant known occurrence of shallow marine and intertidal benthic microbial ecosystems living on the Earth today.

Modern day analogues such as occur in great diversity and abundance in Hamelin Pool greatly assist in the understanding of the nature and evolution of the earth's biosphere up until the early Cambrian. For example Proterozoic stromatolites are proving to be valuable tools in the relative dating of ancient rocks and are providing valuable information on interpreting palaeo-environments.

The microbial organisms living today are not primitive, but are modern organisms well adapted to and successful in their ecological niches. However, some of these organisms are phenotypically similar to forms that are millions of years old. The Hamelin Pool stromatolites are considered to be a 'classic site' for the study and classification of stromatolitic microbiolites, as the morphology and biology of diverse living types can be studied through a range of environments.

CRITERION 2: AN OUTSTANDING EXAMPLE REPRESENTING ONGOING GEOLOGICAL PROCESSES, BIOLOGICAL EVOLUTION AND MAN'S INTERACTION WITH HIS NATURAL ENVIRONMENT.

In a broad regional and global context Shark Bay is an outstanding example of biological evolution because it forms a transition zone between major ecological provinces. It is of great scientific interest for the study of biogeography including the evolution and extinction of species, the effects of isolation, succession, diversity and other factors such as effects of steep environmental gradients.

Marine Environment

Shark Bay has a unique hydrologic structure resulting from the restriction imposed by banks and sills, that has led to increased salinity in the southern parts of the Bay. This outstanding feature is characterised by three major water types, oceanic, metahaline and hypersaline, creating three corresponding biotic zones.

A key element of the hypersaline environment of Hamelin Pool is the growth of the Faure Sill, a barrier bank formed in the past 4000 years which creates a landlocked marine basin partially separated from Shark Bay, where hypersaline concentrations have developed to almost twice the salinity of normal seawater. The size, depth and other geomorphologic features of the basin combine with salinity to make this an environment unique in modern seas.

These conditions give rise to a number of significant geological and biological features and outstanding among these are the stromatolitic microbiolites. There are also restricted communities of marine organisms tolerant of hypersalinity, vast deposits of organic shells, ooid shoals and lithified sediments of recent age, broad supratidal flats with evolution of subsurface evaporitic deposits, and the meromictic blue ponds, which are rare and scientifically important.

The environmental microbiology of Shark Bay is unusual because extensive tracts of the intertidal and sub-tidal zones of the hypersaline gulfs and embayments are dominated by a wide variety of benthic microbial communities. These are best developed in Hamelin Pool and give the area the most significant assembly of phototrophic microbial ecosystems in the world.

Within the Bay, the effects of the steep environmental gradients are evident in the distribution and diversity of organisms. The most striking example is *Fragum erugatum,* one of few species to tolerate and also thrive in the hypersaline inlets of Shark Bay. Accumulations of these bivalves have, over a long period of time, resulted in spectacular white beaches and ridges such as Shell Beach and coquina (sedimentary rocks of lithified shells).

The steep-environmental gradients also have produced genetic variability among populations of marine species. For example, there is variation between snapper (*Chrysophrys unicolour*) populations inside Shark Bay and those outside, and between the eastern and western gulfs inside the Bay. Venerid clams are a further example of genetic divergence.

The area thus has a high level of genetic biodiversity. As a habitat for bivalves, Shark Bay is of major significance on the western coast of Australia, with high species diversity. The distribution of bivalves within Shark Bay shows an apparent link with salinity gradients.

In terms of ongoing biological and geological processes, Shark Bay provides an impressive example of the roles that seagrasses play in the modification of a whole shallow benthic ecosystem. Seagrass, covering over 4000 square kilometres, can be regarded as the dominant organism in Shark Bay. It has modified the physical, chemical and biological environment as well as the geology of the Bay.

The presence of extensive meadows of large seagrasses has influenced the water current regimes of the Bay, as the seagrasses slow the rate of water flow over the substratum. Rates of sediment accretion associated with the seagrass meadows in Shark Bay are greater than those associated with coral reefs. This is largely a function of the rapid rates of leaf turnover and the fact that the leaves carry a heavy load of calcareous epiphytes. Over geological time, these processes have led to the development of large sedimentary banks, such as the Faure Sill.

The build-up of these barrier banks and sills has restricted the circulation of oceanic seawater and in combination with low rainfall and high evaporation, has resulted in the increase in salinity observed in the inner reaches of the Bay, such as Hamelin Pool and Lharidon Bight. These hypersaline environments have been unsuitable for the further growth of seagrass, but have provided suitable conditions for the development of stromatolites.

The restricted water exchange between the waters of the Bay and the open ocean has resulted in depletion of phosphorus. The seagrass meadows, however, represent large accumulations of nutrients. The majority of the seagrass production is not consumed directly, but is broken down, providing a huge input to detrital food chains. Dugongs and turtles, as well as some fish and crustaceans, feed directly on particular seagrass species.

Shark Bay contains the largest reported seagrass meadows as well as some of the most species-rich seagrass assemblages in the world. Twelve species of seagrass have been found in Shark Bay. Several species are at the northern limit of their range, eg. *Amphibolis antarctica* and *Posidonia australis*. Shark Bay also contains species of tropical affinity such as *Syringodium isoetifolium* and *Halodule uninervis*. *Cymodocea angustata*, endemic to the northern section of the Western Australian coastline, is common in Shark Bay.

The most abundant species in the Bay is *Amphibolis antarctica* which occupies some 3751 square kilometres, over 90% of the total seagrass area. The large surface area of leaves provides a substratum for 66 species of algal epiphytes and over 100 species of zoophytes, refuge for juvenile fish, crustacean and other invertebrates and a habitat for the abundant populations of sea snakes.

In areas where larger seagrasses are absent, various combinations of smaller seagrasses occur in habitats including inter-tidal sand flats, edges of channels, banks and around islands. Beds of one of these, *Halodule univervis*, occupy an area of approximately 500 square kilometres or about 4% of the Bay. Despite having a low biomass, they are highly productive and form a preferred food source for dugong.

The Wooramel Seagrass Bank is the largest reported structure of its kind in the world, covering some 1030 square kilometres and is a major part the Shark Bay ecosystem. The Bank contains a variety of habitats for seagrass, molluscan faunas and mangrove and microbial mat communities in the inter-tidal and supratidal zones. The seagrasses act as organic baffles and provide habitats for organisms contributing skeletal carbonate, and as an important element in the nutrient cycles of marine biota throughout the Bay. Also, tidal waters draining from the Bank influence the hydrology of the embayment and contribute to the unusual steady-state conditions which pertain. Seagrass is also an important fish and crustacean nursery area.

In size, continuity and growth rate, seagrass surpasses most modern coral reefs. In addition, the Bank is one of the largest bodies of carbonate sediment formed by an organic baffle yet recorded from a modern environment.

The Bay is located near the northern limit of a transition region between temperate and tropical marine fauna. Of the 323 fish species recorded from Shark Bay 83% are tropical species, 11% warm temperate and 6% cool temperate species. Similarly. Of the 218 species of bivalves in the region, 75% have a tropical range and 10% a southern Australian range, and 15% are west coast endemics. The coral fauna of 80 species is tropical in distribution, apart from one southern endemic species with its northern limit in Shark Bay. Six species of *Turbinaria* are abundant in the western part of the Bay.

Terrestrial Environment

Shark Bay is of great botanical and zoological importance as the habitat of many species at the end of their range. This importance relates not only to their presence but also to the inference this has for understanding biological evolution in the area.

Shark Bay represents an area where the temperate climate of the southern part of Australia gives way to semi-desert climates and where a transition zone occurs between two major botanical provinces - the South West dominated by *eucalyptus* species and the Eremaean dominated by *acacia* species. 25% of Shark Bay's flora are at the end of their range at Shark Bay, representing 145 species of plant at their northern limit and 39 species at their southern limit.

The sharp overlap between botanical provinces is most pronounced in the southern parts of Nanga and Tamala pastoral leases. Such pronounced overlaps between major botanical provinces are unusual in Australia and, therefore, of great scientific value in determining the adaptation of species to their environment and the factors which limit distribution and abundance.

The area south of Freycinet Estuary contains the unique type of vegetation known as 'tree heath'. The reasons for the "gigantism" of these shrubs are not fully understood. The WHA contains almost all of this vegetation type.

There are also at least 28 species of vascular plants endemic to the Shark Bay region, and others are considered new to science. The key areas are the Tamala sand plain and the coastal zone around Shark Bay. It is likely that new species, and expanded ranges for other species, will be found with further botanical surveys.

The Shark Bay region is also an area of major zoological importance, primarily as a result of the isolation of habitats on peninsulas and islands from disturbance which has occurred elsewhere. Five species of threatened Australian mammals are found on Bernier and Dorre Islands (refer to discussion in criterion 4). Numerous species of native mammals, reptiles and birds are at their northern and southern limits. Mammals include the Ash-grey Mouse (*Pseudomys albocinereus*) which is at the northern end of its range.

Shark Bay is noted for its diversity of herpetofauna supporting nearly 100 species. Many species are at their northern limit at Shark Bay and are largely confined to the western and central zones (ie. to the country west and south of the acacia-eucalypt line). Shark Bay is generally the southern limit of the distribution of marine turtles and seasnakes, and is the southern limit of turtle nesting. Several species characteristic of the arid interior reach the coast in the Shark Bay area, and this Eremaean element is almost entirely restricted to the eastern side of the WHA. The islands, peninsulas and gulfs of the area provide a refuge for nine relict or endemic species and subspecies. The WHA is rich in old Australian elements, especially fossorial species and includes 10 of the 30 dragon lizard species found in Australia. The Sandhill Frog *(Arenophryne rotunda)* was thought to be endemic to Shark Bay however recent surveys have found that this species is common in sand dune country throughout the Gascoyne and Murchison.

The Shark Bay region has a rich avifauna. Over 230 species or 35% of Australia's bird species have been recorded. A number of birds attain their northern limit and others their southern limit. In addition 11 marine birds breed in the area. Some other species are rare or uncommon. A subspecies of the vulnerable Thick-billed Grasswren (*Amytornis textilis*) has a major

stronghold on Peron Peninsula. Over 35 species migrate to Asia, four breeding in the Shark Bay region.

There are numerous examples of evolution occurring in the WHA. For example the Mala or Rufous Hare-wallaby (*Lagorchestes hirsutus*) has a mainland and two island forms and is one of the best known examples for the study of island biogeography because it is known when the populations became isolated (about 7000 years ago). The Banded Hare-wallaby (*Lagostrophus fasciatus*) may be a relict from the Post-Pleistocene macropod Sthenurinae, and therefore would represent the most primitive sthenurine known.

CRITERION 3: SUPERLATIVE NATURAL PHENOMENA, FORMATIONS OR FEATURES.

Shark Bay comprises many superlative natural phenomena, formations and features. Shark Bay is one of the few marine areas of the world dominated by carbonates. The Wooramel Seagrass Bank is one of the largest bodies of carbonate sediment formed by an organic baffle recorded from a modern environment. The Wooramel Seagrass Bank is also the largest seagrass meadow in the world. The growth of the Faure Sill through deposits of seagrass has produced and maintained a basin which is one of the few areas in the world where marine waters are hypersaline with salinities almost twice that of seawater. Stromatolites represent the oldest form of life on Earth. Hamelin Pool is the only place in the world with a range of stromatolites comparable to fossils in ancient rocks.

Shark Bay has a great diversity of landscapes. Exceptional coastal scenery is a distinctive feature of Shark Bay. Notable sea cliffs include Zuytdorp cliffs and those along Dirk Hartog Island, Heirisson and Bellefin Prongs and Peron Peninsula. Other parts of Shark Bay are characterised by calm bays and inlets, with wide sweeping beaches of sand and shells, interspersed by rocky platforms and headlands.

Inland of the magnificent coast, there are low rolling hills interspersed with low, flat clay pans or 'birridas'. Where the sea has access to these areas, shallow inland bays of great natural beauty are created such as Little Lagoon and Big Lagoon. The waters of Shark Bay play host to a range of large marine fauna, including dolphins, dugongs, manta rays, whales and several species of sharks. On land the richness of the flora contributes to an extensive wildflower display every July and August.

CRITERION 4: THE MOST IMPORTANT AND SIGNIFICANT NATURAL HABITATS WHERE THREATENED SPECIES OF ANIMALS OR PLANTS OF OUTSTANDING UNIVERSAL VALUE LIVE.

Shark Bay is the habitat for many species of plants and animals that are recorded as rare or threatened. Importantly theses habitats occur in the biogeographically significant transition zone between the south-west and arid zones. The IUCN Red List of Threatened Mammals (1988) lists 26 species of Australian mammals. Shark Bay has the only or major populations of five of the 26 species, all of which were formerly widespread. Found on Bernier and Dorre Island these are the Banded Hare-wallaby (*Lagostrophus fasciatus*), Western Barred Bandicoot (*Perameles bougainville*), Shark Bay Mouse (*Pseudomys fieldi*), the Mala or Rufous Hare-wallaby (*Lagorchestes hirsutus*) and the Boodie or Burrowing Bettong (*Bettongia lesueur*).

Two threatened endemic reptiles (for example the Baudin Island Skink, *Egerinia stokesii aethiops*) have been recorded at Shark Bay.

Of the 230 bird species recorded for the WHA, 35 bird species are migratory to Asia and protected by international agreements between Australia and China and Australia and Japan. A number of bird species are considered rare or threatened: the Thick-billed Grasswren *(Amytornis textilis),* the endemic Dirk Hartog Black-and-white Fairy-wren *(Malurus leucopterus leucopterus)* and the Dirk Hartog Island subspecies of the Southern Emu-wren *(Stipiturus malachurus hartogi).*

The population of about 10 000 dugong *(Dugong dugon)*, listed by IUCN as vulnerable, is one of the largest in the world. Humpback Whales (*Megaptera noraeangliae*), listed by IUCN as vulnerable, use the Bay as a staging post in their migration along the coast. This species was reduced from an estimated population of 20 000 on the west coast of Western Australia to 500-800 in 1962; and is now estimated at 2000-3000. Green (*Chelonia mydas*) and Loggerhead Turtles (*Caretta caretta*), listed as endangered and vulnerable by IUCN, nest in the Bay which is the southern limit of turtle nesting on the west coast of Australia.

The WHA contains many species of plants that are rare, threatened, little known, undescribed or endemic to the area. Fifteen species are considered to be rare or threatened at the national level and twenty eight species of flora are endemic to the region.

3.3 INTEGRITY OF WORLD HERITAGE VALUES

The WHA contains all of the inter-related and interdependent elements necessary for the maintenance of the salinity gradient, the benthic microbial communities, microbial mats and stromatolites. The whole of Hamelin Pool and Lharidon Bight and adjacent Holocene deposits are included. The WHA contains all of the elements necessary for the system to be self perpetuating with its great size, the range of environments, including all three of the marine biotic zones, and the generally unmodified nature of the WHA. The WHA contains all of the superlative natural phenomena within its boundaries.

The habitats of threatened and other species of special conservation significance are of sufficient size to provide the greatest opportunity for their survival. A feature of Shark Bay is the opportunity to maintain refuges on islands and potentially some peninsulas for species that are threatened or extinct elsewhere on the mainland due to the effects of human use, such as clearing, and through the introduction of predators such as the fox. The survival of migratory species will depend to some degree on management of some regions beyond the WHA.

Adequate planning and management is a major factor in maintaining and enhancing Shark Bay's World Heritage values and their integrity, particularly the need for management plans to be prepared and implemented. World Heritage Areas also need adequate long-term legislative, regulatory and institutional protection.

4.0 OTHER IMPORTANT VALUES

4.1 SOCIAL VALUES

Cultural and Historic
Aboriginal sites including open shell middens, quarries, rock shelters, artefact shelters, burials and stone arrangements have been recorded at Shark Bay. Most of these sites directly overlook the shoreline or are very close to it (Bowdler, 1990a; Bowdler and McGaun, in prep.).

Material dated from sites on Peron Peninsula indicates human occupation of the area from 30 000 to 18 000 years BP. Between 18 000 and 7 000 years BP there is no evidence of occupation, this hiatus probably relates to low sea levels. From 7000 to 6000 years BP there is evidence of occupation, with midden sites, especially on Peron Peninsula and Dirk Hartog Island, indicating a predominant seafood diet being dated to around 6000 years BP (Bowdler, 1990b; Bowdler, in prep.; Bowdler and McGaun, in prep.).

Shark Bay has a long history of visits by European explorers. Dirk Hartog landed at Cape Inscription in the Dutch trading ship Erendracht in 1616, recording his visit by nailing a pewter plate onto a post. He is the first known European to visit Australia. Dutch navigator William de Vlamingh visited Cape Inscription in 1697, removing Hartog's pewter plate and replacing it with his own. Englishman William Dampier subsequently explored the area for seven days in August 1699, naming the area Shark Bay.

Frenchman François de St. Allouarn landed at Cape Inscription in 1772, claiming the area for France by burying two French coins and a parchment in a bottle. Baudin's French expedition in 1801 explored Shark Bay in the corvettes Geographe and Naturalist, while De Freycinet visited Peron Peninsula in the Uranie in 1818. Many of Shark Bay's islands, bays and landmarks are named after the French who explored the area in the 1801 and 1818 expeditions.

Whaling occurred from 1792 until the late 1930's then recommenced in 1949. Whaling ceased with closure of the Carnarvon whaling station in 1963. Commercial pearl shell collection started in the 1850s. By the 1870s, many small pearling settlements were scattered along the shores of Shark Bay, and the first pastoralists had arrived. Guano mining on Shark Bay's islands also took place around 1850. A major pearling settlement, known locally as Freshwater Camp, was established at Lagoon Point in the 1870's and was in 1895 officially named as the townsite of Denham, after Captain Henry Mangles Denham, who charted the waters of Shark Bay in 1858 in HMS Herald.

The pearling industry collapsed in the Depression in the 1930s and fishing became Shark Bay's main industry, with a cannery and processing works having been established at Monkey Mia in 1912 and at Herald Bight in the 1930s. Fishing reached its peak in the 1960s when four fish processing plants were operating in the area before the industry was regulated.

Historic sites of significance, in addition to Aboriginal sites, include wreck sites and associated land camps, pearling camps, guano establishments and military camps.

Known wreck sites in the waters of the WHA include the Gudrun (1901) and the Kormoran lifeboat (1941). The Macquarie (1878), Paul Pry (1839), Perseverant (1841) and possibly the Prince Charlie (1850) were believed to have been wrecked in Shark Bay, however they have not yet been located.

Population
The resident population of the Shires of Shark Bay and Carnarvon in 1993 was 857 and 6635 respectively. The population of the Shires decreased from 1991 where the population was estimated at 1000 and 7500 respectively. The main centres are Carnarvon, Denham and Useless Loop.

Services
Government services provided include: Shire of Shark Bay services, Shire of Carnarvon services, Western Australian Water Authority, Police Department, Fisheries Department, Education Department, Department of Marine and Harbours, Department of Sport and Recreation, Gascoyne Development Commission, Western Australian Tourism Commission, Department of Conservation and Land Management, Telecom, Department of Transport (DT), Commonwealth Employment Service and Customs.

There are two Government primary schools operating within Shark Bay, located in Denham and Useless Loop. Three primary schools and two secondary schools operate in Carnarvon.

Denham's water supply consists of a limited potable supply using desalinated water and a secondary saline supply. The source of all water is an artesian aquifer and the cost of production of potable water is very high.

Other services include: bank agencies, retail, Australia Post, medical and nursing services, and Tourist Information Centre.

Denham recreation facilities include: Council Hall, Golf Club, Bowling Club, Speedway, oval, boat ramps and Television access.

Access

Access to the WHA is by road, air and water. The main access is by road via the North West Coastal Highway from north and south, and thence from the Overlander to Denham. Further access is via unsealed roads and tracks, and by boat. Pastoral station roads and tracks are also used.

Air access is via Denham/Monkey Mia airport and airstrip at Useless Loop and south of Denham. Services are provided by commuter airlines from Perth, Geraldton and Carnarvon. Carnarvon has one airstrip with regular airline services. Most pastoral stations have private airstrips.

4.2 ECONOMIC VALUES

Recreation and Tourism

Tourism is the fastest growing industry in the region, and makes a major contribution to the local economy. Natural attractions include Monkey Mia, Shell Beach, the stromatolites at Hamelin Pool Marine Nature Reserve, the Peron Peninsula, Steep Point and the flora and fauna of the Area. Man-made attractions are mainly related to the area's history, including the Homestead Museum at Nanga and shell block buildings such as St Andrew's Church. Recreational activities in the Area are mostly related to the marine environment and include fishing, boating and diving.

Tourism in 19?? was valued at $$ and employed ?? people

Fisheries

The commercial fisheries operating in Shark Bay have a capital investment of approximately $80 million and account for the direct employment of about 500 people.(Fisheries Department, 1994) Commercial fishing is recognised as an important social and economic component of the region which collectively harvests seafood worth approximately $35 million per year (Fisheries Department, 1994). This includes:

- prawn and scallop fisheries which are the most productive and lucrative in Western Australia and the major commercial fishery in the WHA;
- about 70% of the State's snapper production;
- western rock lobster (*Panulirus cygnus*) (the WHA is a fringe area for this fishery);
- beach-seine fishery which mainly involves taking of whiting, as well as bream, mullet, tailor and some snapper; and
- an aquaculture industry (including pearling) which although not of major economic significance at present has the potential to be of much greater significance.

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.

Mineral and Petroleum Resource Development

The most significant mineral development in Shark Bay is the solar salt operation at Useless Loop. This area is excluded from the Shark Bay WHA. This operation utilises seawater which is progressively concentrated by evaporation in a series of ponds, producing sodium chloride (table salt). Salt is stockpiled on Slope Island, prior to being loaded onto bulk carrier vessels. Almost all of the salt is exported, principally to the Far East, the Middle East and East Africa. In 1994 output was over 850 000 tonnes with a value of approximately $? million. This operation employs 80 people, with the project dedicated town of Useless Loop having a population of 125 (1994).

Gypsum has been mined in the past from evaporite pans, known as birridas, on Heirisson Prong and Useless Loop. Gypsum mining does not currently occur in the Area, however mining leases are held over unexploited gypsum deposits at the southern end of Heirisson Prong and at the northern end of the Peron Peninsula.

Shell deposits are mined at Lharidon Bight and the material has been used around Denham for many years for landscaping, footpaths and primary road surface, and for use as shell grit. Shell blocks from Hamelin Pool are used locally for building material, particularly in the maintenance of historic buildings.

A small part of a petroleum exploration tenement extends into the eastern side of the WHA, however the area has not shown any significant prospects for petroleum development.

Pastoral Use

Pastoral leases occur in, and adjacent to, the WHA. The Shark Bay pastoral industry is based on wool production, however due to low wool prices some substitution of cattle for sheep has occurred. The pastoral industry in the WHA is estimated to return $0.5 million per annum (gross return - see Section 12.7 Pastoral Use).

Other Industries

There has been a long history of sandalwood harvesting at Shark Bay. Stands of sandalwood occur on Peron Peninsula and Nanga station. A contract and license to harvest 20 tonnes a year exist for Nanga station. This amount is below the potential sustainable yield for the area. Export revenue for sandalwood is approximately $8000 per tonne.

5.0 COMMUNITY CONSULTATION IN PREPARING THIS PLAN

This plan has been prepared in conjunction with a range of other management plans and with the review of the Shark Bay Region Plan. A range of public participation activities occurred for planning for the WHA. Advisory committees have been formed for the terrestrial and marine reserves management plans, and workshops have been held; similarly the steering committee for the Region Plan review provided input to this plan. A World Heritage Planning Newsletter has been circulated every 6 months to keep the public informed of planning issues.

Advertisements were placed in newspapers requesting submissions


Darwin
Kakadu National Park
Australian Fossil Mammal Sites (Riversleigh / Naracoorte)
Wet Tropics of Queensland
Great Barrier Reef
NORTHERN TERRITORY
WESTERN AUSTRALIA
Uluru - Kata Tjuta National Park
QUEENSLAND
Shark Bay
Fraser Island
SOUTH AUSTRALIA
Brisbane
Central Eastern Rainforest Reserves (Australia) (comprises 50 separate sites)
NEW SOUTH WALES
Perth
Willandra Lakes Region
Adelaide
Sydney
Australian Fossil Mammal Sites (Riversleigh / Naracoorte)
VICTORIA
Melbourne
TASMANIA
Tasmanian Wilderness
Hobart

Figure 2

6.0 SHARK BAY IN CONTEXT

A total of 131 countries had signed the World Heritage Convention by 1992 [figure will be updated when this plan is finalised]. This is the greatest number of countries to sign an individual convention on conservation.

At July 1995, there were, globally, 114 World Heritage sites listed on the basis of natural heritage values. These include some of the world's most significant and well known natural areas such as Sagarmatha (Mt Everest, Nepal), Yellowstone (USA), Grand Canyon (USA) and Fiordland (New Zealand) National Parks.

In addition to Shark Bay there are ten other Australian WHA's (Figure 2): Great Barrier Reef, Kakadu National Park, the Willandra Lakes Region, the Lord Howe Island Group, the Tasmanian Wilderness, Uluṟu-Kata Tjuṯa National Park, the Australian East Coast Temperate and Sub-Tropical Rainforest Parks, the Wet Tropics of Queensland, Fraser Island and the Australian Fossil Mammal Sites (Riversligh, Narvacoorte).

7.0 ADMINISTRATION

to be reviewed when the State/Commonwealth agreement has been finalised

7.1 WORLD HERITAGE LEGISLATION AND AGREEMENTS

The Convention concerning the protection of the World Cultural and Natural Heritage (the World Heritage Convention) was adopted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1972 and came into force in 1975. In 1974, Australia became one of the first countries to ratify the Convention. It aims to promote co-operation among nations to protect worldwide heritage which is of such universal value that its conservation is a concern of all people.

Nations commit themselves to identifying, protecting, conserving, rehabilitating, presenting and transmitting World Heritage values to future generations. Under the terms of the Convention a World Heritage List of properties having outstanding universal value has been established. Only parties which are signatories to the Convention (ie. national governments) may nominate a world heritage area.

The World Heritage Properties Conservation Act 1983 was enacted by the Commonwealth Parliament to provide for the protection and conservation of those places in Australia and its external territories that are recognised as part of the cultural and natural heritage of the world. The Act does not automatically control activities within the WHA, however it can be used to prevent damage to World Heritage values.

World Heritage listing does not affect ownership rights or control and State and local laws continue to apply. The Shark Bay WHA comprises a range of tenures which are gazetted and administered under State statutes. For example freehold, pastoral lease and conservation reserves exist and a range of activities are undertaken on them, for example grazing and fishing. Management plans have been, or are being produced, for all Australian WHA's and these are considered essential in implementing Australia's obligations under the Convention.

Complementary State and Commonwealth Legislation is to be enacted to give effect to the State/Commonwealth agreement for management of the Shark Bay WHA.

Management responsibilities of local and State government will continue. In addition a Ministerial Council, Community Consultative Committee and a Scientific Advisory Committee will be formed for the Shark Bay WHA. The roles of these committees are discussed in the next section.

7.2 SHARK BAY MINISTERIAL COUNCIL AND COMMITTEES

Shark Bay Ministerial Council

The Council comprises equal representation from Western Australia and the Commonwealth, with up to two members from each. Its role is to:

- coordinate policy between Western Australia and the Commonwealth on all matters concerning the Property;
- approve the Shark Bay WHA Strategic Plan (and any revisions of it) and revisions of the Shark Bay Region Plan in so far as they relate to the World Heritage Property;
- provide advice to both Governments on:
  - (i) management arrangements;
  - (ii) management plans;
  - (iii) research and education;
  - (iv) presentation and promotion;
  - (v) boundary modifications;
  - (vi) community consultation and liaison; and
  - (vii) financial matters;
- refer matters to the Community Consultative Committee and Scientific Advisory Committee and consider reports from these bodies; and
- resolve any dispute that might arise between the two Governments.

Shark Bay Community Consultative Committee

The role of the Community Consultative Committee is to advise the Ministerial Council on matters relating to the protection, conservation, presentation, and management of the WHA from the viewpoint of the community. It will comprise community representatives with knowledge or background in fields such as fishing, local government, tourism, Aboriginal matters, park management, agriculture, conservation and/or heritage. A majority of members will be residents of or live in the vicinity of the Shark Bay WHA.

Shark Bay Scientific Advisory Committee
The role of the Scientific Advisory Committee is to provide advice on:

- scientific research priorities which will contribute to the protection and conservation of the WHA and understanding of its natural history;
- new information or developments in science relevant to protection, conservation, or presentation of the WHA;
- the scientific basis of management principles and practices;
- appropriateness of research funded by agencies in terms of scope, quality and relevance to management of the WHA; and
- maintenance of the World Heritage values and integrity of the WHA.

The membership will comprise persons who have qualifications relevant to, and/or special interest in, the protection and conservation of the WHA.

7.3 OTHER KEY LEGISLATION

Conservation and Land Management Act 1984 - provides for CALM to be responsible for the conservation of flora and fauna and for management of certain lands and waters including national parks, conservation parks, nature reserves, marine parks and marine nature reserves throughout the State.

Aboriginal Heritage Act 1972 - provides for the protection of all Aboriginal sites and Aboriginal cultural objects in Western Australia.

Marine and Harbours Act 1981 - provides for the control of navigation and shipping activities in all State waters.

Wildlife Conservation Act 1950 - provides for protection of native flora and fauna on all land and in all waters within State boundaries. CALM is responsible for the administration of this Act.

Western Australian Marine Act 1982 - provides for the regulation of navigation and shipping by the Department of Transport.

Maritime Archaeology Act 1973 - provide protection for shipwrecks and associated land camps in the reserves for all pre-1900 wrecks.

Local Government Act 1960 - The Shires of Shark Bay and Carnarvon have By-Laws which prohibit or restrict certain activities in the Shires.

Land Act 1933 - deals with the allocation, tenure and lease of Crown land.

Commonwealth Petroleum (Submerged Land) Act 1967 - provides for shared control between the Commonwealth and State for exploiting offshore petroleum resources. The State Petroleum (Submerged Lands) Act 1982 allows petroleum permits to be granted in the State Territorial sea. The State Petroleum Act 1967 provides for the granting of petroleum permits on land and internal waters.

Mining Act 1978 - provides for exploration and mining to proceed in appropriate locations.

Fish Resources Management Act 1994 - provides for the management of fish resources, and related purposes.

7.4 PLANNING

ISSUES

- **Planning is needed to address key areas and issues.**
- **Some planning within the WHA currently does not consider World Heritage values.**
- **There is a need for consultation with the Commonwealth during the preparation of plans.**

Shark Bay Region Plan
This plan was prepared by CALM and DPUD and was endorsed in 1988. It is now under review. This plan will address regional social, environmental and development issues. The Strategic Plan will be consistent with the Shark Bay Region Plan.

In addition to this draft strategic plan, which provides a broad overview for management of the Shark Bay WHA, more detailed planning is occurring.

Monkey Mia Reserve Management Plan
A draft management plan for the Monkey Mia Reserve, which is jointly vested in the Executive Director of CALM and the Shire of Shark Bay, was released in 1993. The draft is being revised and will be released as a 'final' management plan in due course.

Shark Bay Marine Reserves Management Plan
A draft of this management plan was released in 1994 and is being finalised in 1995. It addresses management of the Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve and was prepared by CALM.

Shark Bay Terrestrial Reserves Management Plan
This plan covers the management of the François Peron National Park, Shell Beach Conservation Park, Zuytdorp Nature Reserve and the island Nature Reserves in the WHA including Bernier and Dorre Islands. The draft plan is being prepared by CALM and will be released for public comment.

Shark Bay Management Plan for Fish Resources
A draft of this plan was released in 1994 and is being finalised in 1995. It addresses management of fish resources in the WHA and was prepared by the WA Fisheries Department.

Other Planning
A number of agencies have statutory responsibility for planning within the WHA. These include Local Government authorities and the Ministry for Planning. Other agencies prepare plans for specific purposes, eg. the Gascoyne Development Commission, Main Roads of Western Australia, CALM, Fisheries Department, Department of Transport. There are plans that were prepared prior to listing of Shark Bay as a WHA.

Planning may include site development plans, statutory planning such as Shire Town Planning Schemes, regional plans and plans to address specific issues such as extraction of basic raw materials, tourism and roading. These plans may be produced by government or other groups. Examples of other plans produced include the Gascoyne Road Strategy and the Gascoyne Ecotourism Strategy.

POLICY

Planning for the WHA will be consistent with the Strategic Plan in relation to the protection of World Heritage values.

The planning program will be ongoing, with priorities identified according to the potential impacts on World Heritage values and management needs.

STRATEGIES

1. Ensure other plans are compatible with the strategic directions contained in this Plan (all agencies).
2. Review this Strategic Plan after ten years or earlier if there is an identified need (CALM with appropriate consultation).
3. Consult with the local and broader communities in all WHA planning.
4. Consult with Shires and other agencies and contribute to their planning activities to ensure World Heritage values are taken into account. (CALM, Ministry for Planning).
5. Liaise with the Commonwealth in respect to planning matters which are relevant to the management of the WHA (CALM).

7.5 MANAGEMENT ARRANGEMENTS

Also refer to Section 13 which provides more detail on management of resource utilisation.

ISSUES

- **Authorities which have management responsibilities within the WHA need to be aware of World Heritage values, the implications of World Heritage listing and Western Australia's and Australia's obligations.**
- **A coordinated approach is needed and management arrangements clearly defined with respect to conservation of World Heritage values.**
- **The objectives of individual landowners, occupiers and managers need to be recognised.**
- **Some landholders and owners may seek compensation for loss of existing rights if these are restricted as a result of World Heritage listing.**
- **Sufficient resources are needed for management and implementation of this plan.**
- **Management priorities need to be defined to ensure resources are used most effectively.**
- **Establishment of priorities and deployment of resources should be based on significance of, and threats to, World Heritage values and management goals.**
- **Administrative procedures for coordination and management of the WHA are required.**

CALM is the lead agency in relation to World Heritage management in Shark Bay. However, many government and private owners and occupiers have management responsibilities in the WHA. For the WHA to be effectively managed it is essential that all agencies and individuals with responsibilities are aware of the WHA, their responsibilities in regard to protection of its values and the procedures and processes that are in place to handle World Heritage issues.

This Strategic Plan outlines specific actions and responsibilities for a variety of government agencies, local authorities and other groups in the WHA.

The coordination of World Heritage issues will be the responsibility of CALM. This will involve liaison with other Departments, coordinating requests for funding, and establishment of priorities for management of the WHA. This process will occur in close liaison with the Committees outlined in Section 7.2

POLICY

Administrative procedures will be established by the State Government in consultation with local government and the Commonwealth Government.

Government agencies will ensure the protection of World Heritage values during their own management activities.

Land owners, holders and occupiers will be encouraged to manage their lands/leases to be consistent with protection of World Heritage values.

STRATEGIES

1. CALM, as the lead management agency, will coordinate protection, conservation, rehabilitation and presentation of World Heritage values (CALM).

2. Ensure all authorities with management responsibilities within the WHA are aware of the World Heritage listing, the values and their management obligations (CALM).

3. Develop memoranda of understanding and agreements between government departments, local authorities and other agencies to detail operating procedures in the WHA (CALM with LGA's, management agencies).

4. Priorities for the protection of World Heritage values will be established (see Section 13.2 Priorities and Review) (CALM, other management agencies, committees).

5. Consult with resource managers, land owners and occupiers where they are likely to be affected by protection and conservation of World Heritage values (all managing authorities).

6. Deal with compensation in accordance with the State/Commonwealth agreement for management of the Shark Bay WHA (CALM with all relevant authorities).

7. Ensure adequate resources are allocated by management authorities to allow them to fulfil their management obligations with respect to the protection of World Heritage values (all managing authorities).

8. Liaise with the Commonwealth in respect to obtaining resources to assist in the management of the WHA (CALM).

9. Monitor the performance of managing authorities in protecting and conserving World Heritage values (CALM with the Ministerial Council, Community Consultative Committee and Scientific Advisory Committee).

7.6 COMMUNITY RELATIONS

ISSUE

Community consultation is critical to the development of effective management plans, and to the smooth implementation of their strategies.

The WHA must contribute to, and be part of, the regional, national and international community. However human use of the WHA presents both a potential threat to, and also opportunity for building support for, the protection of the Shark Bay World Heritage values. Community relations and education will aim to maximise community support for protection of the World Heritage values.

Section 7.2 details a community-based consultative committee which will provide input and advice into the management of the WHA. This and other processes should continue to ensure the community has input into management of the WHA.

POLICY

Effective two way communication between Government and the community will be maintained regarding management of the WHA

STRATEGIES

1. Consult with the local, state and national community for all planning within the Shark Bay WHA (CALM, Ministry for Planning, LGA's, other relevant agencies).

2. Establish the Community Consultative Committee to provide advice on management of the WHA (CALM).

3. Actively involve relevant interest groups, owners and occupiers, in the development of policies (all agencies).

8. STRATEGIES FOR PROTECTION

8.1 OVERALL POLICY DIRECTIONS

The management of the Shark Bay WHA will meet Australia's obligations under the World Heritage Convention in accordance with the UNESCO operational guidelines for the implementation of the World Heritage Convention.

Protection will be achieved using legislation, statutory and other plans, protective land tenure and agreements with land owners and occupiers.

Priority will be given to comprehensive strategic and management planning for the WHA. Planning priorities will be based on factors such as threats to World Heritage values and management issues.

Where proposed activities are likely to have a significant detrimental effect on World Heritage values an environmental impact assessment will be required under the Western Australian Environmental Protection Act 1986.

Education and community involvement are essential to achieving the goals for management of Shark Bay.

Management of the WHA will be coordinated and responsibilities clearly defined and communicated to authorities.

Tenure will be amended where necessary to enhance protection of World Heritage values.

8.2 TENURE

ISSUES

- **There is some confusion and uncertainty among land owners and managers about the effects World Heritage listing has on present and future tenure of their property.**
- **Conservation of some World Heritage values may be better provided for by alternative land tenure.**

Shark Bay's World Heritage values occur across many tenures. Tenure provides the basis for management of lands and waters. Previous plans, particularly the Shark Bay Region Plan (1988), recommended some changes in tenure, a number of which have been implemented.

The type and area of existing tenures in the Shark Bay WHA are shown in Table 1 and Figure 3.

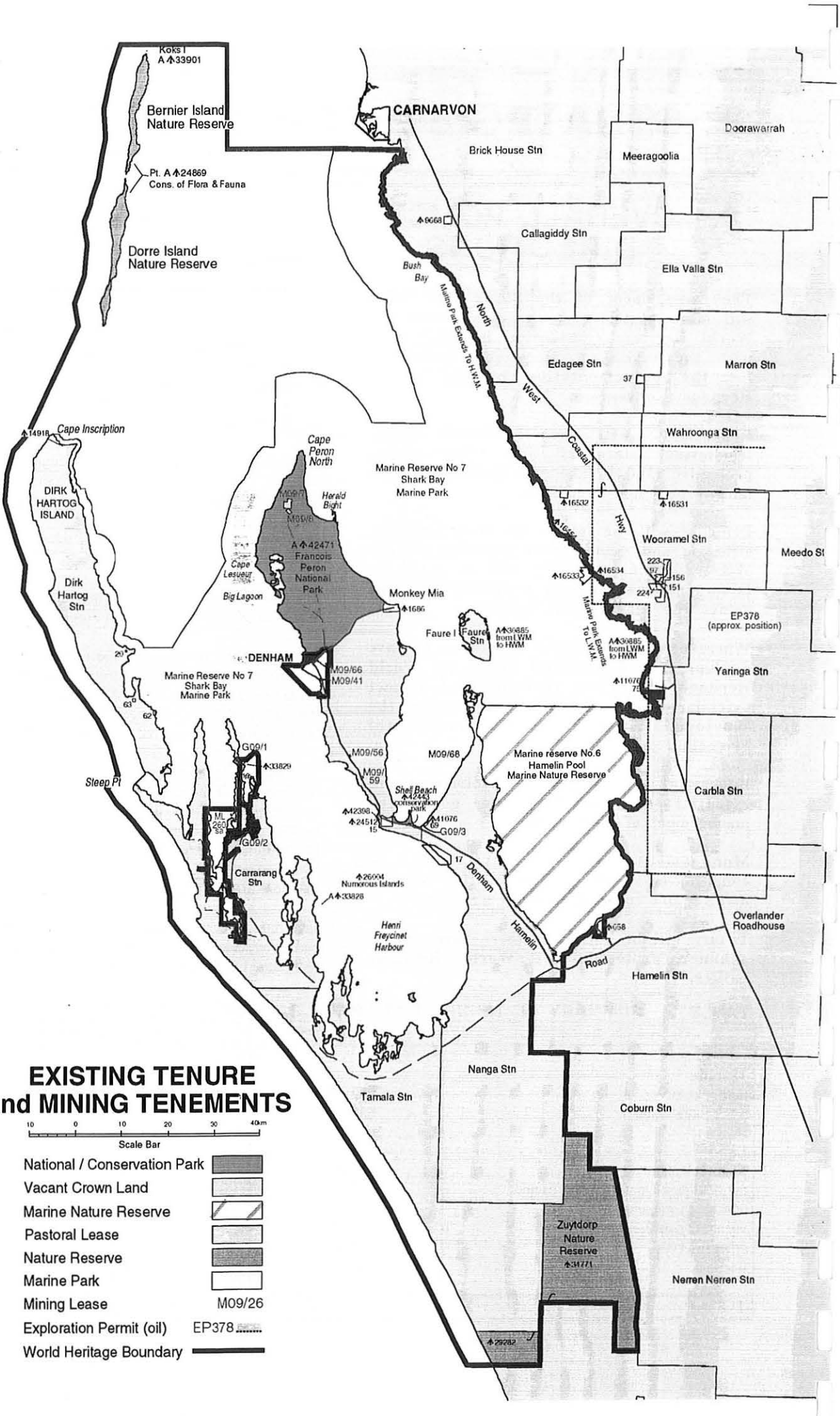
Administration of tenure is the responsibility of the Department of Land Administration (DOLA). Land is generally reserved under the Land Act 1933, however the waters of marine conservation reserves and some land categories are reserved under the CALM Act.

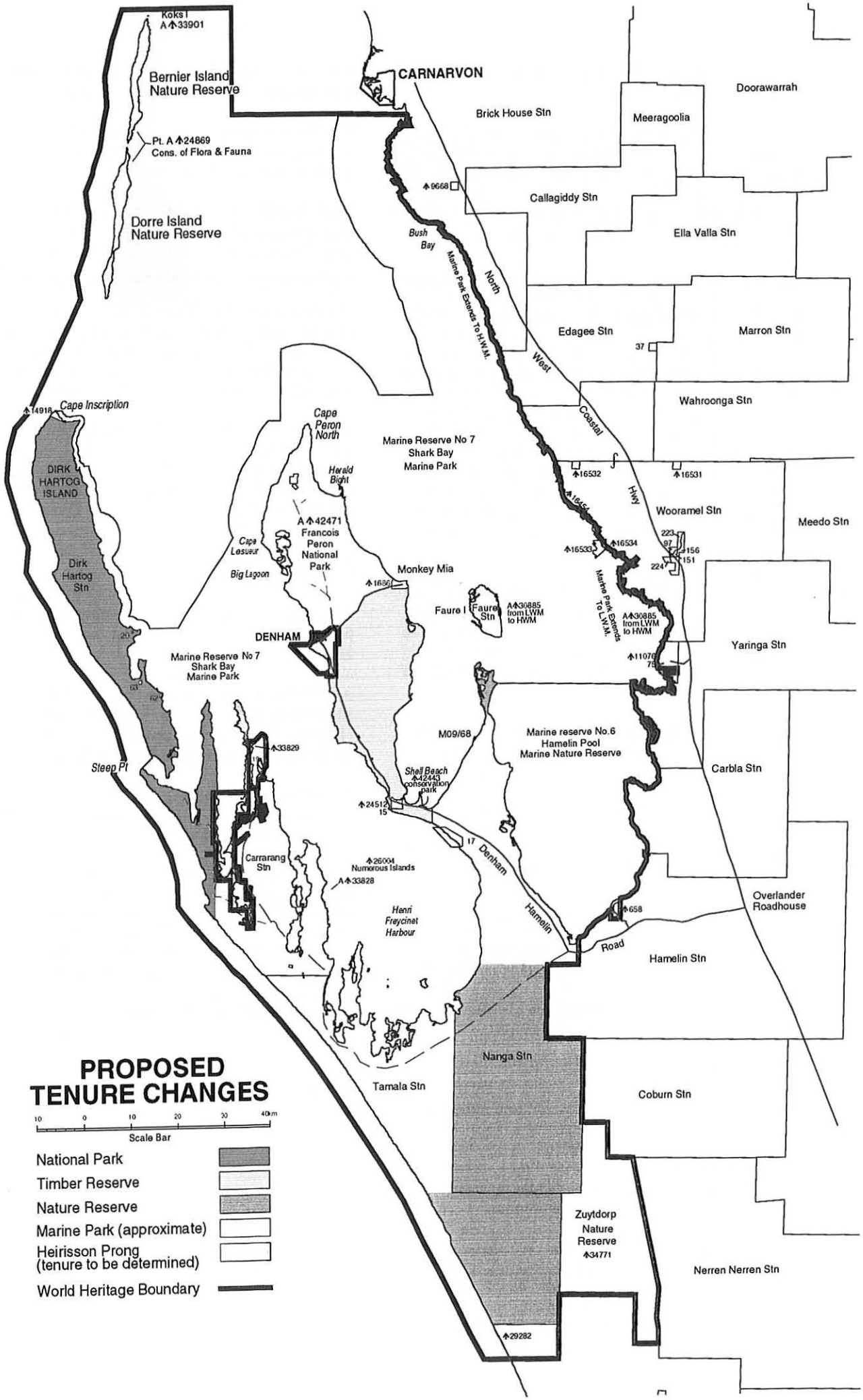
The management plans for terrestrial and marine reserves both address tenure in relation to the conservation reserves. They contain recommendations in respect to additions to reserves, and reserve tenure. In addition to this the Shark Bay Region Plan is being reviewed and will make recommendations with respect to tenure after community consultation and discussion.

Tenure is relevant to the WHA where the protection and management of World Heritage values can be better facilitated by changes in tenure.

TABLE 1 SUMMARY OF TENURE FOR SHARK BAY WORLD HERITAGE AREA

	approx Ha	approx % of WHA
Marine		
marine reserves	882 00	40
other State waters	687 750	30.8
Land		
pastoral leases	450 000	20
national parks, nature reserves and conservation parks	122 000	6
vacant Crown land	55 000	3
other reserves	2 500	0.15
freehold	750	0.05
TOTAL	2 200 000	100%


Koks I
A 33901
Bernier Island
Nature Reserve
Pt. A 24869
Cons. of Flora & Fauna
Dorre Island
Nature Reserve
CARNARVON
Brick House Stn
Doorawarrah
Meeragoolia
9668
Callagiddy Stn
Ella Valla Stn
Bush Bay
Marine Park Extends To H.W.M.
North West Coastal Hwy
Edagee Stn
Marron Stn
37
Wahroonga Stn
14918
Cape Inscription
DIRK HARTOG ISLAND
Cape Peron North
Herald Bight
Marine Reserve No 7
Shark Bay
Marine Park
M09/7
M09/8
A 42471
Francois Peron National Park
Cape Lesueur
Big Lagoon
Dirk Hartog Stn
Monkey Mia
1686
16532
16531
16533
16534
Wooramel Stn
Meedo St
223
97
156
151
224
Faure I
Faure Stn
A 30885 from LWM to HWM
Marine Park Extends To LWM
EP378
(approx. position)
DENHAM
M09/66
M09/41
Marine Reserve No 7
Shark Bay
Marine Park
Yaringa Stn
11076
79
29
63
62
G09/1
33829
M09/56
M09/68
M09/59
Marine reserve No.6
Hamelin Pool
Marine Nature Reserve
Steep Pt
Shell Beach
4243
conservation park
42398
24512
15
11076
69
G09/3
Carbla Stn
ML 260 sa
G09/2
17
Denham
Carrarang Stn
26004
Numerous Islands
A 33828
Henri Freycinet Harbour
Hamelin
Road
658
Overlander Roadhouse
Hamelin Stn
Nanga Stn
Tamala Stn
Coburn Stn
Zuytdorp Nature Reserve
34771
Nerren Nerren Stn
29282
EXISTING TENURE
and MINING TENEMENTS
10 0 10 20 30 40km
Scale Bar
National / Conservation Park
Vacant Crown Land
Marine Nature Reserve
Pastoral Lease
Nature Reserve
Marine Park
Mining Lease M09/26
Exploration Permit (oil) EP378
World Heritage Boundary


Koks I
A 33901
Bernier Island
Nature Reserve
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Cons. of Flora & Fauna
Dorre Island
Nature Reserve
CARNARVON
Brick House Stn
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Meeragoolia
9668
Callagiddy Stn
Ella Valla Stn
Bush Bay
Marine Park Extends To H.W.M.
North West Coastal Hwy
Edagee Stn
Marron Stn
37
Wahroonga Stn
14918
Cape Inscription
DIRK HARTOG ISLAND
Dirk Hartog Stn
Cape Peron North
Herald Bight
Marine Reserve No 7
Shark Bay
Marine Park
16532
16531
16533
16534
Wooramel Stn
Meedo Stn
A 42471
Francois Peron National Park
Cape Lesueur
Big Lagoon
Monkey Mia
1686
Faure I
Faure Stn
A 30885
from LWM to HWM
DENHAM
Marine Reserve No 7
Shark Bay
Marine Park
Marine Park Extends To L.W.M.
Yaringa Stn
11076
M09/68
Marine reserve No.6
Hamelin Pool
Marine Nature Reserve
33829
Steep Pt
Shell Beach
A 42443
conservation park
24512
Carla Stn
Carrarang Stn
26004
Numerous Islands
A 33828
Denham
Hamelin
Road
658
Overlander Roadhouse
Henri Freycinet Harbour
Hamelin Stn
Nanga Stn
Tamala Stn
Coburn Stn
Zuytdorp Nature Reserve
A 34771
Nerren Nerren Stn
29282
PROPOSED TENURE CHANGES
10 0 10 20 30 40km
Scale Bar
National Park
Timber Reserve
Nature Reserve
Marine Park (approximate)
Heirisson Prong
(tenure to be determined)
World Heritage Boundary

Areas that require further consideration for changes to land tenure include (see Figure 4):

The area of Peron Peninsula south of the Denham-Monkey Mia Road was purchased in 1990 and has been vacant Crown land since this time. The 1988 Shark Bay Region Plan proposed that land use in the area remain as pastoral however this is not now believed to be the most suitable land use for this area.

Feral animal control is underway over this area as part of a project known as Operation Eden, which has the aim of re-establishing a range of fauna, including threatened species, which formerly inhabited the area. To be successful this project will require that the whole peninsula is appropriately managed. In addition the area has potential for sandalwood extraction through the existing resource and an expanded industry in the long term through supplementary planting. This complements the removal of sheep, goats and rabbits as these species inhibit natural sandalwood regeneration. Other uses currently occur such as recreation and extraction of basic raw materials, and are intended to continue along with sandalwood extraction.

Given these uses, and the potential benefits to conservation and the local economy, it is proposed that the vacant Crown land on Peron Peninsula, excluding sufficient land around Denham to provide for its future growth, be vested as timber reserve in the Lands and Forest Commission. This would allow the range of multiple uses to occur.

Additions to the Shark Bay marine reserves- These are addressed in the Marine Reserves Management Plan (CALM, 1995). Proposed additions include the waters adjacent to Bernier and Dorre Islands, the inclusion of the sedimentary deposits reserve (Reserve 30885) in the marine park or marine nature reserve and the vesting of most of the 40m strip of coastal vacant Crown land as marine park or marine nature reserve.

Fish Habitat Protection Area - The Shark Bay WHA draft management plan for fish resources proposed that all waters of the WHA, excluding Shark Bay Marine Park and Hamelin Pool Marine Nature Reserve, be set aside as a Fish Habitat Protection Area under the Fish Resources Management Act.

Under Government proposals, there will be an additional category of marine reserve created, namely marine management area. These will be multiple use areas vested with the proposed Marine Parks and Reserves Authority. For consistency of vesting and management of all waters in the WHA, this reserve category may be a better alternative for management of this area and should be investigated further.

Parts of Nanga and Tamala Stations- Parts of these pastoral stations were proposed for gazettal as conservation reserve in the Shark Bay Region Plan (1988). These areas coincide with the zone where the south-west and the Eremaean botanical provinces meet. This is an identified World Heritage value and acquisition as a conservation reserve should be pursued.

Petit Point (part of Nanga Station) was also proposed as nature reserve in the Shark Bay Region Plan, and acquisition should be pursued.

Edel Land (part of Carrarang Station) and Dirk Hartog Island - These pastoral leasehold areas were recommended as national park in the Shark Bay Region Plan. The areas have high scenic and recreation values which could be degraded through unmanaged coastal recreation. Management as conservation reserves would ensure these values were protected. Dirk Hartog Island also has potential value as an area for reintroduction of threatened fauna species. Reservation of these areas should be pursued.

The Government has proposed legislative changes which would provide perpetual leases for existing pastoral leases. The exceptions to this include the Dirk Hartog Island lease which, under these proposals, would be a priority acquisition by the Government for conservation purposes.

POLICY

Changes in tenure will continue to be implemented to protect and conserve World Heritage values.

Acquisition of areas that have been identified as proposed conservation reserves (Figure 4) will be pursued by negotiation with land owners and lease holders.

Transfer of ownership of privately owned or leased land will not be restricted for the purposes of World Heritage management.

The vesting and use of vacant Crown land and expiring leases which revert to the Crown should take into account their World Heritage values. Criteria for assessment will include an area's contribution to: the protection of World Heritage values, especially where threatened; sound management of the particular area; and resolution of boundary anomalies.

STRATEGIES

1. Inform land owners, holders and occupiers within the WHA of the tenure policies (DOLA, CALM).

2. Maintain a record of land owners, occupiers and managers in order to maintain communication with them (DOLA).

3. Identify areas where World Heritage values would be better protected and managed by a change in tenure in liaison with the community (CALM, Ministry for Planning).

4. Negotiate to acquire the Dirk Hartog pastoral lease and vest in the NPNCA as national park (CALM, DOLA).

5. Negotiate to acquire areas of the Nanga and Tamala pastoral leases identified in the Region Plan and vest in the NPNCA as nature reserve (CALM, DOLA).

6. Negotiate to acquire appropriate areas of Carrarang pastoral lease and vest in the NPNCA as national park (CALM, DOLA).

7. Vest the vacant Crown land on Peron Peninsula, excluding an area around Denham, as timber reserve in the Lands and Forest Commission (CALM, DOLA).

8. Implement strategies of the Shark Bay Marine Reserves Management Plan with respect to additions to the marine reserves.

9. Consider impacts on World Heritage values of proposed changes in ownership and tenure, including lease interests which revert to the Crown (DOLA, CALM).

10. Investigate alternatives for vesting and management of the waters of the WHA which are not vested as marine reserves.

8.3 ENVIRONMENTAL IMPACT ASSESSMENT

ISSUES

- **An obligation exists to ensure any proposed activities or developments within or outside the WHA do not have an unacceptable impact on World Heritage values.**
- **Existing State legislation provides the framework for environmental assessment.**

The Environmental Protection Authority (EPA) has State responsibility for environmental impact assessment under the Environmental Protection Act 1986. Any activity likely to have a significant effect on the environment can be referred to the Authority. The Authority must then recommend what the level of environmental assessment should be. This may vary from an informal advice to an extensive public environmental review. This level of assessment is publicly announced and is open to appeal by the public.

The EPA is assisted by the Department of Environmental Protection (DEP) which liaises closely with other departments and will liaise with the Commonwealth in regard to proposals in the WHA which could have an impact on World Heritage values. The Commonwealth will be informed and its advice taken into consideration in setting the level of assessment, in assessing the proposal and in setting conditions should it be approved.

POLICY

All proposals which have the potential to have a detrimental impact on World Heritage values will be referred to EPA for assessment .

STRATEGIES

1. Refer all proposals with potential to impact on World Heritage values to the EPA (DEP, CALM).
2. Establish guidelines which outline a systematic approach for assessment of proposals in relation to World Heritage values (EPA/DEP, CALM).
3. Ensure relevant organisations are aware of procedures for environmental assessment in the WHA (DEP, CALM, LGA's, other agencies).
4. Inform and liaise with the Commonwealth in respect to the level of assessment, the assessment of proposals and conditions of approval where a proposal has potential to affect World Heritage values (EPA, DEP).

8.4 POLLUTION

ISSUE

A range of potential pollution sources exist which could impact on World Heritage values, particularly in the marine environment.

Potential sources of pollution in the Shark Bay WHA include:

- atmospheric pollution, for example, emissions;
- marine pollution, for example, fuel and oil spills, littering (especially plastics and fishing line) and sewage;
- land pollution, for example, littering and urban, industrial and agricultural pollution;
- groundwater pollution, for example, seepage from septics and rubbish disposal sites, nutrients and chemicals from agricultural activities; and
- noise pollution.

Pollution of one environment, for example the land, may lead to pollution of another environment, for example the marine environment.

The Gascoyne and Wooramel rivers drain into Shark Bay, but their flow is intermittent and runoff small. There is little surface runoff in Shark Bay because of low rainfall, high evaporation and permeable soils, however there is active regional groundwater flow.

The nature of Shark Bay, that is, a semi-enclosed embayment, combined with a low flushing rate could result in pollutants being slow to disperse and, as such, increasing the impacts on the marine environment.

The Department of Environmental Protection is responsible for pollution control and abatement. In regard to oil spills a statewide oil spill plan exists, however a plan specifically for the Shark Bay WHA should be prepared detailing how an incident would be handled to minimise the impacts of such an event on the marine environment.

The Western Australian Water Authority is responsible for managing water resources and for the disposal of sewage.

POLICY

The impact of pollution on World Heritage values will be minimised and where possible, prevented.

STRATEGIES

1. Give priority to research and monitoring to improve understanding of the impact of pollution on World Heritage values (DEP, CALM).

2. Establish and maintain an inventory of significant sources of pollutants to the Shark Bay WHA (DEP, CALM).

3. Prepare a contingency plan for emergency pollution and oil spill situations (DEP, DT, CALM, FD).

4. Minimise littering in the marine and terrestrial environments of the Shark Bay WHA through education programs and other means (CALM, FD, LGAs, DT).

5. Minimise nutrient inputs into the marine and groundwater environments of the Shark Bay WHA (DEP, LGA's, WAWA).

6. Provide facilities for the removal and treatment of sullage from vessels at major ports and anchorages (LGA's).

7. Minimise emissions into the atmosphere of the Shark Bay WHA that contribute to air pollution (DEP).

8. Review existing sewage treatment and assess proposals for new developments to ensure that World Heritage values will not be adversely impacted by disposal of effluent (WAWA, LGA's, DEP).

9. STRATEGIES FOR CONSERVATION

9.1 OVERALL POLICY DIRECTIONS

Planning and management will be based on the best available scientific knowledge. Priority will be given to increasing that knowledge.

High priority will be given to maintaining and enhancing existing natural processes. This will be achieved by;

- **conserving terrestrial and marine ecosystems and their flora and fauna, including threatened and other vulnerable species and communities;**
- **increasing knowledge of species and community distributions and dynamics;**
- **conserving landforms and other World Heritage features;**
- **conserving important land and sea scapes; and**
- **managing potentially degrading processes to ensure the integrity of World Heritage values is maintained (refer to section 12).**

9.2 INTEGRITY OF WORLD HERITAGE VALUES

ISSUE

There is an obligation to maintain the integrity of the World Heritage values.

Integrity may be defined as the degree to which a World Heritage value remains unimpaired. All protection, conservation and rehabilitation issues relate in some way to maintenance, restoration or enhancement of the integrity of World Heritage values.

Integrity may be affected by natural processes and by human-induced disturbance. Information on how the integrity of a World Heritage value may be affected is limited.

POLICY

Management of the WHA will aim to maintain, and where possible enhance, the integrity of the World Heritage values.

STRATEGIES

1. Determine baseline information on the condition and extent of World Heritage values, and potential risks to these values (CALM).
2. Determine management priorities for protection, conservation and rehabilitation of World Heritage values (CALM).
3. Ensure unnatural disturbances to the integrity of World Heritage values are minimised (CALM).
4. Monitor the condition of World Heritage values (CALM).

9.3 DEVELOPING KNOWLEDGE

ISSUE

Further knowledge is required to ensure the protection and conservation of Shark Bay's World Heritage values.

A considerable amount of scientific knowledge in relation to Shark Bay's natural environment exists, however, there are gaps. Continuing to develop knowledge of Shark Bay's marine and terrestrial environments is essential. Further management-oriented research is needed, particularly on the impact of human activities and threatening processes (eg. feral animals, weeds, fire) on World Heritage values and to determine appropriate management. The most appropriate and effective techniques need to be developed and utilised to manage potentially degrading processes. Further information on threatened species and communities is also required. Facilities to assist research and monitoring need to be established in the WHA.

POLICY

Research and monitoring specifically to enhance knowledge of the impacts of human activities and threatening processes on World Heritage values and the management of these activities will be encouraged and supported.

STRATEGIES

1. Develop a priority list for research and monitoring projects in liaison with researchers and with the Shark Bay Scientific Advisory Committee, with emphasis on management-oriented research (CALM, DEP, DME, DAWA, FD, tertiary institutions).

2. Encourage and facilitate research and monitoring according to the priority list (CALM, DEP, DME, DAWA, FD).

3. Existing research permit systems will apply (CALM and other relevant agencies).

4. Investigate the provision of facilities to assist research within the WHA, as resources permit (Tertiary institutions, CALM, Fisheries Department, DAWA).

5. Develop and maintain a database record of research in Shark Bay (CALM).

9. 4 CONSERVATION OF SPECIES

ISSUES

- **Knowledge is required on the distribution, biology and management requirements of threatened species and other species of special conservation interest.**
- **Control of threatening processes is important for the conservation of species.**
- **Priorities for conservation of species within the WHA need to be established.**

Flora and fauna of the WHA are a significant part of the Area's values. All four criteria on which Shark Bay was nominated rely totally, or in part, on the maintenance of species to maintain the values to meet these criteria.

All flora and fauna are protected under the Wildlife Conservation Act and cannot be taken without lawful authority. Lawful authority includes:

- flora and fauna taken under Wildlife Conservation Act licences or open season arrangements;
- flora and fauna taken by people of aboriginal descent in accordance with the Wildlife Conservation Act;
- fish taken in accordance with the Fish Resources Management Act; and
- sandalwood taken in accordance with the Sandalwood Act 1929 and the CALM Act.

Flora and fauna on marine and terrestrial conservation reserves are totally protected under the Wildlife Conservation and CALM Acts. The only exceptions to this are fish species taken lawfully under the Fish Resources Management Act, species taken lawfully by aboriginal people and species taken under scientific licence.

Flora gazetted as "likely to become extinct or is rare" under the Wildlife Conservation Act are totally protected and cannot be taken without Ministerial approval. Fauna gazetted as "likely to become extinct or is rare", or "in need of special protection" also cannot be taken without licence. The only exemption to this is dugong which can be taken by aboriginal people for food only. Species that are declared under the Wildlife Conservation Act and occur in the WHA are listed below.

Threatened Fauna
(likely to become extinct or rare)
Banded Hare-wallaby (*Lagostrophus fasciatus*),
Western Barred Bandicoot (*Perameles bougainville*)
Mala or Rufous Hare-wallaby (*Lagorchestes hirsutus*)
Boodie or Burrowing Bettong (*Bettongia lesueur*).
Woilkara or Greater Stick-nest Rat (*Leporillus conditor)*
Djoongari or Shark Bay Mouse (*Pseudomys fieldi)*
Southern Right Whale (*Eubalaena australis*)
Humpback Whale (*Megaptera novaeangliae*)

Loggerhead turtle (*Caretta caretta*)
Baudin Island Skink (*Egerinia stokesii aethiops*)

Thick-billed Grasswren *(Amytornis textilis)*
Dirk Hartog Black and White Fairy-wren (*Malurus leucopterus leucopterus*)
Malleefowl (*Leipoa ocellata*)

Threatened Flora
(likely to become extinct or rare)
Plectrachne bromoides
Eucalyptus beardiana

Specially Protected Fauna
Woma python (*Aspidities ramsayi*)
Dugong (*Dugong dugon*)
Peregrine Falcon (*Falco peregrinus*)
Freckled Duck *(Stictonetta naevosa*)

A statewide approach to the management of threatened fauna and flora has been developed by CALM. This involves the review of threatened species distribution, number and size of populations, biology and potential threats. From this the species are ranked to develop priorities on a statewide basis for research and management.

On the basis of these priorities the Department develops "Recovery Plans" which detail programs which aim to improve the status of the species and ultimately to remove it from the threatened species list. Recovery plans have been prepared or are in the process of preparation for the Shark Bay Mouse and the Greater Stick-nest Rat. Recovery plans for the Banded Hare-wallaby, Rufous Hare-wallaby, Boodie and the Western Barred Bandicoot are a high priority.

Management of threatened species is also facilitated through the reservation and management of conservation reserves. An example is Bernier and Dorre Islands which contain five threatened mammal species. The management of use, activities and threatening processes (eg fire, feral animals) is essential to the maintenance of these important populations. Another important management strategy is to establish new populations of threatened species on areas to enhance the security and numbers of these species. This has been undertaken on Salutation Island and Heirisson Prong, however, other mainland and island opportunities exist in the WHA for future translocations. Peron Peninsula has significant potential for the establishment of a large area free of feral animals for mammal translocations. This was recognised by CALM and Project Eden was commenced in 1994 to control feral animals on the Peron Peninsula to enable the re-introduction of threatened and other fauna. If feral animal control is successful a variety of species could be introduced, including the Shark Bay Mouse, Boodie, Rufous Hare Wallaby, Chuditch, Banded Hare Wallaby and the Western Barred Bandicoot. Management of conservation reserves is addressed in the management plans for the marine and terrestrial conservation reserves.

Some threatened species occur on lands not protected in conservation reserves. An example is the loggerhead turtle which occurs outside the marine park and nests on Dirk Hartog Island. These species are protected by the Wildlife Conservation Act, however there may be threats to the species (eg feral animals, incidental captures in fishing operations) which need to removed or managed to ensure the species survival. Currently most threatened species populations are found on conservation reserves. The exceptions are the loggerhead turtle, Dirk Hartog Black- and-white Fairy-wren, the Freckled Duck and the Thick-billed Grasswren that occurs on vacant Crown land on Peron Peninsula. Threatened species translocated to Heirisson Prong are also exceptions.

Shark Bay is considered to be very important for water birds although surveys of the area have been limited. It is particularly important for some species such as the Eastern Curlew and the Pelican. Thirty five species listed in the Japan Australia Migratory Birds Agreement and the China Australia Migratory Birds Agreement occur in the WHA. There is a need to conduct surveys to identify species distribution, important roosting and breeding sites and identify potential threats to these species. Smaller islands in Freycinet Harbour are very important for nesting seabirds.

Some species, although not classified as threatened, are important values of the WHA. These may be fauna classified under the Wildlife Conservation Act as "in need of special protection", or flora species which have been identified by CALM as "priority species" because they are restricted to a small number of populations which may be under threat. There are also many species which are at edge of their range, eg. 25% of the WHA's vascular plants (283 species) are at the end of their ranges in Shark Bay. Species also utilise areas in the WHA for breeding or foraging, eg. loggerhead turtles, pelicans and migratory waterbirds. It is important that these species are protected.

An increasingly popular tourist activity is wildlife interaction. Wildlife interaction is any activity where people seek to interact with wildlife in some way which does not include the physical taking of a species. This may include watching marine mammals such as dolphins, whales and dugongs, fish feeding and viewing wildlife events such as turtle nesting. A wide array of wildlife of interest to the public exists in Shark Bay and they are of potential commercial value to tourist operators. Operation Eden will also provide significant opportunities for nature-based tourism.

Some activities may be detrimental to wildlife. Wildlife interaction is an example of an activity where visitors have the potential to affect species' natural foraging and social patterns.

The Wildlife Conservation Act provides protection for whales, dugongs, dolphins, turtles and other fauna as defined in the Act from harassment arising from wildlife interaction. Marine species which are fished are managed under the Fish Resources Management Act. Protection and management of species subject to non-extractive interactions, and management of those interactions, is provided for under the CALM and Wildlife Conservation Acts. It is important to ensure that these species which are targeted for interaction are provided with the appropriate legislative protection and management.

The WHA has high flora values. The Area contains two threatened flora species *E. beardiana* and *P. bromoides*, both found on Tamala and Nanga Stations. The area contains both the South West and Eremaean Botanical Provinces. The area at which these provinces meet is important as many species from the provinces are at the limits of their geographical distributions. These areas should therefore be included in the conservation estate to provide appropriate security for these values. The area contains at least 51 species which are endemic to the WHA. The major threat to these values would be clearing, feral animals and weeds. These threatening processes must be managed to protect the flora values.

POLICY

Flora and fauna values of the WHA will be protected.

Priority will be given to the protection and management of threatened species at greatest risk.

STRATEGIES

1. Determine research and management priorities for threatened flora and fauna in the WHA (CALM).
2. Prepare recovery plans or Interim Wildlife Management Guidelines for all threatened taxa in the WHA (CALM).
3. Manage threatened taxa in marine and terrestrial conservation reserves in accordance with the management plans for the reserves (CALM).
4. Control activities and processes on other lands and waters that have potential to impact on threatened species (CALM, other relevant agencies).
5. Coordinate the management of threatening processes (eg. inappropriate fire regimes, feral animals, weeds, habitat degradation, uncontrolled tourism) to ensure the maximum benefit to flora and fauna conservation (CALM, other relevant agencies).
6. Provide appropriate reserve tenure for areas important for the conservation of flora and fauna (CALM, DOLA).
7. Identify important flora and fauna taxa (other than threatened) and determine priorities for management (CALM).
8. Conduct and facilitate research on the WHA's flora and fauna with an emphasis on threatened, specially protected, endemic or other important taxa (CALM, tertiary institutions).
9. Promote and assist the integration of nature conservation with economic activity according to the principles of ecologically sustainable development (CALM, other relevant agencies).
10. Monitor change in distribution and abundance of the WHA's flora and fauna with priority for threatened , specially protected, endemic or other important taxa (CALM).
11. Manage wildlife interaction outside conservation reserves to ensure that the animals are not adversely impacted (CALM).
12. Provide legislative protection for species which have potential for wildlife interaction (CALM).

9.5 CONSERVATION OF ECOLOGICAL COMMUNITIES

ISSUES

- **Knowledge of some communities and management is limited, particularly in the marine environment.**
- **Some communities are not represented in the conservation reserve system.**
- **Some communities are fragile and sensitive to disturbance.**

Shark Bay contains a broad range of marine and terrestrial communities.

Shark Bay's diverse ecological communities include hypersaline stromatolite communities, extensive seagrass beds, sparse coastal shrubs and dense heaths. These diverse habitats support a diverse fauna and flora. The conservation of communities is essential in maintaining biological diversity.

Protection of the communities is provided for in conservation reserves and management of them is detailed in management plans for these areas. Land areas outside conservation areas are managed by the respective manager or vestee, however the Wildlife Conservation Act still applies in respect to the protection of flora and fauna. Communities identified as important values in the WHA, eg. the vegetation transition zone, which are outside the conservation reserve system need to be managed accordingly.

Some waters outside the marine reserves are proposed to be declared as a Fish Habitat Protection Area under the Fish Resources Management Act.

It is important that activities in the WHA do not impact communities identified as being of special value.

POLICY

Existing biodiversity will be maintained.

Potentially degrading processes will be managed to minimise their impact on World Heritage values.

Acquisition of knowledge of ecological communities and their management requirements will be encouraged and supported.

STRATEGIES

1. Identify important ecological communities and potential threats to these communities (CALM).
2. Develop priorities for management and protection of threatened, uncommon or ecologically important communities (CALM).
3. Reserve important ecological communities in vested conservation reserves (CALM).

9.6 CONSERVATION OF FORMATIONS AND LANDFORMS

ISSUES

- **Some formations and landforms are sensitive to degradation**

One of the World Heritage listing criteria was the existence of unique, rare or superlative natural phenomena, formations or features of exceptional natural beauty. The natural formations include the Faure Sill and the Wooramel Seagrass Bank. Activities that could potentially impact on these formations must be appropriately managed. These activities are generally addressed in the Shark Bay Marine Reserves Management Plan however there may be activities external to the marine reserves which could affect these two areas. For example any activity which degrades water quality could affect the seagrass and land use in the Wooramel catchment may alter sedimentation patterns which may affect the Faure Sill and seagrass in this area.

Many landforms constitute features of exceptional natural beauty, eg. the Zuytdorp Cliffs, Dirk Hartog Island, Peron Peninsula, and Heirisson and Bellefin Prongs. These landforms must be managed appropriately to ensure their scenic values are protected. This issue is discussed in the next section 9.7 Conservation of Land and Sea Scapes.

Specific formations and landforms may also provide habitat for particular flora and fauna. Protection of the formation may be necessary to maintenance of these habitats. Landforms should be managed to minimise degradation by inappropriate activities.

POLICY

Potentially degrading processes will be managed to minimise their impact on landforms identified as a World Heritage value.

Acquisition of knowledge of landforms and other features and their management requirements will be encouraged and supported.

STRATEGIES

1. Identify landforms in the WHA which constitute a World Heritage value (CALM).

2. Ensure that activities do not occur which degrade these values. (CALM, LGA's, MRWA, DME, WAWA, Western Power)

9.7 CONSERVATION OF LAND AND SEA SCAPES

ISSUES

- **A range of activities and uses could impact on the exceptional aesthetic qualities of the natural land and sea scapes.**
- **The exceptional natural beauty and aesthetic qualities of the WHA are poorly documented and there is little management-related information to assist in the protection and conservation of these values.**

The seascapes and landscapes of the WHA contribute to a significant visual resource. This feature of Shark Bay is recognised in the area's World Heritage listing, with "features of exceptional natural beauty" being one of the criteria for listing.

Features include:

- exceptional coastal scenery with sea cliff's such as Zuytdorp cliffs, wide sweeping beaches of sand and shells interspersed by rocky platforms, headlands, peninsulas and islands;
- low rolling hills interspersed with low, flat claypans or birridas; and
- shallow bays, lagoons, channels, extensive seagrass meadows, coral, sand flats, mangroves and limestone reef.

The broadscale landscape character of the WHA and preliminary assessment of landform, vegetation, waterform and land use for each landscape character type has been considered in a statewide study (CALM, 1994). Shark Bay includes the Kalbarri Sandplain, Shark Bay Peninsulas, Wooramel Plains and Carnarvon Coastal Plain landscape character types.

Human-imposed changes to the seascape and landscape should not detract from the natural visual character of the WHA. Visual seascape and landscape management ranges from broad scale to site specific analysis, and includes sensitive planning, design and construction.

POLICY

The visual seascape and landscape values of the WHA will be maintained, restored and enhanced where appropriate.

STRATEGIES

1. Classify scenic management areas according to their importance (CALM).
2. Assess potential impacts of developments, uses and management on the visual seascape and landscape values and minimise negative impacts where appropriate (CALM, DEP, Ministry for Planning, LGA's).
3. Develop scenic quality objectives for inclusion in planning (LGA's, Ministry for Planning, CALM).
4. Rehabilitate areas where the visual land and sea scapes have been degraded, in accordance with priorities developed from the scenic management area classification (LGA's, CALM, MRWA).
5. Ensure that the visual impacts of developments and activities in areas adjoining the WHA are minimised where they may significantly impair the natural beauty of the adjoining WHA (all management agencies).

10. STRATEGIES FOR REHABILITATION

10.1 OVERALL POLICY DIRECTIONS

Rehabilitation will be achieved using legislative mechanisms, plans and agreements with land owners, holders and occupiers.

Priority will be given to rehabilitating degraded areas where the greatest benefit will be achieved in the protection and conservation of World Heritage values.

As far as practicable, rehabilitation will be coordinated with landowners, neighbours and the wider community and focus on restoration of the environment to as natural a condition as practical.

10.2 DEFINITIONS, TECHNIQUES AND STANDARDS

ISSUES

- **Areas requiring rehabilitation need to be identified.**
- **The priorities for rehabilitation need to be identified.**
- **Effective rehabilitation techniques need to be determined.**
- **Inappropriate rehabilitation techniques have the potential to introduce disease, weeds and other exotic species in some areas.**

A proportion of the Shark Bay WHA has been modified by past, and is being modified by present, activities. Disturbance had already occurred in the area at the time Shark Bay was listed as a WHA. Disturbance has been caused by activities such as mining or quarrying, clearing for agriculture, grazing, physical damage by vehicles, machinery and people, the introduction of feral animals and weeds, and trawling It is expressed in various ways including changes to natural assemblages of plants and animals, soil compaction and/or erosion, salinisation and reduction in water quality.

The type and extent of rehabilitation required in the Shark Bay WHA will vary depending on the type and extent of the disturbance to World Heritage values. Rehabilitation will be a priority in areas where World Heritage values are threatened The procedure used may also depend upon the priority use of the land. Care needs to be taken to prevent the introduction of exotic species through rehabilitation.

Rehabilitation in the Shark Bay WHA is generally overseen or conducted by the following agencies:

Department of Agriculture - rehabilitation of degraded rangelands.

Department of Minerals and Energy - mining operations under the Mining Act.

Local Government Authorities - basic raw material extraction and other disturbed sites on Shire managed lands (eg. disused roads, carparks, etc.).

CALM - basic raw material extraction and other disturbed sites on CALM-managed lands (eg. recreation sites, disused roads and tracks).

The Commissioner of Soil and Land Conservation can develop regulations and soil conservation notices under the Soil and Land Conservation Act 1945 to prevent soil degradation in the WHA. Soil conservation notices require the landowner, manager or occupier to take action to prevent land degradation and refrain from activities that are resulting in land degradation.

Potential sources of disturbance in the Shark Bay WHA are discussed in more detail in other sections of the Plan. These sources and the relevant sections in the Plan include:

- Mineral Resource Development, Section 12.2
- Petroleum Resource Development, Section 12.3
- Basic Raw Materials, Section 12.4
- Salt Production, Section 12.5
- Fisheries, Section 12.6
- Pastoral Use, Section 12.7
- Aboriginal Resource Use, Section 12.8
- Services and Infrastructure, Section 12.10
- Tourism, Section 12.11

POLICY

Rehabilitation will be directed towards protecting and where possible enhancing the World Heritage values.

STRATEGIES

1. Identify areas requiring rehabilitation within the Shark Bay WHA (DOME, CALM, LGA's, DAWA).

2. Determine priorities for rehabilitation (DOME, LGA's and DAWA in consultation with CALM).

3. Establish appropriate standards and techniques for rehabilitation in the WHA and use, where possible, local plant species and soil (DOME, CALM, LGA's, DAWA).

4. Consider the risk of the introduction and spread of disease, weeds and other exotic species in rehabilitation techniques used (DOME, CALM, LGA's, DAWA).

5. Promote community-based involvement in rehabilitation projects (DOME ,CALM, LGA's, DAWA).

10.3 WEEDS

ISSUES

- **Weeds can degrade World Heritage values.**
- **Existing knowledge of the priority species for weed control, and their ecology and distribution is limited.**
- **Control programs can impact on non-target species and other World Heritage values.**
- **There are currently no legislative requirements for control of weeds other than those threatening agriculture and declared under the Agriculture and Related Resources Protection Act 1976.**

In relation to this plan weeds are defined as any non-animal organism that does not naturally occur in the WHA. Sixty four species of weeds or introduced plants are found in the Shark Bay WHA. They vary in distribution and degree of threat to World Heritage values. Weed invasions are generally related to disturbances, caused by:

- removal of existing vegetation cover and soil exposure;
- introduction of seeds and plant material;
- construction, maintenance and use of roads, powerlines and waterlines;
- fire, cyclones and clearing which remove the vegetation cover;
- grazing and livestock movements; and
- movement of people.

Weed species have the potential to impact upon the conservation values of the WHA through displacement of native species and destruction of habitat. Weeds may also degrade the aesthetic and recreational values of the area.

Priorities in weed control are constantly changing, with new threats and species continually emerging. Major weeds already present in the area include *Lycium ferocissimum* (Box Thorn - a serious invasive pest of offshore islands), *Brassica tournefortii* (Prickly Turnip) which has extensively invaded grazed Acacia shrublands in the area and *Urospermum picroides* (extensively invaded limestone headland at Eagle Bluff). Box Thorn should be controlled or eradicated in the short term. It will not be possible to control or eradicate species of weeds that are distributed by fauna in the WHA unless a biological control can be found. This is due to the vast area and the difficulty in controlling the spread of weeds such as Doublegee, Calthrop, Ruby Doch and Buffel Grass.

Some plants have been introduced in the Shark Bay WHA for the benefit of pastoral and other industries. These may be a threat to World Heritage values. Species cannot be introduced for pastoral purposes without approval from the Minister for Lands.

Landowners, managers and occupiers are responsible for controlling and eradicating weeds declared under the Agriculture and Related Resources Protection Act. There is no legislative requirement for landowners, managers or occupiers to control other weeds in the WHA. Administration of the Act is the responsibility of the Agriculture Protection Board.

Potential weeds in the WHA also include exotic marine flora and micro-organisms. The impact of foreign ballast discharge on the marine environment is currently of great concern throughout the world. Ballast water discharge is managed by the Australian Quarantine and Inspection Service (AQIS). No legislation or regulations control ballast discharge, however voluntary guidelines have been introduced to encourage practices which would minimise the risks of introducing exotic organisms. In the marine areas of the Shark Bay WHA the major shipping activities that occur are involved with servicing the Useless Loop Salt operation. In 1994 approximately 35 ships visited the port.

The AQIS guidelines recommend a range of measures, one of which is exchange of ballast en route, therefore minimising the foreign water being discharged at Useless Loop. This practice should be encouraged and the level of compliance monitored by AQIS in liaison with Shark Bay Salt and the Department of Transport. Research into the contents of ballast water unloaded at Useless Loop is also required to ascertain if organisms are being released, and if so, whether they are surviving. This research and monitoring would assist in identifying the risk to the marine environment of the Shark Bay WHA.

POLICY

The impacts of weeds on World Heritage values will be minimised and where possible , weeds will be eradicated.

The introduction of exotic plants for agricultural, ornamental or rehabilitation purposes will not be permitted where this has the potential to degrade World Heritage values.

Consultation will occur between relevant landholders and managers to develop coordinated weed control programs.

STRATEGIES

1. Control those species which present the greatest threat to the World Heritage values (CALM).
2. Prevent the establishment of new weed infestations and rapidly eradicate infestations (CALM, APB).
3. Encourage landowners to control environmental weeds where they impact on World Heritage values (CALM, APB).
4. Encourage landowners and managers to utilise weed control techniques that are appropriate to the target species, location or infestation, environmentally compatible and cost effective (APB).
5. Control and eradicate weed infestations in the transition zone between the two Botanical Provinces (CALM, APB, lessees).
6. Improve the knowledge base on existing and potential weed species, current distribution, their impacts and management options (CALM, APB).
7. Conduct scientific research which improves the understanding of the impacts of weeds on World Heritage values, and which investigates improved techniques and strategies for control and eradication (CALM, APB).
8. Develop education and community involvement programs in weed control (CALM, APB).
9. Monitor the high priority weed infestations within the WHA and the success of control and eradication programs (CALM, APB).
10. Monitor any effects of control programs on non-target species and make changes to procedures if required (CALM, APB).
11. Ensure that testing and monitoring of bilge and ballast water occurs within the Shark Bay WHA (AQIS, DT, DEP).
12. Identify methods of preventing the introduction of exotic marine flora through consultation (AQIS, Commonwealth EPA, FD, CALM, DEP)

10.4 FERAL ANIMALS

ISSUES

- **Feral animals pose a threat to World Heritage values.**
- **Further knowledge is required for effective control of some feral animals.**
- **There are currently no legislative requirements for control of feral animals other than those threatening agriculture and declared under the Agriculture and Related Resources Protection Act.**

Feral animals pose a threat to the integrity of World Heritage values. The most significant threat is from cats, foxes, rabbits and goats. Feral animals may have a detrimental effect on landforms and native animals and plants. They may predate native fauna, compete for food and shelter, and damage native plants, habitats and landforms by grazing, trampling and digging. Domestic animals that are part of pastoral activities are discussed in Section 12.7 Pastoral Use.

An integrated control, and in some cases, eradication program is needed for feral animals. Past research in arid areas has indicated that cat populations significantly increase when foxes are eliminated and likewise rabbits flourish when cat numbers are reduced. This may also apply in Shark Bay. The ability exists to control foxes and goats on a broad scale, and broad scale cat and rabbit control is being researched. It is important to consider the impacts of removal of a feral animal species on populations of other feral animals. Integration of control programs is essential.

Islands and peninsulas in the Shark Bay WHA have potential for threatened fauna translocation programs. Feral animal programs may be necessary where introduction programs are planned. This type of eradication work has already been implemented through intensive work at Heirisson Prong and a program of eradication on Peron Peninsula (Project Eden) is underway.

Landowners, managers and occupiers are responsible for controlling and eradicating feral animals declared under the Agriculture and Related Resources Protection Act. Foxes, rabbits and goats are declared under the Act however cats are not. There is therefore no legislative requirement for landowners, managers or occupiers to control feral animals in the WHA other than those declared under the Act. Administration of this Act is the responsibility of the Agriculture Protection Board.

There is potential for the introduction of exotic marine species in ballast discharge from ships (refer to discussion in Section 10.3 Weeds). Existing knowledge indicates that there are no exotic marine animals in the waters of the WHA however no surveys have been undertaken specifically for this purpose.

POLICY

The impact of feral animals on World Heritage values will be minimised and where possible, feral animals will be eradicated.

Consultation will occur between relevant landholders and managers to develop feral animal control programs.

Impacts of ballast water discharge will be investigated and action taken to minimise any adverse impacts found to be occurring.

STRATEGIES

1. Compile and maintain a database on the distribution of feral animal species in the Shark Bay WHA (CALM, APB).
2. Control species which represent the greatest threat to World Heritage values (CALM, APB).
3. Maintain areas, such as Bernier and Dorre Island Nature Reserve and other islands, free of feral animals (CALM).
4. Integrate feral animal control and eradication with translocations of native animals (CALM, APB).
5. Control and where possible eradicate feral animals on islands, Peron Peninsula and Heirisson Prong (CALM, APB, Useless Loop Biosphere Group).
6. Develop control and eradication strategies in consultation with relevant landholders, owners and managers in the WHA, State Government agencies, local authorities and interested community groups and individuals (CALM, APB).
7. Continue scientific research to improve understanding of the impact of feral animals on World Heritage values and to improve techniques and strategies for control and eradication of feral animals, particularly cats and rabbits (CALM, APB).
8. Develop information to raise community awareness of the impacts of feral animals on World Heritage values, and the importance and reasons for control programs (CALM, APB).
9. Ensure testing and monitoring of bilge and ballast water occurs within the Shark Bay WHA (AQIS).
10. Identify ways of preventing the introduction of exotic marine animals through consultation (AQIS, Commonwealth EPA, ANCA, FD, CALM, DEP).

11. STRATEGIES FOR PRESENTATION

11.1 OVERALL POLICY DIRECTIONS

Visitor opportunities within the WHA will be strongly oriented to presenting World Heritage values, in a way which minimises impact on the integrity of these values.

Presentation will maximise opportunities to increase public understanding of, and support for, the WHA.

Development of opportunities which present the values of the WHA without impacting on values will be supported and encouraged.

Provision of visitor facilities will be based on visitor use information and the predicted impact on World Heritage values if the facilities are or are not provided.

Community education and participation in management will be an important means of generating community understanding and support for the WHA.

11.2 RECREATION AND TOURISM

ISSUES

- **The WHA provides an opportunity to expand nature-based tourism and to increase community knowledge about Shark Bay and its natural and other values.**
- **Recreation and tourism have the potential to impact on World Heritage values, but well-managed recreation and tourism have the potential to generate greater support for the conservation of Shark Bay's World Heritage values.**
- **Private tourism developments exist and others are likely to be proposed, and these could impact on World Heritage values (depending on their location, nature and management).**
- **Liaison with the tourism industry is crucial in planning and development of tourism within the WHA.**
- **The provision of facilities and presentation of the WHA is not integrated across the WHA.**
- **Existing opportunities to view and experience the WHA are limited.**
- **There is increasing interest from the public to visit Shark Bay.**
- **Management should provide equity between users (eg. consider visitors, boat users, tour operators) and provide for a broad spectrum of activities.**
- **Some existing recreational use is degrading World Heritage values, particularly in coastal areas.**

A wide range of activities occur on the lands and waters in the Shark Bay WHA. A user survey for the WHA was conducted between June and November 1993 and this indicates the major activities occurring and the types of groups in the Area (CALM, 1994).

Visitors surveyed originated from the Perth metropolitan area (29.9%), country WA (28.4%), interstate (17.1%) and overseas (5.2%). The most popular recreation sites within the WHA were Monkey Mia, François Peron National Park, Shell Beach Conservation Park, Hamelin Pool and Steep Point.

The most popular land-based activities included viewing the Monkey Mia dolphins (73.9%), sightseeing (62.2%), photography (57.8%) and

picnicking or barbecuing (49.6%). The most popular water-based activities undertaken in the WHA were linefishing (45.5%), swimming (37.9%) and power boating (28%).

The existence of the WHA with its significant and diverse range of natural values and features represents a major resource for expansion of nature-based tourism in Shark Bay. This type of tourism represents an opportunity to increase community knowledge of the Shark Bay environment and World Heritage whilst supporting an expanded tourism industry.

Tourism and recreation facilities in the WHA range from hotel and caravan park accommodation with associated facilities and services at Denham, Monkey Mia and Nanga. A small caravan park is located at the Flintcliff Telegraph Station (Hamelin Pool) and remote camping is provided for at François Peron National Park, Gladstone and at Carrarang and Tamala Stations. Dirk Hartog Station also provides tourism accommodation. Day use facilities are provided at Shell Beach Conservation Park, Hamelin Pool Marine Nature Reserve, François Peron National Park and Shire managed sites at Bush Bay, New Beach, Little Lagoon and Eagle Bluff.

There are many opportunities for tourism and recreation in the WHA that could be provided with minimal impact to the World Heritage values. These would provide visitors with opportunities to view and enjoy the values of the WHA.

Management plans for the marine and terrestrial conservation reserves contain detailed strategies for management of recreation and tourism. These plans will be compatible with the development of tourism in the region as outlined in the Shark Bay Region Plan.

The development of tourism and recreation in the WHA should be coordinated and developments consistent with the management of the WHA actively promoted.

Promotion of the WHA should be accurate and consistent and where possible in keeping with the values of the WHA. It should provide a clear and accurate message to visitors as to what World Heritage means and what the values of Shark Bay are.

Use of the coast for remote camping and fishing is degrading coastal landforms on some areas (Marine Reserves Management Plan, CALM 1995). It is essential that these activities are controlled and managed to stop the gradual destruction of coastal vegetation.

POLICY

Nature-based tourism opportunities will be promoted consistent with the maintenance and presentation of World Heritage values.

A range of tourism and visitor opportunities and experiences will be facilitated, consistent with the protection of World Heritage values.

The promotion of the WHA should be accurate and promote wise use of the WHA.

STRATEGIES

1. Provide and facilitate a range of recreation and tourism opportunities in the WHA (LGA's, CALM).
2. Ensure that tourism development and recreation activities do not impact on World Heritage values (LGA's, CALM, DEP, Ministry for Planning).
3. Maintain liaison with recreational tourism managers to ensure a coordinated approach to the provision of information, services and facilities in the WHA (WATC, CALM, LGA's).
4. Ensure that tour operators and guides are well informed and trained to provide visitors with accurate and consistent information about the WHA (WATC, CALM).
5. Monitor tourism promotion to ensure it is accurate and promotes the World Heritage values consistent with the concept of World Heritage (WATC, CALM).
6. Manage tourism activities in conservation reserves in accordance with management plans for these areas (CALM).
7. Identify environmentally sensitive areas not protected in conservation reserves and manage recreation and tourism to levels consistent with the protection of the environmental values (LGA's, CALM).
8. Assess proposals for major tourism development, including associated infrastructure, to ensure World Heritage values are protected (DEP).

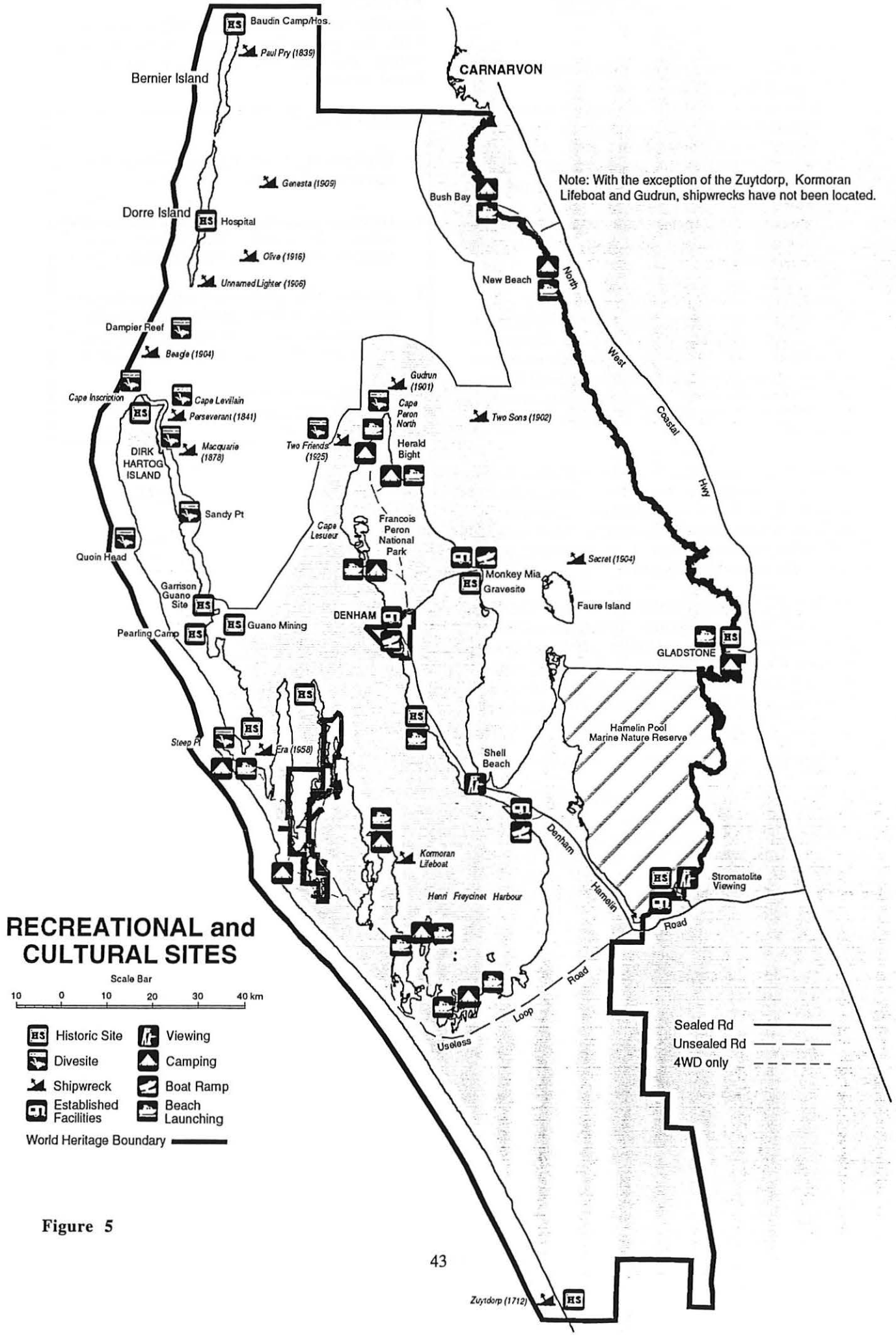
Baudin Camp/Hos.
Paul Pry (1839)
Bernier Island
CARNARVON
Genesta (1909)
Dorre Island
Hospital
Olive (1916)
Unnamed Lighter (1906)
Bush Bay
New Beach
North West Coastal HWY
Note: With the exception of the Zuytdorp, Kormoran Lifeboat and Gudrun, shipwrecks have not been located.
Dampier Reef
Beagle (1904)
Cape Inscription
Cape Levillain
Perseverant (1841)
DIRK HARTOG ISLAND
Macquarie (1878)
Gudrun (1901)
Cape Peron North
Two Friends (1925)
Herald Bight
Two Sons (1902)
Sandy Pt
Cape Lesueur
Francois Peron National Park
Quoin Head
Garrison Guano Site
Guano Mining
Pearling Camp
DENHAM
Monkey Mia Gravesite
Sacret (1904)
Faure Island
GLADSTONE
Steep Pt
Era (1958)
Shell Beach
Hamelin Pool Marine Nature Reserve
Kormoran Lifeboat
Henri Freycinet Harbour
Denham Hamelin Road
Stromatolite Viewing
Useless Loop Road
Zuytdorp (1712)
RECREATIONAL and CULTURAL SITES
Scale Bar
10 0 10 20 30 40 km
Historic Site
Divesite
Shipwreck
Established Facilities
Viewing
Camping
Boat Ramp
Beach Launching
World Heritage Boundary
Sealed Rd
Unsealed Rd
4WD only

Figure 5

11.3 ACCESS

ISSUES

- **Access is the prime factor that affects use of the WHA.**
- **Provision of access provides opportunities to present the World Heritage values but also has the potential to lead to degradation of those values if visitor use is inadequately managed.**
- **Provision of access can open up areas that are sensitive and not suitable for development.**

Access to the WHA is possible by road, air and water. Currently the main access is by road via North West Coastal Highway from north and south, and thence from the Overlander to Denham. With the exception of roads to Denham, Monkey Mia and Shell Beach, access within the WHA comprises mainly unsealed roads and tracks. Pastoral station roads and tracks are also used.

Air access is via airstrips at Denham, Useless Loop and Nanga. Services are provided by commuter airlines from Perth, Geraldton and Carnarvon. Carnarvon has an airstrip with regular airline services. Most pastoral stations have private airstrips. Boats provide access to remote areas inaccessible by road.

The demand for access within the WHA is likely to increase. The Draft Roads 2020 Regional Road Development Strategy (MRWA, 1994) detailed proposals for upgraded road access within the region. This includes the following road developments in the WHA: upgraded access to Hamelin Pool; upgraded access to Useless Loop, Carrarang and Tamala coast; upgraded Nanga road access; and a review of road access requirements in the François Peron National Park.

The provision of further access in the WHA needs to consider the potential impacts on the World Heritage values of opening up areas which are sensitive and capable of sustaining little of no visitor use. Existing inappropriate access should be closed and action taken to prevent establishment of new, inappropriate access.

POLICY

Provide access within the WHA consistent with the protection of the World Heritage values and the encouragement of nature-based tourism.

STRATEGIES

1. Determine the level of access and priorities for new or upgraded roads.
2. Ensure new access proposals take account of the potential direct and indirect impacts on World Heritage values (CALM, MRWA, DEP, LGA's).
3. Encourage the development and upgrading of an access network which provides opportunities for the community to experience and appreciate the values of the WHA (MRWA, CALM, LGA's).
4. Restrict access and close tracks where they are adversely impacting on World Heritage values (CALM, LGA's).

11.4 INFORMATION AND EDUCATION

ISSUES

- **There are numerous uncoordinated sources of information about the WHA.**
- **Information provided is not always accurate or complete.**
- **There is some confusion in the community regarding World Heritage.**
- **There is significant media interest in the WHA.**

The WHA provides an opportunity to inform the public of the high conservation values of Shark Bay. Appreciation of these values will encourage visitors in general to take a responsible approach to use of the area as well as improve the quality of the experience. Nature-based tourism provides an exciting opportunity to interpret the natural features to visitors. Effective provision of information through signs, interpretive facilities, written publications, tourist facilities, tour operators and through personal interaction with Government officers is crucial to interpreting the natural features.

Information on what World Heritage is about, and how the area is managed, is also important as there is some confusion regarding World Heritage.

There is a variety of people and organisations that provide information about Shark Bay in a range of locations and using a variety of techniques and media. Coordination of these programs and consistency of the information provided is important to ensure accurate information is provided, and to maximise the opportunities that exist in Shark Bay. A key component in the provision of information is the establishment of a World Heritage visitor centre in Denham. An evaluation of alternative sites has been conducted (Hale, 1994). The visitor centre and location, facilities and information should provide opportunities to understand the natural and cultural values, World Heritage and opportunities that exist for visitors in the WHA.

There will be other opportunities for the provision of information on the cultural heritage of the WHA. For example at the Peron Homestead site there is an opportunity to interpret the pastoral history of the area.

POLICY

Accurate and consistent information about the Shark Bay WHA will be provided to visitors to promote and encourage the protection of World Heritage values.

STRATEGIES

1. Ensure that information and education materials and signs are accurate and consistent (CALM, WATC, LGA's, FD).
2. Develop a communications program to promote the WHA visitor opportunities (CALM, WATC).
3. Construct a World Heritage visitor centre at Denham to provide a focus for visitors to interpret the WHA (CALM, Shire of Shark Bay).
4. Coordinate the provision of information (LGA's, CALM, WATC, FD, tourism operators).
5. Make information about the WHA available to the tourism industry to help with marketing and promotion (CALM, WATC).
6. Monitor promotion of the WHA to ensure it is accurate and promotes wise use of the area (WATC, CALM).

11.5 KNOWLEDGE

ISSUE

Knowledge about visitor use, patterns and needs/expectations is required for effective management.

Knowledge of visitor use and needs and expectations through social research and monitoring are important components of effective management. They provide a basis for improving management practices and to be able to predict, and respond to changes in visitor patterns and demands.

Research should be conducted to ascertain the quantitative and qualitative aspects of visitor use (types and patterns of use and visitor expectations and perceptions). This can then provide the basis of improving opportunities for presenting the World Heritage values.

POLICY

Knowledge of visitor use and needs will be obtained and utilised to effectively manage recreation and tourism.

STRATEGIES

1. Coordinate collection of data on the numbers, characteristics, attitudes, preferences, activities and seasonal patterns of visitors within the WHA (CALM, WATC, tourist bureaux, LGA's, FD).
2. Prepare and implement a visitor use monitoring program to gain an understanding of visitor use and expectations (WATC, CALM).

12.0 STRATEGIES FOR MANAGING RESOURCE USE AND OTHER ACTIVITIES

12.1 OVERALL POLICY DIRECTIONS

Land and water resource use and other activities will be managed to ensure they do not affect the integrity of World Heritage values. Uses and activities include:

- **mineral resource development;**
- **petroleum resource development;**
- **basic raw material use;**
- **salt production;**
- **pastoral use;**
- **fisheries;**
- **Aboriginal resource use;**
- **services and infrastructure; and**
- **tourism.**

12.2 MINERAL RESOURCE DEVELOPMENT

ISSUES

- **Mineral resource exploration and development and associated infrastructure have the potential to impact on World Heritage values unless properly managed.**
- **Disturbance of the seabed may impact on geomorphological and biological processes.**
- **Continued access is required for exploration.**

Mineral resource development occurs in accordance with the Mining Act and is managed by the Department of Minerals and Energy. This includes stringent rehabilitation conditions and a performance bond which is set according to the type, extent and possible impacts of the activity. All new proposals are subject to assessment in accordance with the Environmental Protection Act 1986. The management of the Shark Bay Salt operation is addressed in Section 12.5

Mining tenements present within or adjacent to the WHA include those for gypsum, shell coquina and salt (see section 12.5, Salt Production). The gypsum mining leases are excluded from the WHA and occur at Brown Inlet and Peron Peninsula. Both are unexploited. If the tenements covering the Peron deposits expire or are relinquished these areas should be included in the François Peron National Park.

Shell deposits (*Fragum erugatum*) are extracted from a mining lease and a quarry on Reserve 41076 (see Section 12.4, Basic Raw Material Use) adjacent to Lharidon Bight. Research is required to determine the sustainability of extraction. The DEP is required to provide guidelines to ensure that shell extraction is sustainable. Shell extraction also has the potential to impact on tourism and other values.

Evaporitic rocks within the Silurian sequence (eg. sandstone, siltstone and limestone) may contain more valuable components, such as sylvite (KCl). No occurrences are known in the Shark Bay region, but if indications of its presence were to be found there could be demand to explore for it. No other minerals are considered to be prospective in the prevailing economic and strategic climate.

POLICY

Mineral resource exploration and development will be managed in accordance with the Mining Act and the Environmental Protection Act, and other relevant Acts.

The impacts on the integrity of World Heritage values will be considered in mineral resource exploration and development.

STRATEGIES

1. Review existing mining operations to ensure compliance with environmental conditions taking into account impacts on World Heritage values, including the effect of associated infrastructure, the impact on presentation of the WHA and rehabilitation proposals (DME, DEP, DRD).
2. Continue to allow access for exploration provided methods are used which have negligible impact on the integrity of World Heritage values (DME, DEP, CALM).
3. Ensure no new or renewed lease or exploration permit is granted or renewed unless it can be demonstrated to have negligible impact on the integrity of World Heritage values (DME, DEP).
4. Encourage research into the natural processes which influence the shell deposits at Lharidon Bight (DME, DEP, CALM).
5. Monitor the impacts of exploration and mining on World Heritage values (DME, DEP, CALM).

12.3 PETROLEUM RESOURCE DEVELOPMENT

ISSUES

- **Petroleum resource development and associated infrastructure have the potential to impact on World Heritage values unless properly managed.**
- **The disturbance of the seabed may impact on geomorphological and biological processes.**
- **Continued access is required for exploration.**

Petroleum resource development occurs in accordance with the Commonwealth Petroleum (Submerged Waters) Act 1967, the State Petroleum (Submerged Waters) Act 1982 and the State Petroleum Act 1967. The Department of Minerals and Energy administers petroleum exploration and production. All new proposals are subject to environmental impact assessment in accordance with the Environmental Protection Act 1986. Petroleum operations are subject to a stringent approval process with appropriate environmental approvals required at each stage. The potential impacts of the ancillary infrastructure, for example transport of petroleum and support tenders, are likely to be of greater environmental concern than the extraction itself.

The Shark Bay region has not seen active petroleum tenements for over a decade, and active field exploration for over 20 years. A small part of one exploration permit (EP 378 onshore title) existed in the WHA at July 1995, however, no exploration activity has occurred. The WHA is relatively underexplored due primarily to logistic problems in the acquisition of seismic in very shallow water, land access issues, and concentration on other areas perceived as more highly prospective. With the development of new technologies and continuing research into methods of minimising environmental impact of petroleum field operations, there may be renewed attention to the petroleum prospectivity of the area (DME, 1994).

On 30 July 1994 the Government announced its policy on petroleum exploration and development in marine conservation reserves. No drilling or production will be allowed in marine nature reserves or in Sanctuary or Recreation Zones in marine parks. Drilling and production will be possible in those portions of General Use Zones where it has been established that such activities will not impact on sensitive marine habitats. Drilling and production will not be permitted in Special Purpose Zones where such activities are incompatible with the purpose of the zone. Seismic surveys may be permitted into areas that are not available for drilling. Any proposals for exploration and production are referrable under the Environmental Protection Act process.

Pollution is discussed in Section 8.4.

POLICY

Petroleum resource development will be managed in accordance with the Petroleum Acts and the Environmental Protection and other relevant Acts.

The impacts on the integrity of World Heritage values will be considered in petroleum resource exploration and development.

Petroleum exploration and production will be in accordance with Government policy in marine conservation reserves.

STRATEGIES

1. Assess any proposed exploration and production activities to ensure the impacts on World Heritage values are taken into account, including the effect of associated infrastructure, the impact on presentation of the WHA and rehabilitation proposals (DME, DEP, CALM).

2. Continue to allow access for exploration and production in accordance with Government policy provided it can be demonstrated to have negligible impact on the integrity of World Heritage values (DME, DEP, CALM).

3. In accordance with Government policy, carry out a comprehensive assessment of biological values, petroleum prospectivity and potential risk to conservation values to determine areas of the Shark Bay WHA where petroleum exploration and production would be practical and environmentally acceptable (DME, CALM, DEP).

4. Maintain liaison between the petroleum industry, the Department of Minerals and Energy, the Department of Environmental Protection and CALM to ensure that adequate conditions are set and followed to minimise any detrimental impacts on World Heritage values arising from any petroleum exploration and production (DME, DEP, CALM).

12.4 BASIC RAW MATERIAL USE

ISSUES

- **Basic raw material extraction and associated infrastructure have the potential to impact on World Heritage values, particularly the visual landscape, unless properly managed.**
- **Standards of management of basic raw material extraction and rehabilitation vary depending on the operator and the controlling authority.**

Basic raw materials within the WHA include gravel, sand, limestone and shell grit/coquina which are utilised for construction purposes and approval for extraction is effected through various mechanisms.

- Local Authorities generally access basic raw materials through the creation of quarry reserves under the Land Act (managed by DOLA) or under the powers of the Local Government Act on other land tenures.

- Basic raw materials on private land are not defined as minerals under the Mining Act. Consequently they are accessed through extractive industry licences issued under the Local Government Act.

- Extraction of basic raw materials on Crown lands may occur under a mining lease granted under the Mining Act 1978 with approval of the vested authority. These operations are regulated and managed by DME in consultation with CALM with respect to environmental issues on CALM-managed lands.

- Private landowners and pastoral lessees may utilise basic raw materials on properties they own or lease for their own purposes without licence.

- CALM may utilise basic raw materials on lands it manages without licence or allow access by Local and State Government through various methods depending on the tenure of the land. Limited access for other Government authorities to conservation reserves may be allowed in accordance with CALM and NPNCA policy.

- The Main Roads Department may access basic raw materials from private land under the powers of the Public Works Act, and as outlined above for Crown land.

If basic raw material extraction is likely to have a significant impact on the environment it is subject to assessment under the Environmental Protection Act. Otherwise monitoring and rehabilitation may be the responsibility of Local Government, DME, CALM, pastoral lessee or a private operator, depending on the mechanism of extraction. As several agencies are involved, coordination of basic raw material extraction is required.

Shell (heart cockle, *Fragum erugatum*) is extracted from a quarry on Reserve 41076 adjacent to Lharidon Bight. Research on the biology of this species is being undertaken to determine the sustainability of extraction. The DEP is required to provide guidelines to ensure that shell extraction is sustainable. Shell extraction also has the potential to impact on tourism and other values. Coquinite (consolidated shell) extraction occurs from a quarry on Reserve 37963 vested in the Shire of Shark Bay which is near the Telegraph Station. The Shire of Shark Bay is preparing a management plan for this reserve. This resource is limited and as such extraction should only occur for the purposes of renovation of historic buildings.

The planning and coordination of basic raw material extraction will be addressed in a plan being prepared by the DME. This will address resource availability, demands and a process to ensure World Heritage values are not adversely impacted by these activities. Particular attention will be given to ensuring appropriate access for basic raw material extraction on South Peron.

POLICY

The Environmental Protection Act will continue to be applied to basic raw material extraction.

Basic raw material extraction will be allowed to continue subject to assessment of the potential impacts on World Heritage values.

STRATEGIES

1. Refer proposals for basic raw material extraction that have potential to degrade World Heritage values to the Department of Environmental Protection for environmental impact assessment (the proponent of the proposal).

2. Manage basic raw material extraction in accordance with the basic raw material plan being prepared for the WHA (LGA's, DRD, MRWA, CALM, WAWA, DT)

3. Establish minimum rehabilitation standards for basic raw material extraction in the WHA (DME, DEP, CALM).

4. Encourage rehabilitation of existing and disused sites (DME, LGA's, CALM, MRWA).

5. Extraction of coquinite will only be permitted for the purposes of renovation of historic buildings (LGA, DME).

12.5 SALT PRODUCTION

ISSUES

- **The operations of bulk carriers may impact on World Heritage values (see section 8.4 Pollution).**
- **Bitterns and other discharges from the salt operation and other operations such as dredging may impact on World Heritage values.**

The Shark Bay Salt operation at Useless Loop and Useless Inlet was established in 1965 and is excluded from the WHA. Numerous associated leases for road, pipelines and drains are administered by the Department of Minerals and Energy under the Mining Act. The operation includes an airstrip and company town site.

The salt operation is managed in accordance with the Shark Bay Solar Salt Industry Agreement Act 1993, an agreement between the State and the Shark Bay Salt joint venture. This Agreement Act provides Shark Bay Salt with the right (and also the obligation) to carry out solar salt mining on the project site. The Act is administered by the Department of Resources Development (DRD).

The Agreement Act requires Shark Bay Salt to operate in accordance with State environment legislation and also contains provisions requiring on-going environmental investigation, monitoring and reporting for the duration of the project. Environmental reporting is on a three-year cycle of two annual interim reports and a detailed triennial report, in which past performance is evaluated and plans for the next three-year period are put forward. The reports are reviewed by DME and other relevant agencies.

The triennial reporting procedures allow the State or the developer to seek amendments to existing environmental programs. This normally results from a review of past results, experience and changes in technology or project structure. If the State is not satisfied with changes proposed by the developer, amendments to the program can then be required by the responsible Minister.

With about 35 ship loadings per year at Useless Loop, the most significant potential impacts on the WHA from salt mining include the risk of oil spillage from a shipwreck and the possibility of introducing foreign biota via ballast waters. These issues are addressed in Section 8.4 Pollution.

POLICY

Shark Bay Salt operations will continue to be managed in accordance with the Shark Bay Salt Industry Agreement Act 1983.

STRATEGY

Continue to monitor environmental management of the salt operation to ensure that adjacent World Heritage values are not adversely impacted (DRD, DME, DEP).

12.6 FISHERIES

ISSUE

Fisheries activities have potential to degrade World Heritage values if not managed appropriately.

Commercial fisheries are an important economic and social component of Shark Bay worth approximately $35 million a year and directly employing about 500 people (Fisheries Dept., 1994). Some aquaculture (including pearling) occurs and there is significant further potential. Recreational fishing is a major activity of visitors and locals and also a tourist attraction. Line fishing is most popular and is conducted from boats, beaches and cliffs.

Commercial and recreational fishing are controlled and regulated under the Fish Resources Management Act and managed by the Fisheries Department on the basis of ecological sustainability. The Fisheries Department has prepared a management plan for the fish resources in the WHA. This plan addresses potential impacts on World Heritage values by fisheries activities and recommends appropriate management strategies to ensure the maintenance of these values. This has been prepared in conjunction with, and complements, CALM's management plan for the marine reserves in the WHA. The Fisheries management plan provides a detailed basis for management of Shark Bay's fish resources.

POLICY

Fisheries will continue to be controlled and regulated under the Fish Resources Management Act and managed by the Fisheries Department.

The Fisheries Department's Shark Bay World Heritage Area Fish Resources Management Plan will be the basis for management.

STRATEGY

Implement the Shark Bay World Heritage Area Fish Resources Management Plan (FD).

12.7 PASTORAL USE AND AGRICULTURE

ISSUES

- **Pastoral activities have the potential to degrade World Heritage values if not managed appropriately.**
- **Increased use of non-indigenous plants (including for pasture improvement) and feral animals may be introduced through pastoral activities.**
- **The concerns of local pastoralists need to be addressed.**

Approximately 60 % of the land area of the WHA is Crown land leased for pastoral purposes, comprising 5 leases totalling 447430 ha. Based on average sheep numbers carried on these properties, pastoralism in the area would be expected to return approximately $500000 (based on $16.3 gross return/head of sheep; source-Pastoral Board). The stations are Carrarang, Dirk Hartog Island, Faure, Nanga and Tamala. A further nine pastoral leases are adjacent to the boundary of the WHA.

Pastoral leases are managed in accordance with the Land Act and administered by the Pastoral Board. The lessee is subject to many requirements including those relating to rent, improvements to the property, stocking levels, land deterioration, cultivation of non-indigenous species and clearing vegetation. Proposed amendments to the Land Act may allow for multiple use of pastoral leases, for example, for tourism purposes.

The Soil and Land Conservation Act which relates to managing soil erosion and land degradation also applies to pastoral lands. This Act is administered by the Department of Agriculture. It includes regulation of vegetation clearing.

Regulation and control of declared weeds and feral animals on pastoral properties is the responsibility of the Agriculture Protection Board (APB). This is addressed in Section 10, Rehabilitation.

An area of vegetation encompassing part of Tamala and Nanga pastoral leases is the vegetation transition zone between the South West and the Eremaean Botanical Provinces. This land has very low grazing value and contains vegetation which is an identified World Heritage value. Grazing is likely to degrade the World Heritage value of this area and thus a more suitable tenure is required. The tenure of the transition zone and some other areas of pastoral leases in the WHA is addressed in Section 8.2 Tenure.

Seaward boundaries of pastoral leases adjacent to the WHA are generally not fenced and in some cases stock occasionally graze the coastal fringe, and infrastructure such as pipelines occurs outside the leases. Fencing will generally not be required and grazing that occurs outside the lease will be permitted provided that World Heritage values are not impaired. Any fencing that may be required will be done in liaison with the relevant pastoralist and costs negotiated with the State Government .

Overstocking could impact on World Heritage values, however existing legislation provides the mechanism to ensure that this does not occur. The introduction of non-indigenous species for pasture improvement could occur and depending on the species and their location they may impact on World Heritage values.

Local pastoralists have concerns in relation to a number of issues. These include:

- potential delays which may occur in approvals for new proposals due to World Heritage listing, eg if seeking to introduce a new pasture species;
- the impact of World Heritage listing on existing activities;
- the impact of World Heritage listing on activities outside the WHA; and
- responsibility for meeting the costs of protecting and conserving World Heritage values on privately owned and leased land.

An opportunity exists to interpret past and present pastoral activities to visitors to Shark Bay in liaison with the pastoral industry. This is addressed in Section 11.4 Information and Education.

POLICY

Pastoral activities will be managed, in accordance with the Land Act, the Soil and Land Conservation Act and other relevant Acts.

Local pastoralists will be consulted regarding all World Heritage matters that may affect pastoral leases.

STRATEGIES

1. Ensure pastoral lease conditions protect and conserve World Heritage values (Pastoral Board, DOLA).

2. Consider the potential impacts on World Heritage values in assessments for proposed improvements to pastoral leases, eg clearing, introduction of non-indigenous species. Establish an approval process in consultation with pastoralists (Pastoral Board, DOLA).

3. Develop mechanisms for determining if compensation to pastoralists is payable if pastoral activities are affected by World Heritage protection and conservation measures (DOLA).

4. Include impacts on World Heritage values in monitoring the environmental condition of pastoral leases (DAWA).

12.8 ABORIGINAL RESOURCE USE

ISSUE

Aboriginal resource use may impact on World Heritage values unless properly managed.

Archaeological research indicates that aboriginal use of the natural resources at Shark Bay dates from about 30000 years ago (see Section 4.1 Social Values).

Use of flora and fauna by aboriginal people is provided for under the Wildlife Conservation Act. Flora and fauna can be taken by aboriginal people for food for consumption (not sale) except for species declared as threatened or specially protected under the Wildlife Conservation Act. The only exception to this is the dugong which can be taken despite its classification as a species in need of special protection. The species targeted and the number of animals taken are difficult to determine. Small numbers of dugongs, green turtles, kangaroos and other fauna are known to be taken in the WHA. The management of hunting of flora and fauna in marine and terrestrial conservation reserves is addressed in management plans for these areas. Areas outside these reserves will be managed in accordance with existing legislation and policy.

The use of fish resources by aboriginal people is managed through the Fish Resources Management Act. This use has been addressed in the Management Plan for Fish Resources for the WHA.

It is important that these activities are monitored to ensure that the World Heritage values are not degraded. If certain activities have potential to impact on these values then, in liaison with local aboriginal communities, the issue should be reviewed and appropriate steps taken to protect these values.

POLICY

Aboriginal use of resources will continue to be recognised and allowed for in accordance with the Wildlife Conservation Act and the Fish Resources Management Act.

STRATEGIES

1. Manage aboriginal resource use in conservation reserves in accordance with the terrestrial reserves and marine reserves management plans (CALM, FD).

2. Monitor aboriginal use of traditional resources in liaison with local aboriginal communities to ensure these activities are not impacting on World Heritage values (CALM, FD).

3 Where activities have potential to degrade World Heritage values, liaise with aboriginal communities to determine management arrangements to protect these values (CALM, FD).

12.9 OTHER RESOURCE USES

ISSUES

- **Other resource use may impact on World Heritage values unless properly managed.**
- **New resource development should be appropriately assessed before commencing.**

Other resource use includes sandalwood, craft materials, wildflower picking, seed collecting, apiculture, land based aquaculture and any additional natural resource industry or use of natural resources, eg. water, that is proposed for the WHA.

Sandalwood (*Santalum spicatum*) extraction occurs on Nanga station in the WHA. Currently the extraction of 20 tonnes per annum is permitted which is less than 1% of overall State production.

Sandalwood extraction is administered by CALM according to the Sandalwood Act 1929, CALM Act and Regulations. Extraction is not permitted on conservation reserves, however, it can occur on timber reserves, State forest and on pastoral leases subject to licensing.

Local flora is also utilised to a minor extent for commercial wildflower picking, seed collecting, craftwood and for firewood. This use is controlled by CALM under the CALM Act and the Wildlife Conservation Act. No taking of flora for commercial purposes is permitted on conservation reserves and as such these activities would be limited to pastoral leases and to reserves that permitted such use, eg. timber reserves. Conditions are imposed on these activities. Threatened flora is protected from being harvested.

There is increasing interest in the establishment of landbases for aquaculture in Shark Bay. These proposals will be evaluated by existing mechanisms, ie. consideration by the Fisheries Department in consultation with the Interdepartmental Committee on Aquaculture and assessment by the EPA as necessary.

POLICY

Other resource uses will be dealt with in accordance with existing legislation and any new proposals will be assessed to ensure these will not impact on World Heritage values.

STRATEGIES

1. Provide for and manage sandalwood extraction on pastoral leases and South Peron in accordance with existing legislation (CALM).
2. Continue to manage commercial wildflower picking, craftwood, seed collection and firewood collection in accordance with existing legislation (CALM).
3. Monitor these uses to ensure they are not impacting on World Heritage values (CALM).
4. Assess proposals for aquaculture landbases in accordance with existing legislation and guidelines (FD, DEP).
5. Assess proposals for new resource uses to ensure that they will not impact on World Heritage values. (CALM, DEP).

12.10 SERVICES AND INFRASTRUCTURE

ISSUES

- **The provision of services and infrastructure could degrade World Heritage values, depending on location and type.**
- **The extraction of groundwater could degrade World Heritage values.**

Services and infrastructure, such as roads, accommodation/housing, electricity, water, waste disposal, tourism developments, and communications are necessary to service the towns, pastoral stations and industries within the WHA.

The provision of new infrastructure has the potential to impact on World Heritage values. Such impacts may include the clearing of vegetation, introduction of weeds, visual impacts and the destruction of important habitats. To ensure that infrastructure does not cause these impacts it is important that there is a process of environmental assessment. Existing State legislation provides for this assessment, except in the case of telecommunications carriers, and is discussed in Section 8.3.

POLICY

The provision of services and infrastructure will be managed to ensure that World Heritage values will be maintained.

STRATEGY

Assess potential impacts on World Heritage values of proposals for the provision of services and infrastructure. Apply appropriate conditions to these projects (DEP, CALM).

13. STRATEGIES FOR IMPLEMENTATION

13.1 RESOURCES

This plan provides a number of proposed strategies for management of the WHA, and identifies the agency or agencies which will be responsible for implementation of a particular strategy. The resourcing of these strategies will be via State, local Government and Commonwealth funding mechanisms. Some strategies confirm existing management arrangements by State and local Government agencies and, as such, additional funding will not be required for these. There are, however, strategies that will require additional resources to implement.

Consistent with Government policy on visitor fees and commercial licence and lease fees for conservation reserves, the user-pays approach will be progressively implemented and revenue will be used to help manage the WHA,

13.2 PRIORITIES AND REVIEW

It is unlikely that resources will be available to achieve all strategies immediately. As such there is a need to determine priorities for implementation of the strategies outlined in this plan. The proposed priorities are outlined in Appendix x. These are presented as a guide only and may be varied as new information becomes available.

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APPENDIX 2 - ABBREVIATIONS

APB - Agriculture Protection Board

AQIS - Australian Quarantine and Inspection Service

CALM - Department of Conservation and Land Management

DAWA - Department of Agriculture Western Australia

DEP - Department of Environmental Protection

DME - Department of Minerals and Energy

DOLA - Department of Land Administration

DRD - Department of Resources Development

DT - Department of Transport

EPA - Environmental Protection Authority

FD - Fisheries Department

LGA's - Local Government Authorities

MRWA - Main Roads Western Australia

WATC - Western Australian Tourism Commission

WAWA - Water Authority of Western Australia