A GUIDE TO SHARK BAY

WORLD HERITAGE PROPERTY

A WIDE VARIETY

Shark Bay's varied landscapes and habitats range from rugged sea cliffs along the coast to tranquil bays and inlets fringed by wide beaches of sand or shells. With a shoreline that meanders in a 'W' shape for 1,500 kilometres, the Shark Bay region covers about 22,000 square kilometres, roughly 70 per cent of which is water. Facing the Indian Ocean are the spectacular Zuytdorp Cliffs, the elongated inlets and bays of the Edel Land Peninsula, and Dirk Hartog, Bernier and Dorre islands. Then there is the Bay, whose main bodies of water are 10-15 metres deep and divided by shallow banks and many peninsulas and islands. Jutting into the Bay is Peron Peninsula, with its sandy, undulating plains punctuated by gypsum pans or birridas, with the fishing town of Denham and dolphins of Monkey Mia on its shores. Shark Bay also includes some outstanding national parks, marine parks and nature reserves managed by the Department of Conservation and Land Management.

This region's history, geology and natural features are so significant that Shark Bay has been internationally recognised as a World Heritage Property.

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GOVERNMENT OF WESTERN AUSTRALIA

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

PATRIMONIO MUNDIAL • WORLD HERITAGE • PATRIMOINE MONDIAL

People have lived in Shark Bay for many thousands of years.

Aboriginal people lived in the region long before European contact, and an archaeological record of cave shelters and shell middens can still be seen today. Caves used by Aboriginal people about 1000 years ago can be seen on the Monkey Mia walktrail.

The first recorded landing of a European on Australian soil was made by Dirk Hartog in 1616 at Cape Inscription, at the northern end of Dirk Hartog Island. He erected a post to which he nailed a pewter plate from the ship's galley to record the visit.

Willem de Vlamingh revisited Hartog's landing site in 1697 when searching for survivors from a missing ship.

William Dampier, the first English visitor to Australia, landed in the same area in 1699. He spent seven days examining the shore and his name of "Shark's Bay" remains today.

The reports of these explorers led to several other scientific expeditions to Shark Bay. Others were attracted to the voyages of discovery, looking for the riches of Shark Bay and the Great South Land.

From 1792 to the 1870s American, French and British whalers were attracted to Shark Bay by the large population of humpback and southern right whales. Whale hunting ended in 1963 when legislation was enacted to protect the humpback whale, which had become vulnerable to overfishing.

Around 1850 guano (seabird droppings) was recognised for its commercial potential. Deposits were mined on the islands around Shark Bay and exported for use as an agricultural fertiliser.

Following this mining, the potential of local pearls and pearl shell was recognised. Numbers of natural pearls were found in the Bay and the shell was increasingly used for button-making.

By the early 1870s, pearling settlements were scattered along the shoreline at Freshwater Camp (now Denham) and Monkey Mia, attracting Europeans, Malays, Islanders and Chinese to the region.

Left: Cape Inscription on Dirk Hartog Island.
Photo – Babs & Bert Wells/Department of Conservation and Land Management

With discarded pearl shell and 'pogey pots' were situated on the beach filled with pearl shell which were left to rot in these huge iron cauldrons. Much later the pots were heated and the stinking meat was skimmed off to reveal the clean pearl shell.

After 70 years of pearl trading, the Depression in the 1930s and over exploitation of pearl shell caused the pearling industry to close. In the past few years the pearling industry has undergone a minor revival. Several aquaculture ventures in the area are now producing cultured seed pearls through the use of modern scientific practises, technology and farming methods.

The first pastoralists arrived in the 1860s. The pastoral leases were primarily developed as sheep stations throughout Shark Bay and surrounding islands. Most of the pastoral holdings suffered from lack of water periodically until the 1900s when a large artesian basin was discovered and artesian bores were sunk, enabling a plentiful supply of water for the stock.

Sheep farming, sandalwood and fishing became the main commercial industry for the district and a cannery and processing works were established in 1912.

Today, the Shark Bay region thrives on tourism, fishing and the pastoral industry. A solar salt project at Useless Loop also contributes to a growing export trade. Recreational fishing attracts many visitors to the area and supports many local businesses. Special rules apply in Shark Bay to ensure fish stocks are used sustainably.

Francois Peron National Park

Spectacular Francois Peron National Park is named after the French naturalist who visited Shark Bay with the Geographe expedition in 1801 and 1803. In his journals Peron describes the wildlife he collected, the Aboriginal people he met and their dwellings.

Developed in the late 1880s, Peron Peninsula was managed as a sheep station until the State Government bought it in 1990. Pearlers also used the area in the late 1800s and old pearl shells still litter the beach at Herald Bight, the site of a pearling camp.

Today, renovations have seen the homestead restored and a visitor centre established in the old overseer's quarters.

The park is managed by the Department of Conservation and Land Management and covers about 52,000 hectares of undulating sandy plains interspersed by gypsum claypans, or birridas. Most birridas were landlocked saline lakes when sea levels were much higher than at present, and gypsum was deposited on the lake floors. In some places the sea has invaded the claypans, such as at Big and Little Lagoons, to form shallow inland bays.

A variety of birds is found on Peron Peninsula, including fairywrens, scrubwrens, and wedgebills. The endangered thick-billed grasswren was once widespread on the mainland, but is now restricted to a small area that includes Francois Peron National Park. Seabirds can be seen nesting on the Park's cliffs, beaches and sandy pits. Wedge-tailed eagles can often be seen and large osprey are found near the sandy beach embayments.

From the cliffs of Cape Peron visitors may see bottlenose dolphins playing, dugongs feeding, migrating humpback whales breaching, green and loggerhead turtles surfacing for air, and large manta rays gliding past just beneath the surface. The vast seagrass beds blanket the shallow waters to provide important protective habitat for the diverse marine life, and threatened populations including dugongs and loggerhead turtles.

Thanks to Project Eden, the Park is currently home and breeding station to many endangered animals that are now extinct on the Australian mainland and survive only on Bernier and Dorre Islands in Shark Bay.

Cover and below: Cliffs at Cape Peron.
Photos – Jiri Lochman

FABULOUS FLORA

Shark Bay's flora is varied and beautiful - but you have to look.

At first glance, the area's flora seems to be low, wind-pruned and relatively uniform. Visitors may be surprised to learn that Shark Bay is a region of major botanical significance.

Shark Bay is the meeting point of two botanical provinces - the flora of the south-west and the desert meet at the base of Peron Peninsula and Edel Land.

The best selection of the flora range limits can be seen in an area between 24 and 29 kilometres from the Denham Road, on the road to Useless Loop. Here, it is possible to stand in a tree heath surrounded by south-western banksias, grevilleas, melaleucas and eucalypts, and see the start of the desert's spinifex plains.

Shark Bay's floral gems may not be viewed immediately. It takes several visits and an inquiring eye to see just what the Bay has to offer. In spring, the area bursts into colour. The shrubs of the heath are at their best in late spring (end of September to October), while the smaller herbs are exceptional early in the spring.

The Shark Bay region has about 700 species of flowering plants. This alone is a high figure for an arid region, but of these species a staggering 146 (more than 24 per cent) are at the northern limits of their ranges.

These include such well known flowers as the State emblem (the red and green kangaroo paw), three species of coneflowers (*Conostylis*), a smokebush, two orchids (the rattlebeak and bunny orchid), woollybush and running postman.

About 30 species of flowering plants are confined to the Shark Bay mainland and offshore islands. Some of the more spectacular are a one-sided bottlebrush (*Calothamnus formosus*), a subspecies of the purple chenile honeymyrtle (*Melaleuca huegelii* ssp. *pristicensis*), *and* Royce's gum (*Eucalyptus roycei*).

Cockwise from below left: Tamala rose, coastal foxglove, halgania and lantern flower.
Photos – Babs & Bert Wells/Department of Conservation and Land Management

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DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

A NEW EDEN

Project Eden aims to control introduced predators on the 1050 square kilometre Peron Peninsula and turn it into a haven for rare and endangered native animals.

It is the biggest arid zone nature conservation program ever undertaken in Australia, to reverse the decline of a wide range of native animals caused by fox and feral cat predation.

It will also be a significant addition to the Shark Bay World Heritage Property, enhancing its environmental values and providing a further nature-based tourism attraction.

Since Project Eden began in 1995 under the statewide Western Shield program, the Department of Conservation and Land Management has virtually eliminated foxes on the Peninsula. About 50,000 baits are laid on Peron every year to control cats and foxes. The adjacent Nanga station is also baited yearly, with help from the Shark Bay Land Care District Committee and funding support from World Heritage, to provide a buffer against reinvasion of foxes and cats.

Since feral cats do not readily take baits when there is live prey around, Departmental scientists have been developing a new bait for cats. They have also developed an innovative trapping technique using special lures.

Traps are now laid on every kilometre of track on the Peninsula and more than 3200 cats have been trapped since July 1996. The Department's intention is to reduce cat numbers to a low level so reintroduced animlas can survive and breed.

The Department has also built a specially designed barrier fence across the narrow isthmus near Shell Beach. The two-metre high electrified fence was constructed to prevent animals re-invading Peron Peninsula from outside the control area. Where the fence crosses the Denham-Hamelin road, other deterrents are used to prevent animals coming through the gate, such as movement-activated recordings of barking dogs. The fence is also baited regularly along both sides.

The project has entered its second phase, the reintroduction of native animals. Malleefowl and woylies were the first two species reintroduced, in September 1997 and again in August 1998. Radio tracking and monitoring of these animals show that they are establishing on Peron and breeding.

Bilbies were released in 2000–2001 and are also doing well while reintroductions of Mala (Rufous Hare Wallaby) and Banded Hare Wallaby in 2001 are still in their early stages.

Many of the native wildlife species to be released on the Peninsula are endangered species existing in small populations, many on islands. These species include the mala or rufous hare-wallaby (*Lagorchestes hirsutus*), western barred bandicoot (*Parameles bougainville*), greater stick-nest rat (*Leporillus conditor*) and the Shark Bay mouse (*Pseudomys fieldi*) right. It has been essential therefore to embark on captive breeding programs for some species to provide the animals for translocation to Peron Peninsula.

Currently bilby, banded hare-wallaby and western barred bandicoot breeding programs are underway within breeding enclosures specially built in Francois Peron National Park. Breeding stock of banded hare-wallabies and western barred bandicoots were collected from Bernier Island in Shark Bay. Bilbies were collected from wild populations in Western Australia and the Northern Territory, with some bilbies coming to Peron via the Kanyana wildlife sanctuary. Mala from the Tanami Desert in the Northern Territory were added to the breeding colony in 1999.

Malleefowl were raised at the breeding facility from eggs collected from Wheatbelt region and from the nearby Nanga pastoral station. After being artificially incubated at the breeding facility and raised to adult size, more than 65 malleefowl were released onto the peninsula in 1997 and 1998.

The third phase of Project Eden is transforming Peron into a major nature-based tourism attraction for Shark Bay. A visitor centre has been built and in the future visitors will also be able to observe native animals in the wild.

Shark Bay mouse.
Photo – Babs & Bert Wells/Department of Conservation and Land Management

WORLD HERITAGE LISTING

Shark Bay became a World Heritage listed area in 1991 and is one of only 16 places in the world that satisfy all four natural criteria for listing:

outstanding examples representing the major stages of the Earth's evolutionary history. Cyanobacteria are salt-tolerant organisms which were the first life forms to appear on Earth and these were dominant for 3,000 million years.

In Hamelin Pool, high salinity levels ensure that plants and predators cannot survive and as a result, a wide diversity of cyanobacteria now flourish. These form extensive mats and stromatolites, much as they did millions of years ago.

outstanding examples representing significant ongoing geological process, biological evolution and man's interaction with his natural environment. Shark Bay's enormous seagrass beds are an impressive example of the role seagrasses play in modifying a whole marine ecosystem. For instance, the accumulation of skeletons of marine organisms living among the seagrasses north of Hamelin Pool has created the Faure Sill. The sandbar effect of the Sill in turn restricts tidal exchange, which sustains the hypersaline environment needed by the stromatolites of Hamelin Pool.

The region is also a meeting point of three climatic zones, and forms a transition zone between two major botanical provinces - the eucalypt-dominated South West and the acacia-dominated Eremaean. With many species at the end of their range, the area is scientifically important in determining factors that limit species distribution and abundance. In the marine environment, too, the area is on the northern extremity of many cold water species typical of the south and the southern extremity of many tropical northern species.

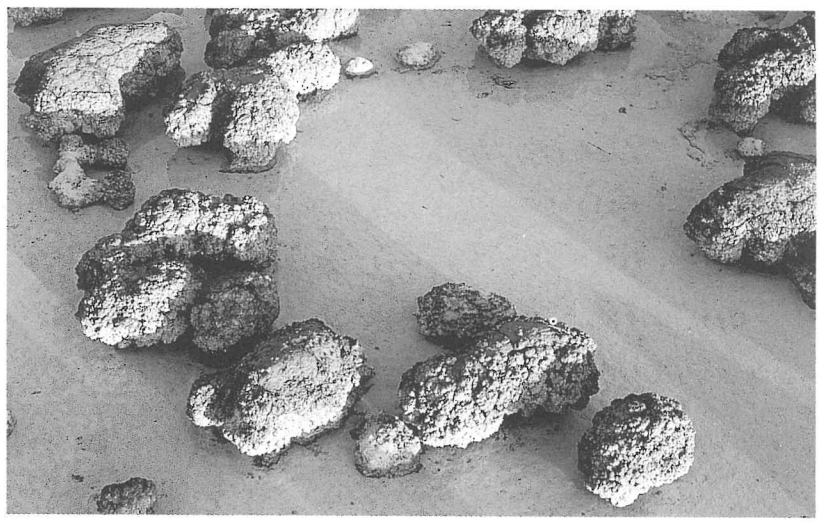
unique, rare or superlative natural phenomena, formations, or features of exceptional beauty. Shark Bay abounds with exceptional coastal scenery most notably at the Zuytdorp Cliffs, Shell Beach, Eagle Bluff and Cape Peron. Here the coast transforms from limestone rugged cliffs to red blown sand dunes, contrasting with tranquil bays of white beach sand or shell. The area's unique natural phenomena include the stromatolites of Hamelin Pool, the Wooramel seagrass banks and the elliptical gypsum claypans known as birridas.

significant natural habitats where threatened animal or plant species of outstanding universal value still survive. The only natural wild populations of the banded hare-wallaby, western barred bandicoot and Shark Bay mouse are found on Bernier and Dorre Islands.

The Bay has nine endemic reptile species, three rare bird species, one tenth of the world's dugong population and significant loggerhead turtle rookeries. It is also an important site for migratory species such as the humpback whale and wading birds from Siberia and parts of Asia.

The Department of Conservation and Land Management is the nominated lead management State agency that legislates guidelines for the protection, conservation and presentation of the Shark Bay World Heritage Property values.

Below: Stromatolites.
Bottom: Zuytdorp Cliffs.
Photos – Jiri Lochman



WOODEN GOLD

Sandalwood has been exported from Shark Bay for 100 years. The first shipments of the aromatic timber from Shark Bay left in the 1890s, bound for south-east Asia to be used to make joss sticks for religious ceremonies.

Shark Bay sandalwood differs from that growing in other parts of the State. Unlike other sandalwood, it's able to coppice, or send up new stems from a stump once the tree is cut down. The coppice shoots start producing seed again in three or four years, ensuring that harvesting can be sustained.

In fact, sandalwood harvesters working on Nanga Station are reworking old sandalwood tracks from the 1930s, using timber that has since regenerated. This suggests that sandalwood can probably be harvested on a 60-year rotation on Nanga, even with stock grazing.

The State's sandalwood industry is managed by the Department of Conservation and Land Management to ensure that timber is only harvested on a sustained yield basis.

Its unpalatable leaves are another unusual characteristic of Shark Bay sandalwood. It's not clearly understood what makes Shark Bay sandalwood so different. One theory is that the deeper red sand loams and more regular rainfall encourage a much bigger tap root system, which can support coppice growth.

Sandalwood fruits.
Photo – Babs & Bert Wells/Department of Conservation and Land Management

MONKEY MIA DOLPHINS

Wild dolphins have been visiting the beach at Monkey Mia to interact with people since the early 1960s.

It is thought that this interaction began when 'Old Charlie' was hand fed from the side of a fishing boat. Gradually trust grew and several dolphins were fed at the jetty and later at the beach.

Today, up to nine dolphins can visit the beach on a daily basis. Occasionally small groups of other dolphins join the regulars and venture quite close to shore although they tend to ignore people.

About 100,000 people visit Monkey Mia each year. Regulations strictly prohibit visitors feeding their own fish catch to dolphins from boats, the jetty or the shore. The Department of Conservation and Land Management has developed a management program to ensure the well being of all the dolphins in Red Cliff Bay, Monkey Mia.

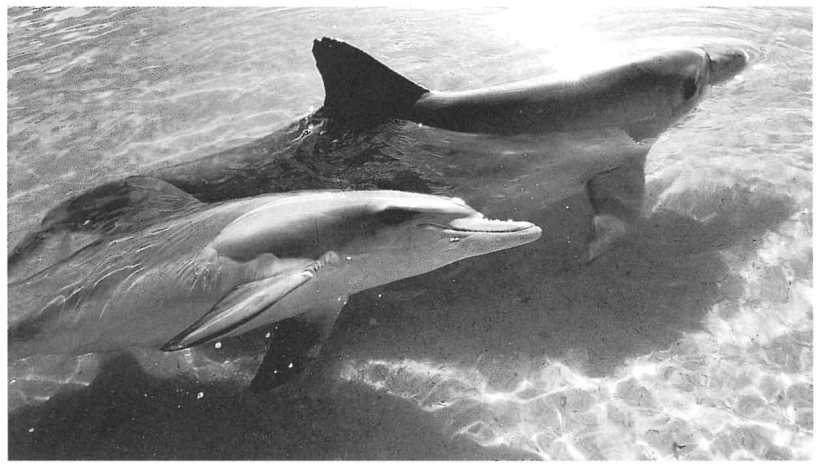
The Dolphin Interaction Area has been established so that the dolphins can visit without being disturbed by swimmers or boats. Rangers supervise this stretch of beach allowing people to stand no more than knee-deep in the water and it is only in this area that the dolphins are fed. Feeding is restricted to mornings to encourage the dolphins to spend more time offshore in their normal activities throughout the afternoon.

Only adult female dolphins are fed and never more than a third of their daily food requirement as it is essential that each dolphin continues to hunt for the bulk of its nourishment. There are no set times when the dolphins are fed because of the random nature of their visits to the beach.

Calf survival is a major indicator of the success of dolphin management. Over the 20 years to 1998, five of the adult female dolphins have had 22 calves between them. Before the Department took over management in 1995, 17 calves were born but only five are still alive. However, all calves born since 1995 have survived.

These results would not be possible without the cooperation of visitors to Monkey Mia, who comply with the feeding and swimming precincts.

The entry fee to Monkey Mia Reserve is used to protect the dolphins, manage the Reserve and provide visitor facilities. Through good management, the aim is to see a new generation of wild dolphins living and breeding off the shores of Monkey Mia.



Bottle-nosed dolphins at Monkey Mia. Photo – Jiri Lochman

MARINE TURTLES

Up to 6000 marine turtles live in the waters of Shark Bay. Some of these turtles are permanent residents but many visit periodically for breeding or foraging.

Green turtles (*Chelonia mydas*) are at their southern limit in Shark Bay, yet they are the most abundant species in the area and are most commonly seen from boats in Shark Bay Marine Park.

Loggerhead turtles (*Caretta caretta*) are considered the most endangered turtle species that nests in the Australian region. Resident loggerheads are found in the Bay, and numbers increase significantly in the summer when many migrate to the Shark Bay waters to breed.

Turtles can be seen gathering in the Bay from the end of July, although the breeding season generally starts a little later in the year. After mating, the female lays her first eggs on the beach, repeating this on a fortnightly basis as many as eight times.

Female loggerhead turtles lay their eggs on Bernier, Dorre and Dirk Hartog islands. Turtle Bay, on the northern tip of Dirk Hartog Island, is one of the few loggerhead nesting areas on the west coast, and the southern limit of their nesting in this State.

It's estimated that more than 1000 loggerhead females nest each year in Western Australia, most of them between Shark Bay and Exmouth Gulf. Individual females don't nest every year and may not return for seven years or more.

The Western Australian Marine Turtle Project, run by Department of Conservation and Land Management scientists, conducts vital research to gain important information on the life history, behaviour and conservation needs of turtles.

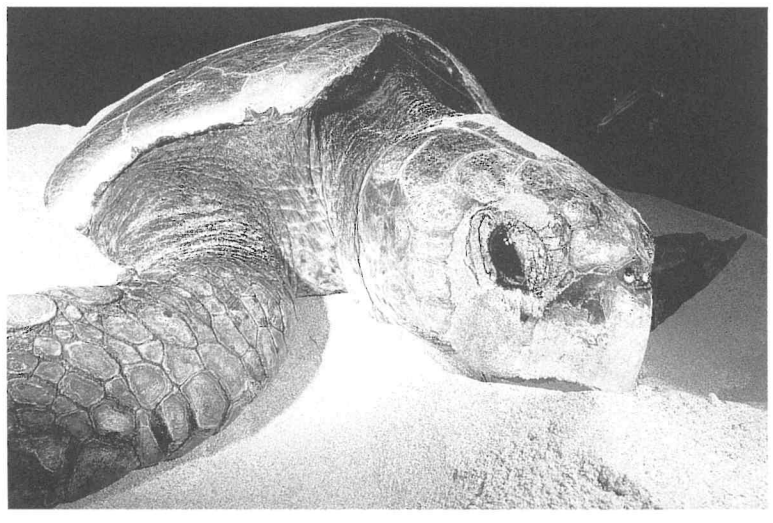
Scientists and volunteers collect valuable data on female loggerhead turtles as they lay their eggs, which later hatch on the beaches of the Shark Bay Islands. As this database expands and a population profile is developed, priority habitat locations can be identified, such as Turtle Bay, and appropriate management activities implemented.

It is important not to disturb turtles during nesting and hatching. Turtles are easily disturbed by lights, noise and movements - especially when they are leaving the water, crossing the beach and digging the nest.

From December to April, anchor boats in deep water. If anchored or moored in Turtle Bay please extinguish all deck lights at night. Turtles are attracted to lights and boat lights cause them to stay in the shallows where their chances of survival plummet.

For more information on the turtle monitoring program contact the Department's Shark Bay District office on (08) 9948 1208 or the Department's Western Australian Marine Turtle Project team on (08) 9405 5100.

Loggerhead turtle. Photo – Jiri Lochman



GENTLE GRAZERS OF THE BAY

One of the largest and most secure populations of dugongs in the world forages in the shallow marine environment of Shark Bay.

In most places around the world, dugongs are on the edge of extinction because of hunting, loss of habitat and entanglement in fishing lines resulting in accidental death.

Around 10,000 dugongs, or 10 per cent of the world's remaining dugong population, live in Shark Bay.

The animals feed mainly on seagrass. The dugong's snout is expanded into a short trunk, with a greatly expanded upper lip equipped with complex muscles and bristles. They use this snout to root into the sea bottom and extract seagrass rhizomes.

Dugongs leave irregular feeding trails through beds of rhizome-producing seagrass species, stirring up mud clouds that are visible from the air.

They have a low reproductive rate. Females may live 70 years, but don't produce their first calves until 12 to 17 years of age. The interval between births may vary between three and seven years.

Dugongs can't haul out on land, and reportedly give birth in very shallow water. The single calf stays close to its mother for 18 months or more.

Although the calves begin to eat seagrass within two weeks of birth, females continue to suckle their young during their long association.

Gladstone, situated north of Hamelin Pool Marine Nature Reserve, is the only place in the world where researchers have witnessed the mating rituals of dugongs.

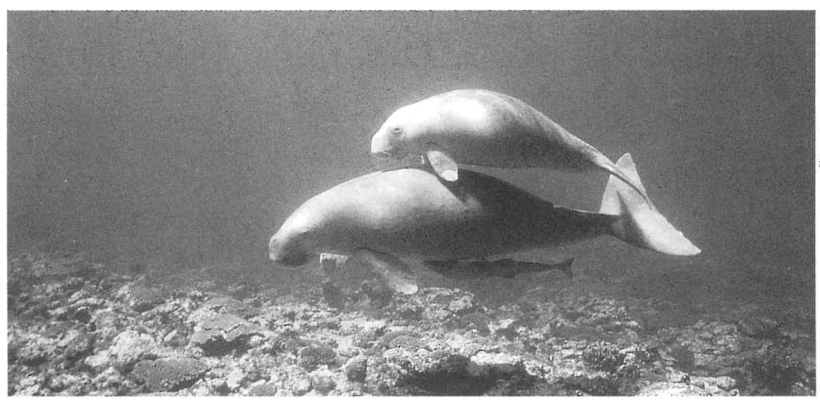
To protect this precious dugong site, much of the area is closed to boats during summer, though boats use the channel at all times.

When boating, reduce speed around dugongs. They should never be followed continuously, or forced to escape at top speed. Harassment could cause them to leave feeding areas, and prolonged high-speed swimming may cause damaging stress.

Boats within 100 metres of dugongs should travel slower than 10 knots. If you come across a herd of dugongs, cut the boat's engines and drift and let them swim around the boat.

Dugongs inhabit the large shallow seagrass beds, so do not cross shallow seagrass banks as they are at risk of being hit and killed.

Dugong mother and calf. Photo – Geoff Taylor/Lochman Transparencies



Microscopic masterbuilders

At first glance, the rocky lumps strewn around the beach at Shark Bay's Hamelin Pool don't look particularly significant. But the lumps, or stromatolites, are built by microscopic living organisms similar to the earliest forms of life on Earth.

Up to 3000 million individual microorganisms per square metre use sediment and organic material to build stromatolites up to 1.5 metres high - 10 million times their size.

The diverse microbial communities found in Hamelin Pool are the world's finest examples of stromatolites. The restricted circulation into Hamelin Pool creates a hypersaline environment that is twice as saline as normal ocean water. This enables the stromatolites to survive, as few predatory organisms are able to tolerate the salinity

When the Shark Bay stromatolites were discovered by scientists in 1956, they were the first ever recorded growing examples of fossilised structures found in very old rocks.

The discovery of modern examples has helped scientists understand the significance of microorganisms in the environment. The stromatolite-building microorganisms grow very slowly - a metre-high stromatolite would be about 2000 years old - and resemble the earliest life forms which dominated the earth for 3500 million years.

Stromatolites are very fragile and can be degraded by visitors walking over the site to view them. As a result a boardwalk has been built at Hamelin Pool by the Department of Conservation and Land Management. The boardwalk was design in conjunction with BHP Engineering to ensure that the structure would not cause significant long-term impacts.

Interactive, award-winning interpretation panels are situated along the boardwalk which emphasise the fragility of the stromatolite communities and the importance of protecting the site.

The visitor site is adjacent to the historic Hamelin Pool Telegraph Station and is the only place where visitors can view stromatolites in Shark Bay.

MARINE ANIMALS TO AVOID

Many marine animals use venom and toxins for catching prey and defence.

Only a few species have venoms and toxins potent enough to cause serious harm to people and these are not often encountered. However, it is best to be aware of problems they can cause and avoid coming into contact with them.

In Shark Bay, the most harmful marine creatures are the blue-ringed octopus, stingrays, cobblers, stone fish and coneshells. These creatures kill their prey with a potent toxin injected with their bite. Most of these marine animals only pose a threat when they are accidentally trodden on or harassed.

Blue-ringed octopus

Blue-ringed octopus live on reef flats and in tidal pools in muddy areas and can be recognised by their brilliant blue rings when disturbed. Be cautious when handling dead shells and when exploring underwater crevices or caverns.

Stingrays

Stingrays are flat in shape and have a very sharp and spiky barb. Be sure to keep a wary eye out when wading in shallow water.

Photos – Clay Bryce/Lochman Transparesncies

Coneshells

Coneshells are conical and cylindrical in shape. By day they bury themselves in sand and emerge at night in search of small fish, snails or worms. You should never pick up live coneshells.

Certain fish, such as catfish (or 'cobblers') and stingrays, have venomous spines and can cause painful injury.

Stonefish

Stonefish are found around the top two-thirds of the Australia coast. They inhabit coastal reefs, rocks and weeds, as these structures provide good camouflage, and usually lie partially buried on the seafloor in shallow marine environments.

If people tread on this animal the sharp, venomous spines can pierce their feet, causing severe pain and tissue damage. Always wear footwear when walking in the shallows and exploring rock pools.

Seasnakes

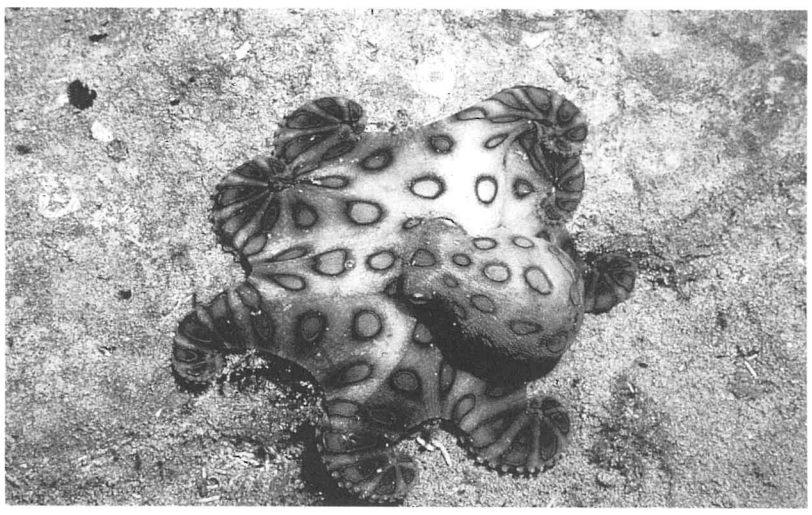
Seasnakes are also found at Shark Bay, and some species are dangerous to people. They are quite curious and may approach. Treat them just like land snakes. If you don't touch or approach them they should leave you alone.

Sharks

Sharks are common inhabitants of our coastal waters. To ensure they do not take an interest in your activities, don't clean fish around swimming areas.

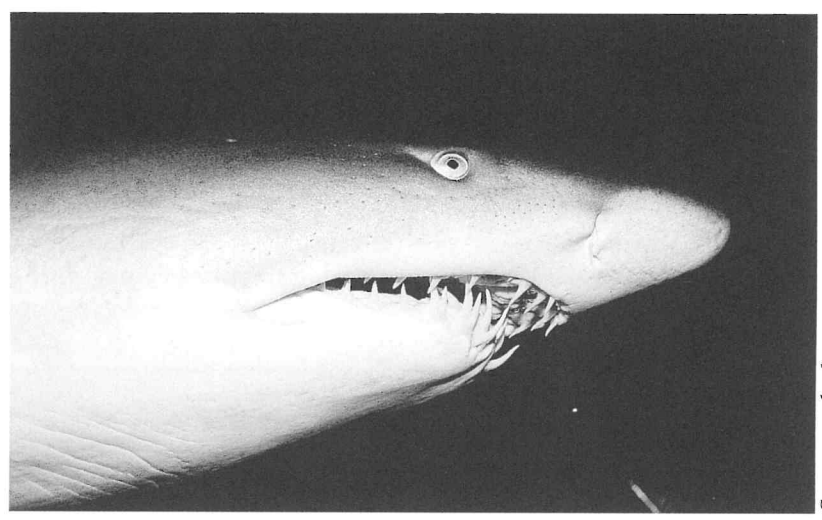
Your chances of seeing even one of these marine animals are minimal. Avoid problems by being observant and cautious around marine plants or animals and modify your behaviour in their environment.

If you are unlucky enough to be bitten or poisoned by such animals keep the injured limb still and contact the Silver Chain in Denham on 9948 1213 or Useless Loop on 9948 1226.



Blue-ringed octopus.

Textile coneshell.



Grey nurse shark.

sea meadows

The world's largest seagrass meadows and the most diverse array of seagrass species lie beneath the waters of Shark Bay.

The massive Wooramel seagrass meadow runs some 129 kilometres along the eastern shore of the Bay and covers 1030 square kilometres. Yet the Wooramel bank occupies only a quarter of the area of seagrass in Shark Bay. Seagrass meadows or banks cover more than 4000 square kilometres (a third of the Bay), and 12 different species have been recorded.

Seagrass differs from seaweed. Seaweeds are marine algae that have no roots or flowers and need a firm surface, such as rock, to grow on.

Seagrasses, in contrast, are more closely related to land plants and form large meadows in the sand. They have adapted entirely to submerged living and produce underwater flowers. Pollination also occurs underwater and the currents carry the pollen from flower to flower.

More than 100 species of plants and animals grow directly on the Shark Bay seagrasses. The lush meadows provide a nursery habitat for prawns, scallops and many fish species that form the basis of an important commercial fishing industry in Shark Bay.

The bacteria and fungi of decomposed seagrasses are important food for the filter feeding oysters and scallops.

Shark Bay produces seagrass equivalent to four to six wheat crops a year from a similar area, an estimated eight million tonnes. This is more than enough to feed Shark Bay's resident population of about 10,000 dugongs, the second largest population in the world.

Dugongs eat the seagrass foliage, especially wire weed (*Amphibolis antarctica*) during winter months and use their snout to root into the sea bottom to extract plant rhizomes. In the summer months they feed on the tropical paddle weed (*Halophila ovalis*) and the *Halodule uninervsis* species that grow in the warm water of the shallow embayments.

Seagrass banks have significantly shaped the bottom of Shark Bay by modifying tidal movement and contributing to sediment build-up on the sea floor. This results in the creation of hypersaline bays and protective habitats for marine life. The restricted circulation into Hamelin Pool means it is twice as salty as normal ocean water, enabling the stromatolites to survive as few predators can tolerate salinity.

It is important to note the location of seagrass beds. Propellers and anchors will destroy the seagrass and high-speed boats across shallow beds are a risk to dugongs, dolphins and turtles that frequent the area. To prevent damage, do not cross shallow areas and anchor only in bare sand. Seagrass is a valuable resource, but once removed does not readily recover.

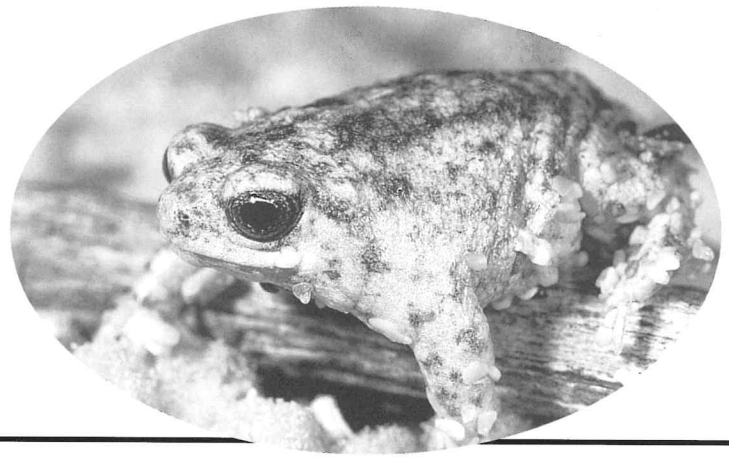
*Seagrass (*Posidonia australis*). Photo – Clay Bryce/Lochman Transparencies*

SANDHILL FROG

One of the strangest creatures in Shark Bay is the rotund sandhill frog (below), which spends most of its days buried in the sand on the dunes of Edel Land.

It lives entirely in sandhills, and is one of very few frogs that goes through its life without ever inhabiting free water.

The sandhill frog (*Arenophryne rotunda*) emerges to feed on ants and other insects when it rains or in the night dew. It does not have tadpoles, instead the young frogs hatch directly from large eggs laid buried in the sand.



GETTING INTO HOT WATER

People usually don't like getting into hot water. But at Francois Peron National Park it's just the opposite - the 'hot tub' is one of the park's most popular features. Now used as a recreational spa, the hot artesian bore water was once essential to the survival of Peron Station.

Peron Peninsula lies within the Carnarvon Basin, a geological structure lacking permanent fresh surface water. In the late 1800s, when pastoral stations such as Peron were established, shallow beach wells were built to provide ground water of marginal quality for stock.

In the early 1900s, most of the wells became redundant as it was discovered that the area was situated over a large artesian basin. Artesian bores were put down to provide a greater quantity and quality of water. More than 100 bores have been built for pastoral use in the Carnarvon Basin.

Artesian groundwater exists, under pressure, in the sandstone below an impervious layer of shale. The pressure is created because the point where the coastal bore meets the artesian water is deeper than the source of the groundwater further inland. When a bore is established, drilling continues until water is forced by pressure to the surface.

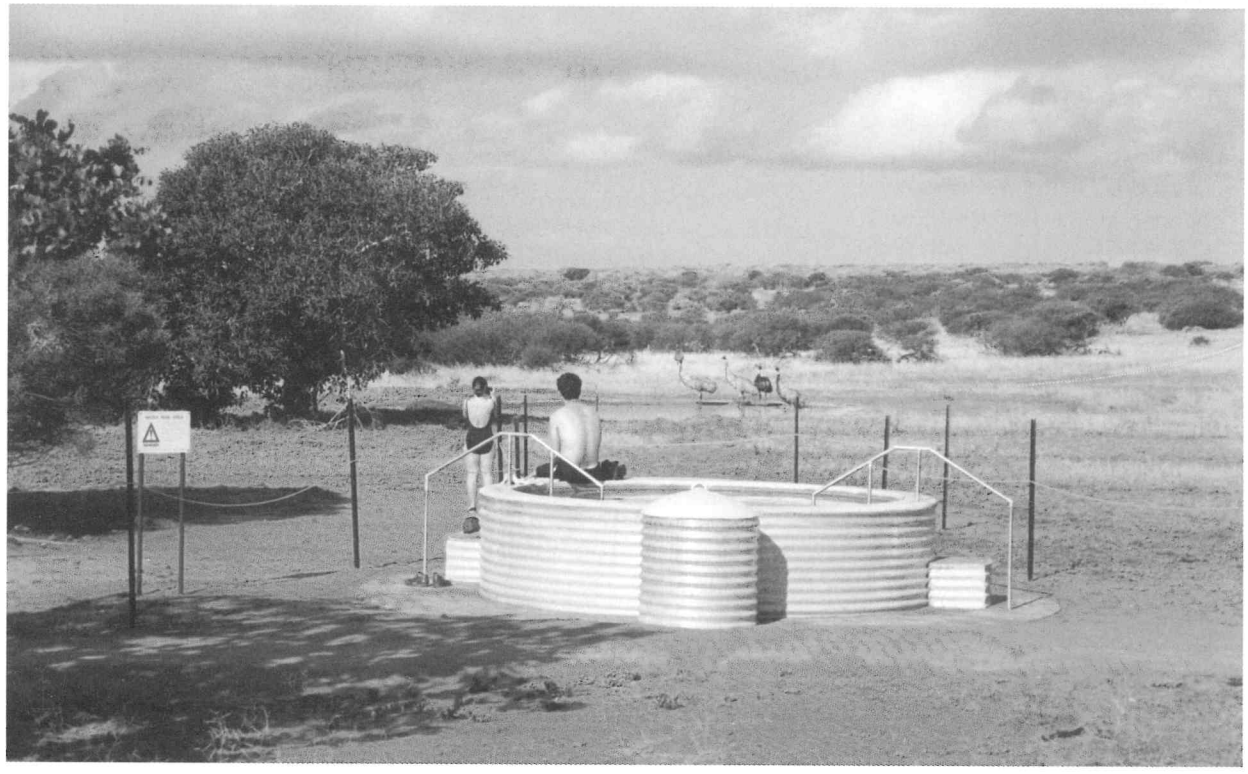
The old artesian bore at Peron was drilled between September 1922 and July 1923 to a depth of 542 metres. When Peron was run as a station, the water was pumped from the reservoir tank by three windmills to nine watering points located in five different directions, providing water for up to 17,000 sheep.

Over the years the water had been allowed to flow freely which saw a gradual decline in the water pressure and flow rate as the bore began to age. The water flow stopped in 1998 as the bore collapsed. A new bore has since been drilled to the same depth and the 40-degrees Celsius water once again flows through the original tank and the artesian tub.

The water flow is now manually controlled and flows at a rate of five litres per second, or 432,000 litres per day. The run off water from the tub now fills a waterhole that provides a great drinking ground for emus, euros, birds and other native wildlife within the area.

Visitors are welcome to soak in the hot artesian tub and to observe the wildlife and scenic surrounds, but you must adhere to the safety conditions attached to the tub. For personal safety it is important not to submerge your head under the water, or stay in the hot water for long periods of time.

The unusual combination of artesian water and a reservoir tank at the Peron Homestead is a unique cultural feature for the park and provides a glimpse of the pioneering history of the north.



4WD PARADISE

Shark Bay is a four-wheel driver's paradise - with Steep Point and Cape Peron in Francois Peron National Park two favourite destinations.

Superb fishing and sensational scenery are major drawcards, but it's important to take care to do the right thing so that others can enjoy the same areas. Off-road vehicles can loosen soil and destroy vegetation cover, increasing the risk of soil erosion.

To help protect natural vegetation and regeneration, please keep to the well-established tracks. To protect tracks, reduce your tyre pressure to the tyre manufacturers' recommendations. As soon as you leave main roads, vehicles should be put into four-wheel-drive. Using two-wheel-drive causes ruts and deterioration of tracks.

Steep Point, the westernmost point of Australia, is a popular fishing area. Steep Point is part of Carrarang Station and camping fees are payable. It can only be reached by four-wheel-drive through rough, arid station and salt-mining country. There is no firewood so it's best to bring your own. Remember not to cut the natural vegetation, break branches or take dead wood on the station as this degrades vegetation and sand dune systems. Even dead wood provides habitat for wildlife.

On Cape Peron, campsites at Big Lagoon, Bottle Bay and Gregories can only be reached by four-wheel-drive and low clearance vehicles are not suitable. Gas barbecues are supplied at each of these campsites because wood fires are prohibited.

Look out for gypsum claypans, known as birridas, and drive carefully around them. Birridas are found across Peron Peninsula and vehicles have become hopelessly bogged in them. Each birrida is basically a thin surface crust over a bog mire, which is caused by groundwaters. Vehicles can also damage the birrida's fragile vegetation, which is difficult to rehabilitate.

Drinking water is not available within Francois Peron National Park or at Steep Point, so visitors should always carry their own supplies.

When travelling to these campsites always inform someone of your destination. If you're heading to Steep Point please contact the Ranger, Paul Dickenson on (08) 9948 3993.

GUDRUN finds a sanctuary

Mystery and sabotage lie behind the tale of the Gudrun, the biggest wooden shipwreck found off Western Australia.

No-one knew of the wreck's location until 1989, when Paul Anderson, a Canadian scientist studying dugongs in Shark Bay, found her on the sand flats north of Cape Peron.

The Gudrun sank in 1901, carrying a load of jarrah from Bunbury to England. She was sabotaged by the ship's carpenter, who admitted drilling a four-centimetre hole through her bottom.

Though repaired in Fremantle after the hole was discovered, the Gudrun sprang a leak about four days out of port and was forced north by strong winds.

By the time she reached Shark Bay, she had four feet of water in her hold, and the vessel was deliberately scuttled in the shallow sandy Peron Flats. The Captain hoped to make repairs, but the ship was abandoned after a gale swept through the Bay and she began to break up.

Today the wreck lies in about six metres of water about 5.3 nautical miles north of Cape Peron. A special sanctuary zone within Shark Bay Marine Park extends 500 metres around the wreck to protect the site. Artefacts can't be removed from the wreck and line fishing and spearfishing are not permitted.

The wreck's superstructure has been flattened by the constant flow of the current and the occasional cyclone, and while her hull is buried largely intact up to a metre in the soft sands, iron frames and fittings rise about the seabed.

The Gudrun has become home to a rich variety of fish and marine life, including marine turtles, giant groper, stingrays, spotted cod, many species of trevally and sweetlips. As a result, it is a spectacular area for experienced recreational divers.

SHARK BAY HIGHLIGHTS

HAMELIN POOL MARINE NATURE RESERVE (F6)

WHERE IS IT?
105 km from Denham or 35 km from Overlander Roadhouse.

TRAVELLING TIME
1 hour from Denham or 30 minutes from Overlander Roadhouse.

THINGS TO DO
Stromatolite viewing, beach walking, trail walking, sightseeing.

FACILITIES
Telegraph Station historical site, information, tearooms/shop, toilets, carpark, museum, shell block quarry.

SHELL BEACH (E6)

WHERE IS IT?
45 km south-east of Denham.

TRAVELLING TIME
40 minutes from Denham.

THINGS TO DO
Beachwalking, sightseeing.

FACILITIES
Lookout, information, carpark, toilet.

EAGLE BLUFF (D5)

WHERE IS IT?
24 km south-east of Denham.

TRAVELLING TIME
20 minutes from Denham.

ACCESS
2WD.

THINGS TO DO
Marine wildlife viewing, bird watching, sightseeing.

FACILITIES
Carpark, boardwalk and viewing platform.

LITTLE LAGOON (D5)

WHERE IS IT
5 km from Denham.

TRAVELLING TIME
10 minutes from Denham.

THINGS TO DO
Walking, bird watching, sightseeing, picnicking, beach fishing.

WALK TRAILS
Lagoon Point Walk trail 1.5 - 2 hours. Meanders from Denham across shrublands to Little Lagoon. Beware of stonefish in the lagoon shallows.

FACILITIES
Gas barbecues, picnic shelter.

MONKEY MIA (E4)

WHERE IS IT?
23 km from Denham.

TRAVELLING TIME
15 minutes from Denham.

ACCESS
2WD.

THINGS TO DO
Swimming, boating, sightseeing, photography, beachwalking, fishing.

WALK TRAILS
Monkey Mia Walktrail - 3 km return. An easy one hour walk across the coastal dunes to the red sandhills and a lookout over the Bay, historic gravesite, a bird hide, Aboriginal shelter cave and a quiet beach.

BEACH WALKS
Skeletons of the sand dollar starfish to be found on the beaches.

FACILITIES
Visitor Information Centre, caravan park and resort, shop, restaurant, barbecue, toilet, boat ramp and jetty.

FEES
Are payable and will be collected at the entrance.

PERON HOMESTEAD (D4)

WHERE IS IT?
10 km from Denham in the Francois Peron National Park.

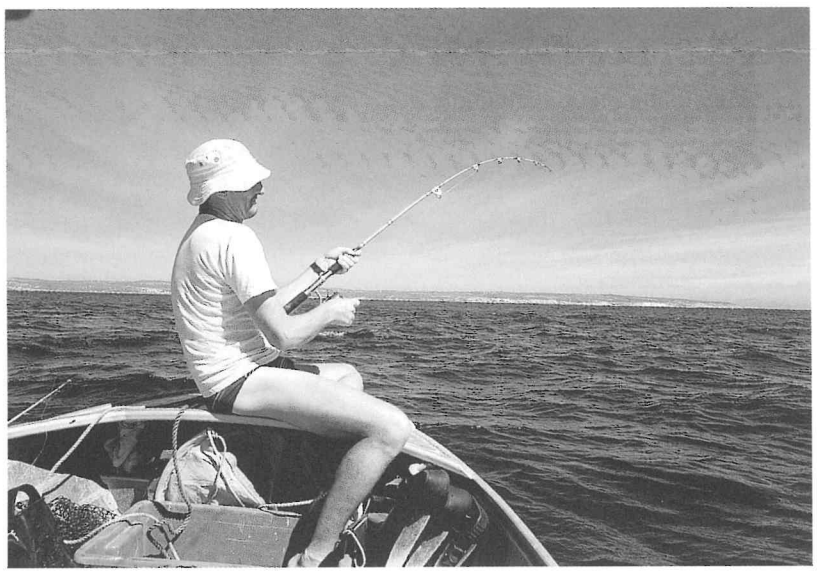
TRAVELLING TIME
15 minutes from Denham.

ACCESS
4WD. Roads are sandy and poor.

THINGS TO DO
Sightseeing, photography, walking or soaking in the historic hot artesian tub.

WALK TRAILS
Pastoral lifestyle walk trail 30 minutes. Takes visitors around the homestead and outbuildings of the former pastoral station.

FACILITIES
Historic homestead, Visitor Centre, artesian tub, information panels, carpark, toilets, gas barbecues.



FEES
Are payable and should be deposited in the box at the Francois Peron National Park Entry Station Shelter.

GREGORIES/SOUTH GREGORIES/BOTTLE BAY

WHERE IS IT?
43 km from Denham in the Francois Peron National Park.

TRAVELLING TIME
1 - 1.5 hours from Denham.

ACCESS
4WD only (low clearance 4WD unsuitable).

THINGS TO DO
Bush camping, four-wheel driving, fishing, boating.

FACILITIES
Gas barbecues and pit toilets are supplied.

FEES
Are payable and should be deposited in the box at the Francois Peron National Park Entry Station Shelter.

CAPE PERON (D3)

WHERE IS IT?
57 km from Denham in the Francois Peron National Park.

TRAVELLING TIME
1.5 hours from Denham.

ACCESS
4WD only (low clearance 4WD unsuitable).

THINGS TO DO
Marine wildlife viewing, fishing, sightseeing, photography.

FACILITIES
Gas barbecues and pit toilets are supplied.

FEES
Are payable and should be deposited in the box at the Francois Peron National Park Entry Station Shelter.

HERALD BIGHT (D4)

WHERE IS IT?
31 km from Denham in the Francois Peron National Park.

TRAVELLING TIME
1 hour from Denham.

ACCESS
4WD only (low clearance 4WD unsuitable).

THINGS TO DO
Bush camping, four-wheel driving, fishing, boating, beach walking.

FACILITIES
Gas barbecues are supplied and pit toilets.

BIG LAGOON (D4)

WHERE IS IT?
20 km from Denham in the Francois Peron National Park.

TRAVELLING TIME
45 minutes from Denham.

ACCESS
4WD only (low clearance 4WD unsuitable).

THINGS TO DO
Four-wheel driving, boating, bush camping, sightseeing, fishing (outside sanctuary zone).

FACILITIES
Gas barbecues and pit toilets are supplied.

FEES
Are payable and should be deposited in the box at the Francois Peron National Park Entry Station Shelter.

STEEP POINT (B5)

WHERE IS IT?
About 260 km from Denham via the Useless Loop Road.

TRAVELLING TIME
3 - 3.5 hours.

ACCESS
4WD only.

THINGS TO DO
Fishing, four-wheel driving, bush camping, photography.

FACILITIES
Ranger station, public phone.

FEES
Are payable and will be collected by the ranger employed by the station owners.

SHARK BAY MARINE PARK

ACCESS
Boat ramp at Denham and Monkey Mia.

THINGS TO DO
Boating, diving, snorkelling, veiwing marine life, photography, fishing (outside sanctuary areas).

Top: Visitors meet the Monkey Mia dolphins.
Photo – Jiri Lochman
Left: Fishing at Shark Bay.
Photo – Neil Wehlack/Lochman Transparencies

SHARK BAY
WORLD HERITAGE PROPERTY

N

CARNARVON

Bernier and Dorre Islands Nature Reserve

Dampier Reef

Cape Inscription

Cape Levillain

Dirk Hartog Island

Sandy Point Sanctuary Zone

Quoin Head

Cape Lesueur

Big Lagoon

Big Lagoon Sanctuary Zone

Big Lagoon Special Purpose Zone

Herald Bight

FRANCOIS PERON NATIONAL PARK

Peron Homestead

Monkey Mia Recreation Zone

MONKEY MIA

Faure Island

Dubaut Inlet Recreation Zone

Little Lagoon

DENHAM

Little Lagoon Recreation Zone

Dirk Hartog Homestead

Surf Point Sanctuary Zone

Steep Point

Eagle Bluff

Useless Loop

Zuytdorp Point

Carrarang Homestead

Gudrun Wreck Sanctuary Zone

Cape Peron Special Purpose Zone

New Beach

Bush Bay

Wooramel Special Purpose Zone

NORTH COASTAL HIGHWAY

WEST COASTAL HIGHWAY

Disappointment Reach Sanctuary Zone

Wooramel Roadhouse

Gladstone Special Purpose Zone

General Use Zone

Lharidon Bight

Shell Beach

Lharidon Bight Sanctuary Zone

Hamelin Pool Marine Nature Reserve

Nanga

DENHAM ROAD

Hamelin

Overlander Roadhouse

To Geraldton 330km

Henri Freycinet Harbour

Boorabuggatta Special Purpose Zone

Mary Anne Is. Sanctuary Zone

18 Mile Beach Sanctuary Zone

Freycinet Special Purpose Zone

USELESS LOOP ROAD

Tamala Homestead

Boundary 3 nautical miles off coast

Zuytdorp Cliffs

LEGEND

- World Heritage Boundary
- Marine Nature Reserve
- Marine Park Zones
- Sanctuary Zone
- Recreation Zone
- Special Purpose Zone
- General Use Zone
- Sealed Road
- Unsealed Road
- 4WD only

SCALE
0 10 20 30 40 50
kilometres

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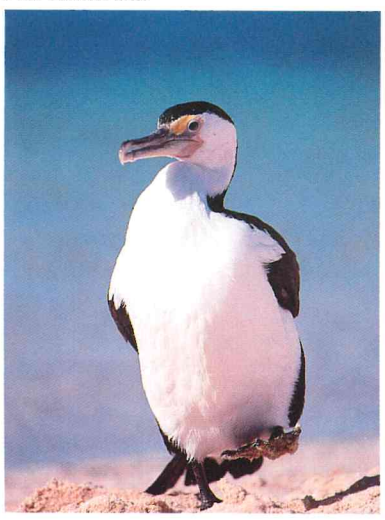
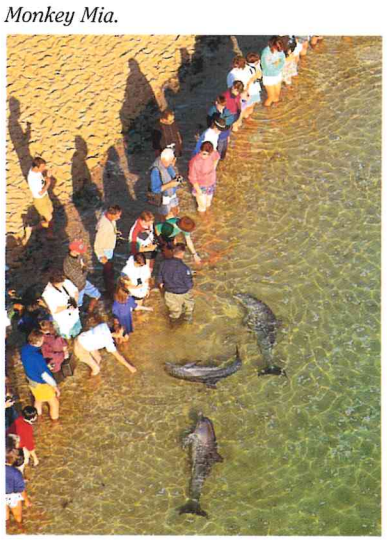
Calytrix.
Photo – Babs & Bert Wells/Department of Conservation and Land Managment

Pied cormorant.



Monkey Mia.



Blue stripe snapper.

Shell Beach. Photos – supplied by Lochman Transparencies