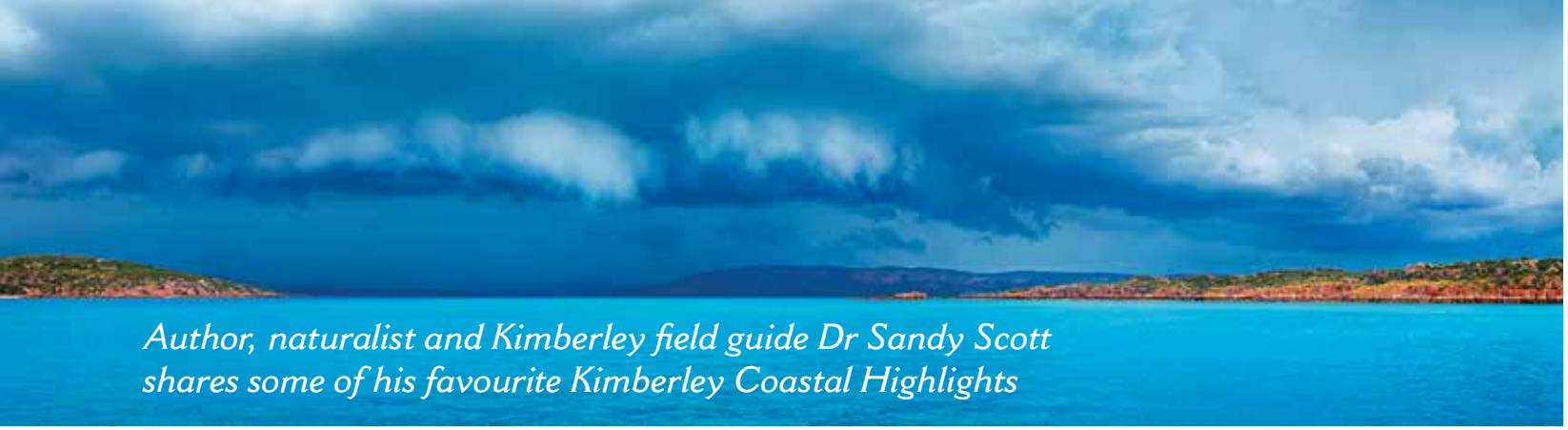
KIMBERLEY COASTAL HIGHLIGHTS

There's nothing quite as profound, immersive, invigorating and peaceful as a Kimberley coastal experience. It is a largely untouched wilderness of striking contrasts, with sculptural sandstone cliffs, colourful rocky landscapes and clear turquoise waters teeming with marine life.

by Dr Alexander (Sandy) Scott



Author, naturalist and Kimberley field guide Dr Sandy Scott shares some of his favourite Kimberley Coastal Highlights

PRINCE FREDERICK HARBOUR

This extensive harbour stretches from York Sound about 25 kilometres inland and about 15 kilometres wide. To its north is an unnamed bay that also faces York Sound about nine kilometres wide. The harbour is the mouth of both the Roe River, which flows from the south-east, and the shorter Hunter River, which flows from the north-east. Many islands in the harbour have been formed of Wunaamin Miliwundi sandstone often underlain by Hart Dolerite or formed of Hart Dolerite alone. These rock units were formed in what geologists call the Paleoproterozoic times, about 1800 million years ago.

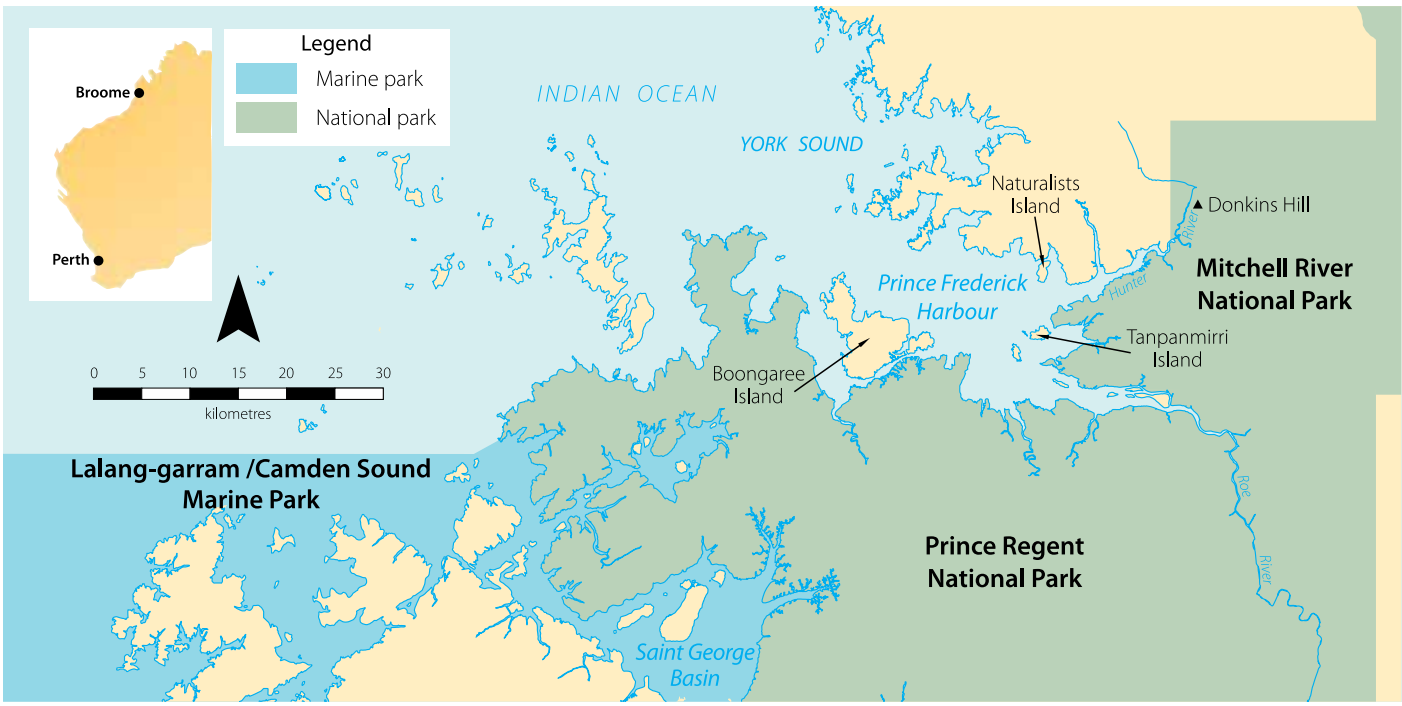
In the Wunambal language of the local Traditional Owners, the land to the north and south of the harbour is referred to as Gural. Hunter River is known as Kampamantiya and the Roe River as Nainbu. The only other mapped local Aboriginal geographical names are Tanpanmirri, the island sited deep in the harbour called Lumbarrni with the Wandjina image of the same name painted under one of its overhanging rocks.

Phillip Parker King sailing the vessel named 'Mermaid' was the first European to explore and name the harbour (see Phillip Parker King: Master mariner of the Australian coast, *LANDSCOPE*, Winter 2020). The largest island in the harbour is Boongaree Island named after an Aboriginal man from the Garigal clan of Broken Bay (near Sydney), who accompanied Phillip Parker King and crew on HMC *Mermaid* when the *Mermaid* was in Prince Frederick Harbour in 1820. In Wunambal language, the local clan refer to this island as Wunandarra or Bunjini.

Some interesting historic, geological and biological attributes seen in and about Prince Frederick Harbour follow.

Previous page
Main Naturalists Island, the dark vegetation is a patch of semi-deciduous monsoon rainforest.
Photo – Dr Sandy Scott
Inset Flame fiddler crabs.

Above Prince Frederick Harbour.
Photos – David Bettini



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NATURALISTS ISLAND

Kampamantiya or Naturalists Island is in the north-eastern area of the harbor close to the mouth of the Hunter River. It has two beaches that face the harbour on its western side and a single beach on its south-eastern side. Its south-eastern end is formed from Hart Dolerite, the rest from the predominant Wunaamin Miliwundi sandstone. The dolerite weathers to form soils and its slopes support a covering of grass and some small shrubs. The sandstone does not weather so readily, it does not form soils and as it covers most of the island, it is vegetated with sparse savanna woodland in contrast to the patches of monsoon rainforest in a moisture retaining gully behind the beaches.

Several of the marginal monsoon rainforest species may be seen on the beachside, including bush cane (*Flagellaria indica*), crab's eye vine (*Abrus precatorius*) and the peanut tree (*Sterculia quadrifida*).

Rainfall soaking into the sandstone slowly seeps downward and comes out on the lower slopes as freshwater soaks. The soaks often have *Pandanus aquaticus* and *P. spiralis*, and elsewhere tulip tree (*Thespesia populneoides*) and *Terminalia petiolaris* occur between the forest and the beach. The Western Australian Naturalists' Club undertook an expedition to study the Harbour's biota in 1989. In 2004, the Western Australian Geographical Names Committee recognised their contribution to identifying the biological values of the island and officially named the whole island, Naturalists Island.

Today this beach serves as a helicopter pick-up and drop-off point for pre-booked passengers arriving by sea wishing to visit Mitchell Plateau and the falls of the Mitchell River.

Top left Fruit of the peanut tree on the margin of the monsoon rainforest.

Top Tulip tree growing on the margins between the beach and the monsoon rainforest.
Photos – Dr Sandy Scott

Above Crab's eye vine (*Abrus precatorius*).
Photo – Eddy Wajon/Sallyanne Cousans Photography

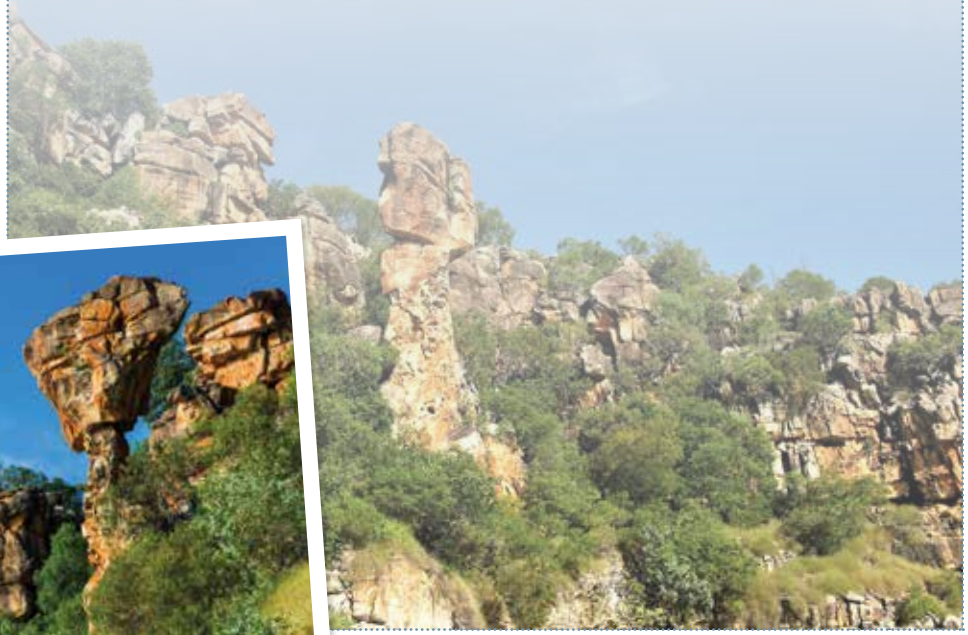
Below Naturalists Island, the dark vegetation is a patch of semi-deciduous monsoon rainforest and mangroves.
Photo – Graeme Snow/Alamy

‘THOR’S HAMMER’

This is an interesting shoreline landform feature named after the Nordic god who wielded a huge hammer to make the noise of thunder. This sandstone structure is located in a northern inlet of the harbour close to the western opening to York Sound.

Crushing pressures and Earth movements, such as faulting or fracturing, can crush or break rocks that can later become welded together again. Geologists name such rock ‘breccia’. This welding occurs through groundwater circulating through the rocks picking up and then depositing molecules to lock the broken fragments together. It appears that the handle of the hammer is formed from crushed sandstone breccia. The head of the hammer is a solid block of the uncrushed Wunaamin Miliwundi sandstone. Throughout the Kimberley region there are many long, straight valleys seen on satellite and aerial images that show the locations of the extensive faulting and fracturing that has affected the region.

The lower sections of the handle right down to the lower tide mark seem to be the quartz ‘welding’ of the breccia.



Opposite page
Left Thor's Hammer, Prince Frederick Harbour with its breccia handle and sandstone block head.
Photo – Dr Sandy Scott

Inset Thor's Hammer.
Photo – Jason Edwards/Alamy

Below left Late dry-season image of a saltwater crocodile (*Crocodylus porosus*) on the mudflats of Porosus Creek.

Right Mid-tide in a channel of Porosus Creek lined with kapok mangrove (*Camptostemon schultzii*) and the sandstone cliffs in the morning sun.
Photos – Dr Sandy Scott

Below right Spotted-leaved red mangrove (*Rhizophora stylosa*).
Photo – Jiri Lochman

Below far right Exposed conical-shaped pneumatophores of the pornupan or apple mangrove. (*Sonneratia alba*).
Photo – Dr Sandy Scott

'POROSUS CREEK'

Porosus is the specific epithet for the saltwater or estuarine crocodile (*Crocodylus porosus*) and these animals may be regularly spotted in the 'creek' (actually a tidal inlet) with this unofficial name. The inlet branches north off the Hunter River near its mouth.

As the tide drops and water flows from the side channels, smaller crocodiles may be seen positioned to sense prey that they quickly snap from the water with lightning speed. Other crocodiles may be floating on the surface water, and it is mainly later in the dry season when the water temperature drops, that the crocodiles come out onto the mud banks or stony shelves to absorb heat for thermoregulation.

Both sides of the 'creek' are covered with mangroves and the mangal (a mangrove community) on the western side is deep with many tidal channels that run back through to the high cliffs of Wunaamin Miliwundi sandstone.

Many of the mudflats on both sides of the 'creek' are covered with patches of low growing club mangrove (*Aegialitis annulata*) that acts like a pioneer species.

Behind these are spotted-leaved red mangroves (*Rhizophora stylosa*) with their dark green foliage and reddish stilt roots branching from the upper parts of the trunk. Occasional grey mangrove (*Avicennia marina*) plants may be seen with an identifying feature of upright pencil-shaped breathing roots (pneumatophores) growing from a cable root below the mud. Fringing the channels are stands of the straight-trunked kapok mangroves (*Camptostemon schultzii*) used by some Aboriginal people to make rafts. In a few locations, including the end corners of the channels, seemingly isolated trees stand out from the mangal. These are pornupan or apple mangroves (*Sonneratia alba*), a species characterised by their flowers with long white stamens and large conical shaped pneumatophores up to 20 centimetres in length, visible during low tides. Their fruits are like small, flattened apples.

Occasionally pockets of dead mangroves are seen in the channels. In most cases, the wet mud has slumped as the soil and roots all slide down into what is regularly deep water. Clearly this creates an unsuitable, deep-water habitat and the affected plants die.

On exposed mud flats between the mangrove roots, fiddler crabs emerge from their holes. One common species is the bright red flame fiddler crab (*Tubuca flammula*). Male fiddler crabs have uneven sized 'nippers' and the larger one is waved back and forth like a fiddler with their bow.

Another common occupant of the mudflats, but generally staying closer to the water, is the small Birdsong's mudskipper (*Boleophthalmus birdsongi*). These fish also emerge from holes and use their pectoral fins as forelimbs to move across the damp mud. They continue out of water for as long as water held in their swollen gill pouches can supply oxygen and their skin remains moist.

BOLETES AND AMBLYPYGIDS

Two very interesting organisms are found within a sea cave on the shoreline of the bay north of the harbour. The cave in question, when flooded by high spring tides, has water rising a few metres up its walls and with enough movement to carry large branches and small logs deep into the cave cavity. The roof of this sandstone cave is not saturated with salt water but particularly at the end of the wet season is damp with fresh water.

When exploring inside the forked tunnels of the cave many sections of the roof sparkle when illuminated by headlamps or torches. On further examination it appears that fungal mycelia covering the ceiling are holding the droplets of water so enabling this effect.

Bolete fungus can be found growing in association with the mycelia. The cap of the bolete is mushroom-shaped, but its underside is made up of a mass of spore producing pores quite unlike the gills of a mushroom. It is assumed that this fungal species (yet to be identified) is living in an ectomycorrhizal relationship with tree or shrub roots of plants growing in the soil above the cave. If so, and a mutualistic relationship exists, the fungi benefit the plants through gathering water and nutrients that are delivered to the roots and in return the fungus is supplied with energy-giving carbohydrates from the plant.

The dark environment of the cave means there are bats living in its higher cavities during daylight hours and leave to hunt at night. Another animal in the cave is an Amblypygid commonly called a whip spider and classified as an arachnid. Currently the Australian amblypygids are not well studied but species are known from northern Cape York, Queensland and the Top End of the Northern Territory.

Amblypygids live on the upper walls in the dark parts of this York Sound cave and may quickly retreat to cracks and joints in the sandstone if threatened. Their most obvious sensory mechanism are their particularly long antennae that are almost twice as long as their legs and, like a praying mantis, their front legs are modified as pincers.

DONKINS HILL

During his survey and charting of the yet-to-be-named Hunter River in September 1820, Phillip Parker King, accompanied by his surgeon James Hunter, stopped for lunch on the eastern bank above a site where they had found fresh water from a spring bubbling within the mangroves. Rather than salty meats they were used to eating, they enjoyed meat from a metal can that had been produced in 1818. This food was part of an English Admiralty contract involving 15 products and some 24,000 cans of preserved food, won by John Hall and Bryan Donkin in England. Donkin and Hall had learnt the technique of hermetically sealing food from the Frenchman, Nicolas Appert but rather than using glass containers as Appert had, they used metal cans.

As a result of this memorable lunchtime event with the ship's surgeon and his men, King named the hill above where they had dined, Donkins Hill.

Above left and below Sparkling droplets of water held by fungal mycelia on the cave roof.
Photos – Dr Sandy Scott

Above Dusky leaf-nosed bat (*Hipposideros ater*).
Photo – Jiri Lochman

Inset Above A bolete, mushroom-like, fruiting body growing within the masses of hyphae on the cave roof.
Photo – Dr Sandy Scott

Left The falls below Donkins Hill.
Photo – Jiri Lochman

Dr A W (Sandy) Scott is a naturalist and field guide and has been visiting the Kimberley by sea annually for more than 20 years and has particular interests in the coastal geology and landforms, biology and ecology, and aspects of the local history. He can be contacted at sandy.scott@bigpond.com