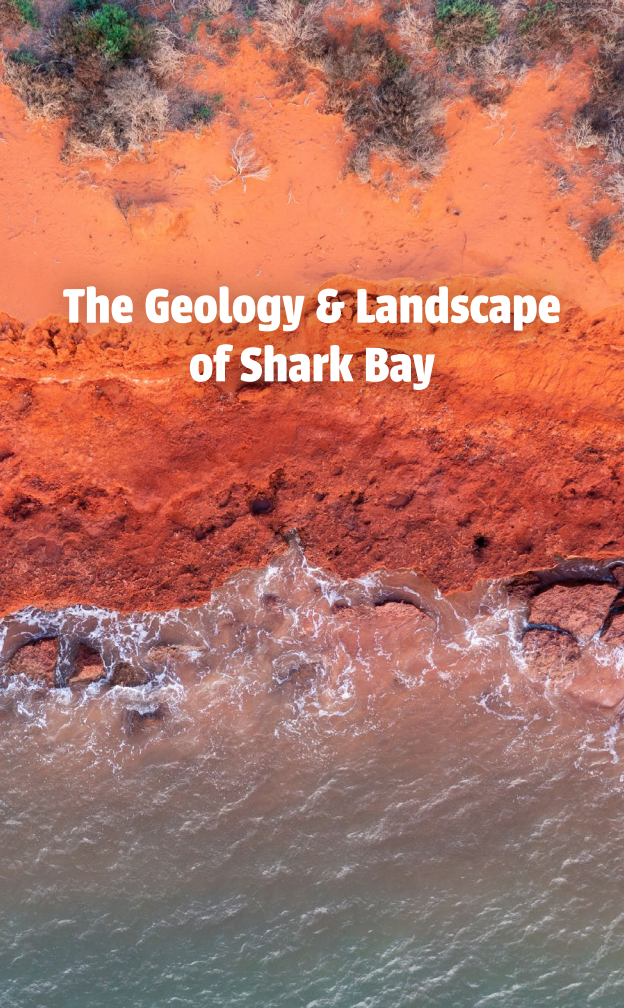

The Geology & Landscape of Shark Bay

The Shark Bay Heritage Reserve spans 2.2 million hectares, 70% of which are marine water. The diverse geological features of the landscape create habitats that are able to support a wide variety of wildlife, and are part of what contributes to Shark Bay's World Heritage listing. Across the landscape, there is stark white and deep red sandstone, seagrass beds, mangrove forests, tidal flats, plains, cliffs, and more.

LAND FEATURES

Shark Bay's landscape includes distinctive rolling red dunes and bright white sandstone, but it didn't always look this way. Anywhere between 2 million and 10,000 years ago, **sand began to collect over the lands of Shark Bay, which was tinted red due to a coating of iron oxide.** After being carried by wind and rivers, it was shaped into dunes and cemented into what is known as Peron sandstone. Later on, **white sand made up of broken shells, corals, and skeletons was deposited on top of the Peron sandstone in many areas, creating Tamala limestone.** Across the Western edge of Shark Bay, strong winds created a long ridge which makes up many of the islands that exist today as well as the Zuytdorp Cliffs.

Another feature created by this sandstone is the blowholes of the Zuytdorp Cliffs. These 200 meter high cliffs stretch for 200 kilometers along the western edge of Shark Bay. In some areas, blowholes in the cliffs form as the ocean constantly crashes against the coast. Cracks initially form in the side of the cliff, and a buildup of pressure breaks them into larger and larger spaces. Once cracks reach the surface, a blowhole is formed. On calmer days, air is pushed in and out of the cracks, and the cliffs "breathe". However, **large and heavy waves can force water to shoot out of the blowholes at the top of the cliff.**

SALINE WATERS

On average, the ocean has a salinity of 3.5%. However, some of the waters in Shark Bay have higher levels of salinity. This is caused by both the hot, arid, and windy climate, as well as restricted tidal flow in and out of the bay. On the outermost edges of Shark Bay are normal ocean waters, or euhaline waters. However, as we move closer to the bay we reach metahaline waters which are made up of around 5.2% salt. **In the areas closest to the Hamelin Pool, L'haridon Bight, and Freycinet Harbour, the waters are hyperhaline with a salinity of about 7% – twice that of normal ocean waters.**

Seagrass Beds & Saline Waters

These three salinity biomes create habits where a variety of creatures can thrive. In fact, the most saline waters are home to one of the features of Shark Bay: the stromatolites. **These living fossils from over 3 million years ago start as microbial mats.** In these harsh conditions of extreme heat and salinity, microbes still thrived, and created layers of microscopic life. **In certain conditions, these microbial mats create stone and form microbialites. These can form tall layered structures known as Stromatolites.** These formations influenced evolution as cyanobacteria breathed oxygen into our world, and were able to outlast extinctions and live on as living fossils.

Stromatolites

CHANGING COASTLINE

Shark Bay's current coastline measures approximately 1500 km, which has been shaped over millions of years by winds, waters, earthquakes, and ice ages. Around 125,000 years ago, glaciers trapped much of the Earth's water in ice and sea levels were significantly lower than they are today. The bay would have been fully connected, and the coastline would have been much further out. **Around 8,000 - 10,000 years ago, melting ice caused sea levels to rise which flooded the bay and formed the islands and geography we know today.**

Birridas

Zuytdorp Cliffs

These changes in sea level also caused one of the unique geological phenomena of the island: the salty hollows locally known as birridas. **When sea levels were higher, saline lakes formed and deposited sulfate of lime onto the lake beds. However, when sea levels dropped, the lakes dried up leaving powdery gypsum.** Today, some of these birridas remain connected to the ocean creating lagoons, while others may retain rainwater or be filled by high winter tides.

LAND ACKNOWLEDGEMENT

It is crucial to acknowledge that the land of Shark Bay is the traditional land of aboriginal groups, including the Malgana, Nanda and Gnulli peoples. The region — known as Gutharraguda in the Malgana language — contains about 130 registered heritage sites which are protected by the Aboriginal Heritage Act. It is illegal to disturb these sites.

European occupation has destroyed and harmed the ecology and people of the area, and cannot be ignored or dismissed. Today, aboriginal groups collaborate with the Parks and Wildlife Services to work towards research and conservation projects.

"Nhanganha Gutharraguda, Wula guda nyinda."
— Malgana —

"This is Shark Bay. You come this way."
— English —