EAST of THE GULF

Each year holiday-makers converge on the hotels of Exmouth and the camping grounds of Cape Range. There they relax among the scenery or do a spot of fishing, but they are never too far from a car, a clock or a supermarket. Few experience the mangrove-lined waterways and shell beaches on the other side of the Gulf, where the tides and the sun rule.

By Tony Start and Norm MacKenzie

Exmouth Gulf separates North-West Cape from the unpopulated, subdued coastline south of Onslow. The west side of the Gulf is dominated by Cape Range, but the eastern and southern sides are dominated by wide coastal mudflats incised by tidal creeks fringed with mangroves. The hinterland of the Gulf is mainly red sandplains and dune fields.

Our survey of the islands on the east of Exmouth Gulf began, by accident, in 1988. We had been studying bat communities in mangroves (see *LANDSCOPE*, Autumn 1988) and needed to reach the massive stands of mangrove along the eastern shore of the Gulf. Several kilometres of treacherous mudflats separate the mangroves from the land and make the eastern shoreline of Exmouth Gulf virtually inaccessible to vehicles. However, bush tracks provide access to the southern end of the Gulf at a place called Sandalwood Landing.

October 1988 found us camped at the head of a tidal creek about 10 kilometres east of Sandalwood Landing. While in search of a good spot to begin our bat studies that night, we launched our small punt and followed the winding channel through dense mangroves to the open waters of Gales Bay. There, not far off shore, we saw an island.

Islands along Western Australia's north-west coast have provided many indigenous species with a refuge from exotic predators, herbivores and weeds that have ravaged so much of the mainland. Indeed, several of Australia's medium-sized mammals now survive only on these islands.

Our map suggested that we were looking at Doole, an island of about five square kilometres. Also shown nearby were two smaller islands: Roberts, about two-and-a-half kilometres north of Doole, and an unnamed island to the west. Nestling close to the coast in very shallow water, they had been so far overlooked by biologists. The sea was calm, we had plenty of fuel and we could afford an hour, so we set off to investigate.

From its southern point, a fringe of ancient and gnarled white mangrove trees (*Avicennia marina*) grew on an intertidal rock platform stretching up the eastern shore, out of sight. The backbone of the island was a series of low

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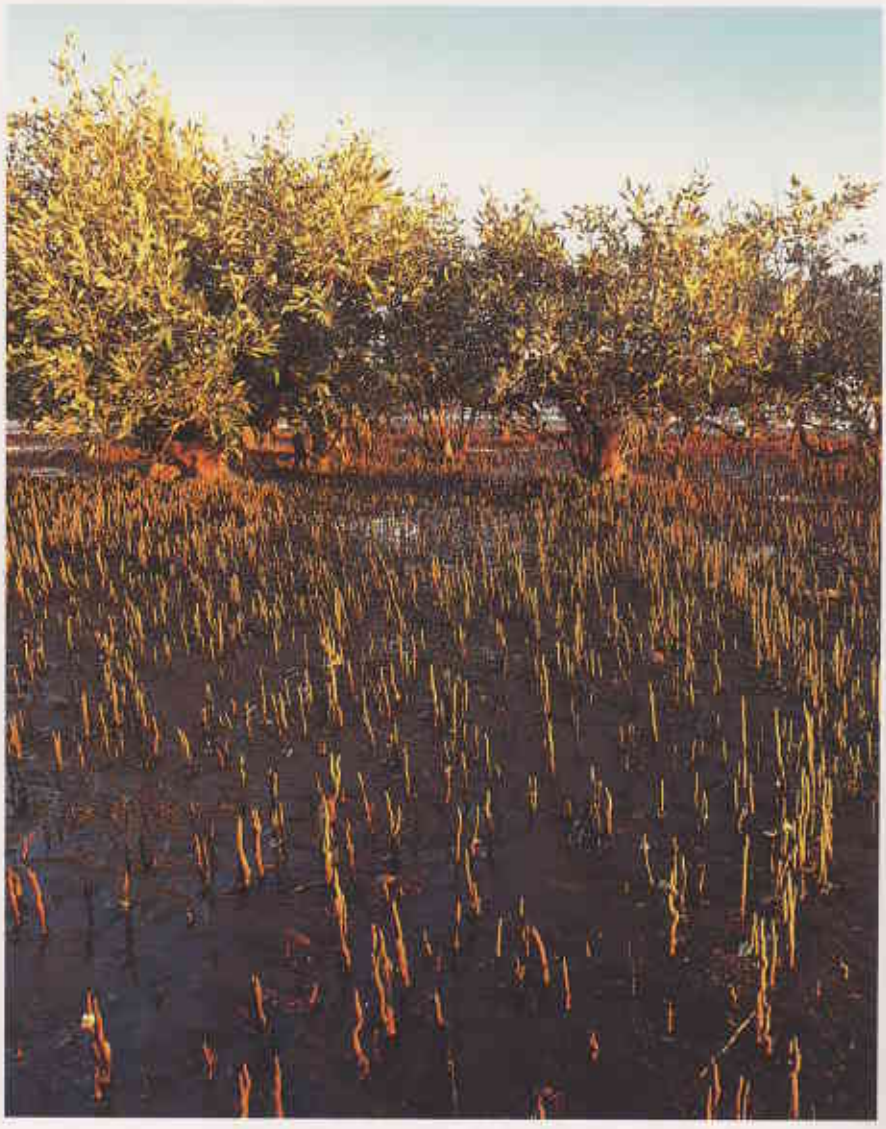
Landsat imagery of the Coral Coast supplied by the Australian Centre for Remote Sensing and digitally enhanced by the Remote Sensing Applications Centre.
Department of Land Administration, WA

Right: White mangroves on tidal platform. Their breathing roots are exposed at low tide.
Photo - Jiri Lochman

Arboreal gecko (*Diplodactylus ciliaris*) waits for nightfall on Sandalwood Island.
Photo - Tony Start

A sandy embayment on the western side of Doole Island.
Photo - Tony Start



sandy dunes covered by shrubs and hummocks of grass. In contrast to the adjacent mainland, the island had few weeds. It was long-unburnt and looked as though it had never been grazed by sheep. The flora was diverse and we found what appeared to be mammal fur in the dropping of some predator.

The sun and the tide were both low when we left Doole. The water was so shallow that the outboard stirred up mud all the way to the mouth of our creek. Mud and tides have created many islands in the shallow waters along the southern and eastern sides of Exmouth Gulf. Most of them are only mud-banks covered with mangrove forest, but a careful study of the maps and air photos revealed several others with 'dry' land. Some, like Hope Point and Sandalwood 'Island', are separated from the mainland by mudflats, mangroves and tidal creeks. However, Simpson Island looked promising, being separated from the coast by a broad channel.

We resolved to return at a later date to survey the plants and animals of these forgotten islands. But for now there were several sticky nights to be spent working on bats in the mangroves.

RETURNING TO DOOLE

We returned to Exmouth Gulf in November 1989, this time camping far enough back from the mangroves to avoid the worst of the mosquitos. Each morning for the next seven days we followed our small creek down to the sea and out to the islands. The punt was piled with black polythene drums that protected cameras, binoculars and notebooks from the corrosive salt spray.

Above left: Prop-root mangroves grow where the mud is deeper, along tidal creeks and in sheltered bays.
Photo - Jiri Lochman

Above: A native tomato (*Solanum lasiophyllum*) widespread in arid environments.
Photo - Jiri Lochman

Right: As the tide ebbed it became more difficult to cross between the islands.
Photo - Tony Start

Below right: The western coast of Simpson Island is a low limestone ridge.
Photo - Norm McKenzie

In some places, where the intertidal rock platform of Doole's eastern coast broadened, the white mangroves formed open woodlands covering two to three hectares. Patches of the prop-root mangrove (*Rhizophora stylosa*), its deep green canopies held aloft by tangled masses of stilt roots, were restricted to sheltered bays. Half way up the coast we found a landing spot where a little beach interrupted the mangroves.

The coastal slopes were clad in shrubland about a metre or two high, often dominated by the wattle *Acacia bivenosa*. Much of the space between the shrubs was filled by large untidy hummocks of beach spinifex (*Spinifex longifolius*). Beach spinifex should not be confused with the spinifex or porcupine grasses of the interior, which belong to the genera *Triodia* and *Plectrachne*. In fact, *Triodia* was the dominant plant over much of Doole Island's hinterland. Coarse sand, full of shell fragments, had been heaped into a steep beach ridge along the island's exposed western shore.

The floor of a hollow in the middle of the island was covered by low samphire growing on saline, silty clay. At one end there was a channel that would have connected it to the sea in times of higher sea level, creating a sheltered lagoon. Debris in the channel showed that occasional storm surges still pushed sea water onto the flat. North of the hollow there was a prominent limestone hill. Here, there were rock figs with a tangled mass of dodder scrambling through their canopies.

High sand ridges separated the hollow from the island's eastern and

western coasts. Both ridges were mantled in fine reddish sand mixed with silt that, at a depth of about 45 centimetres, changed to coarse, pale beach sand, containing many large shells and coral fragments. The sea around Doole Island is shallow and muddy, so these great beach ridges must have been heaped up when sea levels were higher and corals could grow nearby. The mantle of finer material has presumably been blown from the mainland, which still happens today.

PLANTS AND ANIMALS

We recorded 95 species of indigenous plants representing 34 families on the island. This is an impressive list for a small, arid island and some of our collections are still to be identified. In contrast, we found only two species of exotic weed on the island. One was the introduced African buffel grass (*Cenchrus ciliaris*) that now pervades our pastoral districts. The other was *Erodium cicutarium*, a member of the geranium family. Neither was common.

Flocks of waders and terns rested on the shores. Larger birds observed included eastern reef egrets, pelicans, cormorants, ospreys, white-bellied sea-eagles and brahminy kites. Mangrove herons, white-breasted whistlers and bar-shouldered doves lived in the mangroves. The shrublands on the sand ridges yielded land birds, like black-shouldered kites, Australian kestrels, black honeyeaters and even zebra finches.

Yellow daisies were common above the strand line on the beaches.
Photo - Marie Lochman

Ospreys nest on low limestone headlands, the most prominent coastal feature of the islands.
Photo - Jiri Lochman

Bar-shouldered doves, a native species that eats seeds, had no trouble with the tides.
Photo - Jiri Lochman

Three days of trapping revealed 13 species of reptile, but sadly, there were no signs that mammals lived on the island. The 'fur' we had found in 1988 belonged to a hairy caterpillar! The only exotic animals we encountered were feral pigeons; a flock passed by one day.

The channel between Doole and Roberts Island was deep, with clear water. We could make out corals on the bottom: isolated heads to begin with, but gradually, patches of reef. Did reefs such as these once surround Doole, and provide its backbone of coral and shell?

Ashore, mammal tracks criss-crossed between the yellow beach daisies (*Senecio lautus*) on the strand line. What were they made by? Islands sometimes have dense populations, but few species. The next day 17 of our 20 Elliott traps housed lively Tunney's rats. The 12 pit traps fared even better than the Elliotts; one had five rats in it! During the last 100 years, Tunney's rat has disappeared from most of its range. Its Western Australian populations are now confined to the north Kimberley, Shark Bay and certain coastal islands.

Roberts Island is vegetated by low scrubs, mostly acacias, growing amongst hummock grass (*Triodia pungens*). It had few mangroves and no rocky hills. There were fewer samphires in the depression in the centre of the island, but we collected several herbs not found on Doole. The sandy ridges also yielded some new plants, including a bright blue lobelia in the spinifex and a spectacular red mistletoe (*Amyema preissii*) on the acacias. Roberts had fewer plants (50 species from 21 families), birds (35 species) and reptiles (six species) than Doole, but then it has fewer habitats, is smaller, and is more isolated from the mainland. The only exotics we saw were patches of buffel grass on the fine soils in the depression, and a few feral pigeons.

THE SECOND SURVEY

It was midday on 20 April 1990. Bridled and caspian terns came from Brown Island to escort our chartered fishing boat around their fortress: a speck in the blue sea off the port side. We had

slipped out of Onslow just before seven that morning and followed the Pilbara coast westward. We were returning to Exmouth Gulf.

We steered well clear of the broken water that confirmed the many reefs charted around the island, and headed southwards. An hour later our captain gently nosed his vessel shorewards, between blooms of multi-coloured algae eddying in the warm shallow water, towards a tiny shell-beach between rocky headlands. This was the northern tip of Simpson Island, one of a group of islands that lie hard against the eastern side of the Gulf.

By mid-afternoon we were alone. The chartered fishing vessel had left and our food, water and equipment were scattered on the beach around us. During the next seven days, we would be using two small boats to explore nearby islands.

It didn't take long to stretch the tarpaulin between aluminium poles for shade, unpack the portable generator for the refrigerator and radio, and choose places for our swags. By nightfall, we had set lines of pit traps in each of the island's main habitats. One was in a samphire flat, one in dense hummock grass on the back slope of the beach ridge behind our camp, and the third at the foot of a limestone ridge.

Climbing the ridge, we found ourselves at the top of a sea cliff that formed the western shore. From this vantage point we could see that most of the island was an undulating sand plain supporting a scatter of low shrubs growing amongst spinifex. There was a fringe of mangroves along the eastern shoreline, and a much larger patch in a bay at the island's southern end. The cliff top was a limestone pavement, pocked by cracks and hollows that had trapped a little sand. This was a harsh environment, exposed to wind and salt spray, with little capacity to hold fresh water from the infrequent rain. Miniaturised, gnarled trunks of small shrubs grew bonsai-like from the crevices. There were several species, but the prettiest was a *Frankenia* with little pink flowers sprinkled through its dwarf canopy.

Two native mammals lived on Simpson. Tunney's rats occupied burrows in the sand plain, but were less numerous than on Roberts; we seldom caught more than one or two per night. Euros sheltered in limestone breakaways or in the shade of mangrove trees during the day. At night, they emerged to graze the spinifex.

All but 17 of the 58 birds we recorded were species of the sea shore or mangroves. In Exmouth Gulf there are eight species of birds that are mangrove specialists; we found seven of them on Simpson. The cliffs along the island's western shore provided nest-sites for ospreys as well as numerous eastern reef egrets. Each evening, a flock of tree martins roosted on the tops of shrubs in the dune swale near camp.

The eight lizards on Simpson ranged from the large, predatory goanna *Varanus tristis* to the tiny sand swimmer *Lerista bipes*. Three skinks foraged the surface of the soil, and the gecko *Gehyra variegata* was common around trees. Two species specialised in the coastal habitats. Binoe's gecko (*Heteronotia binoei*) was common in the litter and driftwood along the strand line, and the water dragon *Gemmatophora gilberti* foraged the rear edge of the mangroves.

This reptilian community was typical of all the islands. However, the smaller islands had fewer species, and the larger islands had more. For instance, Doole had 13 species including two extra sand swimmers and an extra surface-foraging skink, as well as a python and a legless lizard.

MAINLAND LINKS

From Simpson Island we made forays to Burnside and Tent Islands, as well as to Hope Point which, despite the map, was actually cut off from the mainland by intertidal mangrove forest.

Our small craft were ideal for exploring these sheltered waters. Green turtles often 'flew' away on their flipper-wings, and once we surprised a group of dugongs. Even at low tide, Simpson was isolated from the coast by a deep channel. However, we were dismayed to discover that a vast mudflat linked Burnside with the mainland. The tide left us stranded. We could walk off Burnside as easily as a

We often encountered turtles feeding in the warm shallow waters around the islands.
Photo - Jiri Lochman

Flywire fences guide small lizards and mammals into the pit-traps on Roberts Island.
Photo - Norman McKenzie

fox could walk onto it, but we couldn't go home to Simpson until the returning tide refloated the punt.

There were fox tracks on all four of the islands that connect to the mainland at low tide, but none on the five that remain isolated by a channel. Who would have thought that foxes would cross miles of salt flat, then mangrove forests that are flooded much of the time, and finally several hundred metres of mudflat that is only exposed at very low tides? It may be no coincidence that the islands visited by foxes were also the islands invaded by European house mice.

Burnside was also infested with a variety of exotic weeds, some areas being dominated by buffel grass, a sure sign of considerable disturbance. Broken cement slabs and rusting metal in the middle of Burnside showed that Europeans had lived on the island around the time of the second world war, but two Dutch gin bottles suggested even earlier occupation, as similar bottles have been associated with pearling near Point Sampson around the turn of the century or earlier.

Sandalwood island, visited during our first trip, was the only other place where we had seen so much disturbance. It was the most accessible of all the mainland-linked islands; its 100-metre-wide moat of soft mud had even been crossed by rabbits. Despite the exotics, it was reassuring to find most of the Gulf's island wildlife, except Tunney's Rat, persisting on these land-linked islands.

Our time on the other side of the Gulf had run out. Our charter returned with the morning tide. Relaxing on deck, we made plans to survey the last group of islands in the Gulf. As we passed Brown Island, the terns flew out to escort us from their domain, where the waters of the Gulf protect fragments of the nature of Australia.

The shallow seas around the islands obviously constitute a barrier to cats, foxes, rats and other feral mammals. Perhaps Doole Island or one of the other similarly 'isolated' islands in the Gulf could be used as a refuge for mammals threatened with extinction on the mainland. ■

Tunney's rat has persisted on the islands, but not the adjacent mainland.
Photo - Babs & Bert Wells

A patient traveller, Binoe's gecko was common in driftwood.
Photo - Babs & Bert Wells

FERAL PIGEONS

Feral pigeons have been described as "rats with feathers".

They compete with indigenous species by consuming significant quantities of seed. They are also a menace to both the public and wildlife because they are recognised vectors of more than 40 diseases including toxoplasmosis, chlamydiosis, Newcastle disease, tuberculosis and the systemic fungus candida.

CALM is already attempting to eradicate populations from islands in Shoalwater Bay, but the flocks are mobile and breed rapidly, which makes them difficult to control. We were alarmed to find the species colonising islands as remote as those in the Gulf. The limestone outcrops on the islands probably provide ideal roosts for these descendants of European rock doves (*Columba livia livia*) that, from Roman times, have been bred for food and recreation.

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LANDSCOPE

VOLUME EIGHT NO. 2 SUMMER ISSUE 1992-3

Twenty-three captive-bred chuditch were recently released in the Julimar forest in an attempt to establish a new population. The story of the 'Return of the Chuditch' is on page 10.

'Back in the Outback' (page 34) follows the trail of endangered mammals recently reintroduced into the Gibson Desert from Barrow Is.

In a remote corner of the Gibson Desert lies Lake Gregory, a birdwatcher's paradise. See page 16.

A silent workforce of volunteers assist CALM with a multitude of projects. Colin Ingram tells us more about these 'Volunteers for Nature' on page 28.

The urban cat vies with its feral cousin and the fox for top spot in the predator stakes. See 'Masterly Marauders' on page 20.

FEATURES

REGULARS

COVER

*The chuditch (*Dasyurus geoffroii*) was once found in every State and Territory of mainland Australia. Now it is only found in the jarrah forest and parts of the southern wheatlbelt in the south-west of WA - about two percent of its former range.*

The illustration is by Philippa Nikulinsky.

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