





# UNCOVERING TURTLE ANTIICS

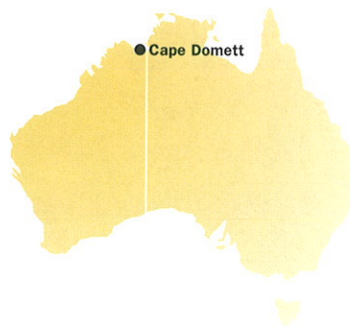
Research on the Cape Domett flatback turtle population in the Kimberley has revealed fascinating new insights into this threatened species.

**by Alex Bowlay and Andrea Whiting**

**M**arine turtles evolved about 65 million years ago from their ancient land-dwelling ancestors and spread throughout the world. Since then, they have survived several ice ages, fluctuating sea levels and changes in continental submergence. They are now spread throughout sub-tropical and tropical regions worldwide. However, recent human-related impacts have caused declines in all species of turtles, resulting in many species being listed as threatened. Major impacts on marine turtles include by-catch in fisheries, harvest for consumption and trade of turtle shell, predation on turtle eggs by native and introduced animals, coastal development, deteriorating water quality, entanglement in nets and ropes, ingestion of marine debris, loss of habitat and lights from residential and industrial development disturbing turtle nesting and hatchling behaviour. However, the remoteness of the Kimberley coast provides an excellent refuge for marine turtles from many of these threats.

### Flatback turtles

The flatback turtle (*Natator depressus*) has a low domed fleshy carapace (shell) with slightly recurved margins, which



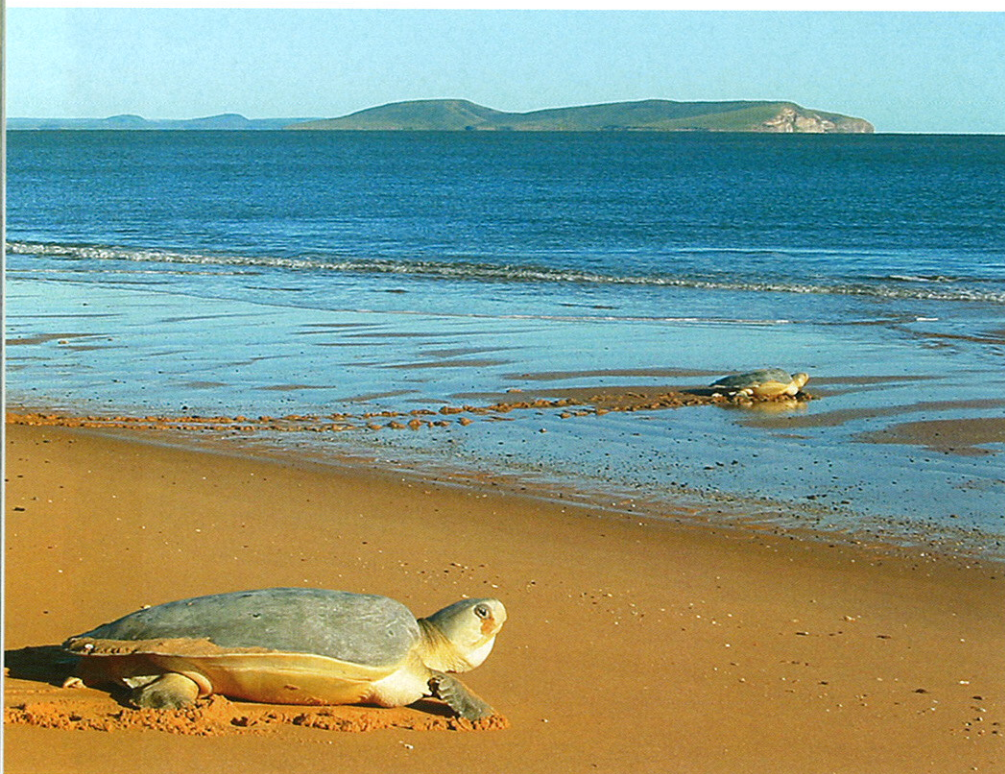
can be grey, pale grey-green or olive in colour. Adults can grow up to 1.2 metres in length. The species is listed as 'vulnerable' under Commonwealth legislation. In Western Australia, it is recognised as 'schedule one fauna'—fauna that is rare or is likely to become extinct—under the *Wildlife Conservation Act 1950*. However, the species remains on a list of reptiles, including other marine turtles and crocodiles, that are allowed to be taken by Indigenous people for food. The turtles are carnivorous, dining on a range of sea cucumbers, soft corals and jellyfish. They appear to prefer foraging on soft-bottomed habitat at a depth between 10 and 40 metres.

### Important nesting habitat

Perched atop Cambridge Gulf in the far north-east Kimberley region,

Cape Domett provides an important nesting area for the flatback turtle. Cape Domett, Cape Dussijour to the west and Lacross Island form a barrier to waters surging into the Joseph Bonaparte Gulf that in turn ultimately merge with the Timor Sea. Located about 110 kilometres north-north-west of Kununurra, the cape is a curious mix of delicate Devonian-period sandstone spires and geologically younger coastal silt, sand and alluvium. Today, the area is classified as unallocated Crown land. Road access is limited to one, narrow and frequently tide-damaged four-wheel drive track emerging from Carlton Hill Station further to the south. The track is impassable during the wet season due to large expanses of clay soil and tidal flats that rapidly become quagmires. The track brings vehicles to a small, elevated headland, from which the cape can be reached by a 10-kilometre boat journey across shallow water.

For some time, local residents, researchers and tour operators have known that the flatback turtle occurred in appreciable numbers in the region but the extent of the population was unknown. The flatback is one of six marine turtles known to occupy coastal areas around northern Australia. Flatback turtles are one of two species of marine turtle, the other being the Kemp's Ridley turtle, that do not have a global distribution and are found only in the tropical waters of northern Australia, Papua New Guinea and Indonesia. Flatback turtle nesting appears to be confined to Australian shores, with four major nesting stocks recognised: the southern Great Barrier Reef, Gulf of Carpentaria, Western Arnhem Land to the northern Kimberley and the North West Shelf from the far-west Kimberley to Barrow Island in WA.



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Flatback turtle hatchlings emerge from beneath up to half metre of sand.

*Photo – Jiri Lochman*

**Left** Cape Domett offers an important flatback turtle nesting habitat.

*Photo – Allan Thomson*



**Above** Aerial view of Cape Domett.  
*Photo – Col Roberts/Lochman  
 Transparencies*

**Right** Camping at Cape Domett.

### Studying Cape Domett flatbacks

Nesting habitat for flatbacks is at a premium in the north-east Kimberley. Typically, the coastline and islands in the region are rocky and rugged, or mud lined, with only small pockets of suitable sandy beaches available. A two-kilometre stretch of beach and sand dunes immediately bordering ‘the Needles’ at Cape Domett provides an extremely important area for flatbacks to come ashore and lay eggs.

Before 2006, only 44 turtles had been tagged on this beach from expeditions in 1988, 1994 and 1995. In 2006, Andrea Whiting, a PhD student supervised by Col Limpus and Milani Chaloupka and co-funded by Charles Darwin University and the Department of Environment and Conservation (DEC), started research at Cape Domett in an effort to determine the best techniques to monitor the year-round nesting populations.

Supported by DEC staff and, at one point, a large and enthusiastic group from Conservation Volunteers Australia,



Andrea visited Cape Domett nine times in 2006 and 2007. Armed with mosquito domes and large quantities of insect spray and ointment, the teams camped behind the beach in a set of low dunes. Shade and fresh water were in short supply at the site, so tarpaulins and large plastic containers full of water had to be transported in.

The beach at Cape Domett is accessible only by boat. A rough four-wheel drive track allows research teams to reach an elevated rocky area about 10 kilometres east of Cape Domett. DEC’s East Kimberley District’s 4.5-

metre, aluminium, custom-built vessel was towed to this point and launched on good tides in the shallow waters of the silt and mud beach below. With the vessel packed with people and equipment, it was a 20-minute journey to the beach around the cape. The boat was then unloaded and moored with several anchor ropes to cope with the large tidal range, strong currents and winds. Cape Domett has a tidal range of more than seven metres during spring tides.

In September 2006, a 14-day field trip was conducted to gain a



better appreciation of nightly nesting fluctuations over both spring and neap tides. The team found massive fluctuations in turtle numbers, ranging from seven to 290 turtles a night—a much larger variation in numbers than observed on previous or subsequent field trips.

### Turtle tactics

A range of techniques was employed to record turtle activity and nesting behaviour. Track counts, conducted very early each morning, revealed total numbers of turtles visiting the beach the previous night. Turtles encountered on the beach at night were tagged with durable titanium tags on the tough leathery inner section of their front flipper. Skin samples were taken to reveal the DNA characteristics of Cape Domett turtles. The team measured adult turtles' curved and straight carapace lengths, widths, mass, plastron (the underbelly shell) length, and counted carapace and head scales.

Turtle nests that contained freshly laid eggs were marked and carefully excavated to check clutch size and the size of the eggs. Frequently, hatchlings were encountered emerging from the sand at night. These were counted, measured and weighed before being released into the ocean.

Hatchling tracks, characterised by tiny train track-like markings in the sand, were often observed originating from a small depression in the sand. Nankeen night heron and dingo tracks were also observed in abundance near these hatchling tracks, testament to hungry opportunists.

To encounter turtles on the beach each night, the research teams waited until high tides in the late afternoon or night when the flatbacks typically came



**Top left** Turtle tracks mark the beach at Cape Domett.

*Photo – Allan Thomson*

**Centre left** Flatback turtles lay leathery-shelled white eggs in the sand.

*Photo – Jiri Lochman*

**Left** Measuring egg size and shape.

*Photo – Alex Bowlay/DEC*

ashore. In the setting sun the turtles' carapaces glistened as they slowly made their way up the beach. The beach was divided up into sectors, with small teams responsible for observing and detailing turtle behaviour in their sector. The team noted the time at which each turtle began excavation and how long they spent on each stage of digging their nest, as well as when the turtle left the beach.

Excavating a nest has two stages: pitting and chambering. Firstly, the female turtle excavates a large shallow pit by actively pushing aside sand with all four flippers. It then begins a more focused excavation involving dexterously digging a chamber straight down in the sand with its hind flippers. Reaching down with a curved hind flipper, sand is scooped up and lifted out of the hole. The sand is then placed to the side, away from the chamber. The turtle shifts its body sideways, positioning the other hind flipper over the chamber, which is then delicately lowered to repeat the action. Digging using body shifting and alternating hind flippers continues until the hole is deep enough and no more sand can be removed. The tiring female then becomes still before laying leathery-shelled white eggs covered in a clear fluid.

Flatback turtles lay the fewest eggs of any marine turtle, with about 50 eggs laid at one time. The turtles fling sand back into the hole with their rear and front flippers, before heaving themselves back down the beach to the water. The total time taken from leaving the water, digging a nest, laying and covering the nest averages 100 minutes. Turtles lay several clutches of eggs during the nesting season.

### New findings

The observations at Cape Domett have revealed some extremely important insights into flatback turtles in the region. For example, it is now known that Cape Domett is home to a major population of nesting flatback turtles and is one of the biggest known flatback rookeries in the world. The beach can receive up to 290 turtles a night. The area was previously thought to receive about 30 to 50 turtles a night.

The new research also determined that nesting at Cape Domett appears to be year-round, with peak nesting occurring between June and October. What's more, particular barnacles found on the carapace of some turtles indicate previously unknown habitats. They may be spending time in mangrove or rocky-reef habitats—areas not previously known to be visited by flatback turtles.

In addition to these findings, the project confirmed that flatback turtle adults and hatchlings face many dangers at Cape Domett. As adult female turtles

emerge and re-enter the water, large estuarine (saltwater) crocodiles often lie in wait. The menacing sight of crocodiles taking turtles was witnessed several times during the year, the powerful crocodiles restraining 70-kilogram turtles with ease. The team also found remains of adult turtles



**Above right** Proof crocodiles attack flatback turtles.

*Photo – Allan Thomson*

**Right** Hatchling flatback turtles make a dash for the ocean.

*Photo – Andrea Whiting*



**Left** Female flatback turtle returning to the ocean after laying its eggs.  
*Photo – Andrea Whiting*

even if hatchlings reach the relative safety of the ocean, they are still faced with many hazards. Fish and other sea creatures consume the vulnerable and exposed.

### **Flatback future**

The remoteness of Cape Domett is no doubt its greatest protection, with access limited to boat or helicopter. This has enabled the sizeable population of flatback turtles to persist in relative isolation from pressures associated with human development in other areas in WA. They are, however, still threatened from coastal development, climate change, spread of introduced predators, fishery by-catch and entanglement and ingestion of marine debris. Given the magnitude of this turtle population, it no doubt requires future protection and research.

Future research directions at Cape Domett include the continued monitoring of flatback turtles and identifying unknown population parameters such as defining the peak of the nesting season, and determining female turtle re-nesting intervals and numbers of nests laid per year. Future research will be based on cost-effective monitoring protocols developed using this research and research from beaches worldwide.

in nearby mangroves with rows of puncture marks in their carapace left by powerful snapping crocodile jaws. Thanks to these observations, it is now believed that estuarine crocodiles take an average of one to two adult turtles a week at Cape Domett.

Hatchlings are especially prone to predation. They run the gauntlet of many predators at Cape Domett. From the moment they struggle to release themselves from over half a metre of sand above their heads, dingoes and nankeen night herons are poised to collect and devour them by night, with a myriad of opportunistic birds of prey including whistling kites and white-bellied sea eagles present if they hatch during the day. Even saltwater crocodiles get in on the act, often seen at the waters edge scooping up hatchlings in their mouth as they enter, or even at the nest site itself where they snatch emerging hatchlings with a deft

tilt of their massive heads. Despite the threats, the turtle nests at Cape Domett appear to experience little predation in comparison with other populations and are not under threat by introduced predators.

However, like other turtle species, it is estimated that only one in a thousand hatchlings make it to maturity. And

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For more information about marine turtles visit the 'Marine turtles in Western Australia' section of DEC's NatureBase website at [www.naturebase.net/marineturtles](http://www.naturebase.net/marineturtles).



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