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Humpback whale, *Megaptera novaeangliae*

# Marine mammals: gargantuan yet graceful

## Whales and dolphins

One can fail to be awed by the gargantuan sight of a whale or captivated by the agile grace of a dolphin. Yet the whales and dolphins of the Great Barrier Reef are a paradox. Although this group includes the largest and most popular animals that occur in reef waters, very little is known about them. It is also ironic that this knowledge has come mostly from the study of the sometimes putrid carcasses of animals that have been stranded on beaches, have been accidentally drowned after becoming tangled in nets, or have been killed by men for oil, meat and other products.

Whales and dolphins are warm-blooded and belong to the order Cetacea which is divided into two distinct subgroups: Mysticeti, commonly known as baleen or whalebone whales, and Odontoceti, the toothed whales. The baleen or whalebone whales strain their small prey from the water by means of horny 'whalebone' plates called baleen which fringe the upper jaw. In contrast, toothed whales are active predators that catch fishes, squid and other prey and swallow them whole.

Ancestral whales evolved from land-dwelling mammals that are thought to have entered shallow waters to take advantage of rich fish stocks. Deposited

in river sediments about 53 million years ago, the skull of *Pakicetus*, the oldest whale yet discovered, has teeth that are not only similar to those of primitive whales, but also resemble those of mesonychid Condylarthra, strange, hooved, wolf-like terrestrial mammals that are now extinct. The skull of *Pakicetus* indicates that it was not fully aquatic because its earbones have features of both terrestrial mammals and modern whales, whose hearing systems have been modified through evolution to pick up sounds travelling through water.

Today's whales and dolphins are highly adapted to spend their entire lives in the water. Typical mammalian features that were not useful or essential in their aquatic environment – such as a lot of hair, a fully mobile neck, most of the pelvic girdle and the hind limbs – have disappeared. Whales and dolphins have a streamlined fish-like shape and move rapidly through the water propelled by the vertical strokes of their powerful tail flukes; their forelimbs have been modified as paddle-shaped flippers. Many species have a dorsal fin that is important for both control of movement through the water and temperature regulation, especially in the smaller species. Because whales and dolphins are

warm-blooded they must maintain their core body temperature within narrow limits. They must also come to the surface to breathe, and in the process of evolution their nostrils have moved to a position high on top of the head to form a single or paired blowhole.

Probably because they are such mobile animals the range of most cetacean species extends over a huge geographical area. Not surprisingly, most of the species that have been recorded in Great Barrier Reef waters are those that are known to occur in relatively shallow, tropical, warm temperate seas for at least part of the year.

## The long-distance swimmers

The largest family of whalebone whales is the Balaenopteridae or rorqual. Rorquals have long grooves along their throats which enable them to fill their mouths with huge amounts of water from which the whale sieves planktonic crustaceans or small fishes (depending on the type of whale). The rorqual's soft fleshy tongue is well adapted for licking food from the filtering baleen.

All six species of rorqual have been recorded off the Queensland coast and all are believed to pass through Great Barrier Reef waters. However,

> Humpback mother and calf simultaneously raise their tail flukes as they dive together in the Whitsunday Island waters. These whales, photographed in late September, are probably heading south to the Antarctic to spend the winter feeding. Between 1952 and 1962, commercial whaling reduced the population of humpback whales migrating along Australia's east coast from approximately 10,000 to about 200 animals. Recent studies estimate the present number to be about 600 whales and indicate that the population is slowly recovering. However, sightings of humpbacks are still comparatively rare, a far cry from pre-whaling days when fishermen claimed that winter sightings were commonplace in Great Barrier Reef waters.

> The giant humpback whales, which may grow to over 15 metres, seek the best of both worlds by wintering in the tropics and spending the summer feeding in Antarctic seas. To do this they must migrate thousands of kilometres each year. The Australian east coast humpbacks travel through southern and central Great Barrier Reef waters to unknown tropical breeding grounds. Because humpbacks are known to breed in filtered waters around reefs and islands in other parts of the world, some scientists now consider it likely that humpbacks breed in Great Barrier Reef waters.



Humpback whale, *Megaptera novaeangliae*

except for the more coastal species – the humpback and the minke – these giant animals are reported very rarely in the area. Blue, fin, sei and humpback whales migrate regularly, forming large summer feeding schools in Antarctic waters and moving north to breed in warm waters in winter. The humpback whale passes close to the eastern Australian coast on its way north. Bryde's whale appears to be a warm-water species that rarely moves north or south. The minke whales seen in Great Barrier Reef waters during the winter months are distinct from the substantial populations seen in the Antarctic during summer and may belong to a warm-water race.

Whalebone whales are usually sighted alone or in small groups, and the only social unit that has been established definitely is a mother and her calf. However, it is possible that the low-frequency sounds produced by whalebone whales may help to

group includes oceanic species such as pilot whales, beaked whales, killer whales and spinner dolphins, which usually travel some distance from the coast but occasionally come close inshore and may become stranded. The second group consists of three inshore species that frequent bays and estuaries: the bottlenose dolphin, *Tursiops truncatus*, the Irrawaddy River dolphin, *Orcaella brevirostris*, and the Indo-Pacific humpback dolphin, *Sousa chinensis*.

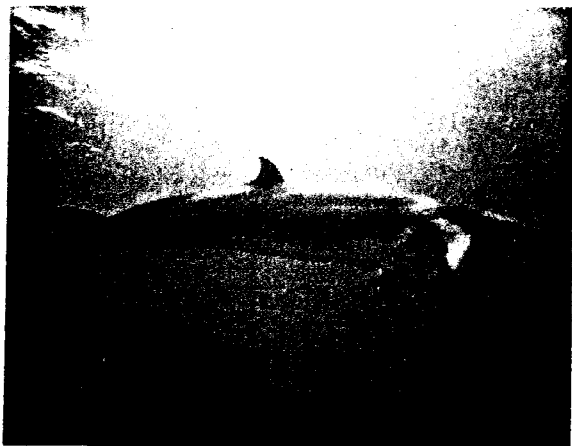
### Sociable, toothed whales

On the whole, toothed whales are more gregarious than whalebone whales but there is a wide variation in the social behaviour of different species. The inshore species are usually seen in small groups, and recent field studies in various parts of the world suggest that the composition of bottlenose and Indo-Pacific humpback dolphin schools is changing constantly. Research in Hawaii indicates that the

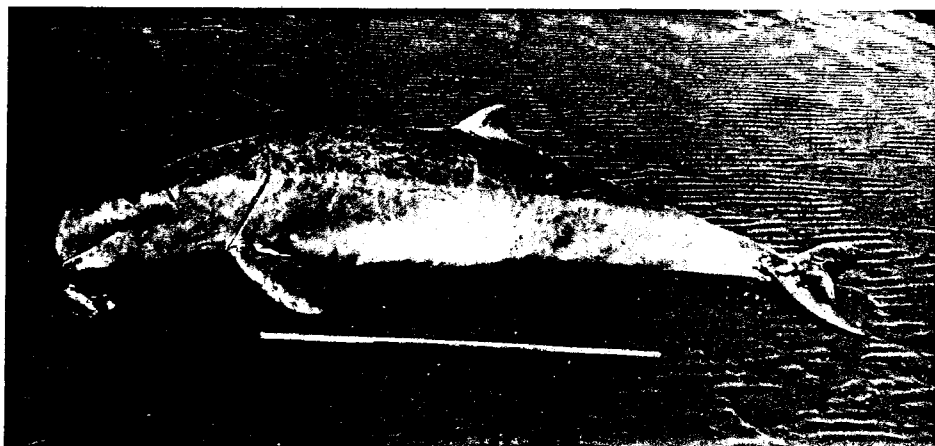
examined. It was found in the Somali Republic of East Africa. No one is yet certain that they have seen this species alive.

It is not only rare species that are little known. The Irrawaddy River dolphin is common inshore north of Mackay. Although well known to locals, this species was not recorded officially in Australian waters until an American scientist recognised the skulls of two dolphins that had been eaten by Arnhem Land Aborigines in 1948. It was not reported in reef waters until the 1960s.

Identifying cetaceans at sea is often difficult, even for experienced observers. But with the growing interest in whales, more amateur observers are recording, photographing and reporting their sightings, and knowledge of these creatures is increasing gradually. If humpback whales recover to their pre-whaling numbers, watching whales may become a highlight of winter visits to the reef.



Minke whale, *Balaenoptera aculorostrata*



Irrawaddy River dolphin, *Orcaella brevirostris*

maintain contact between animals situated quite a distance from each other.

The most vocal whalebone whale is the humpback, whose repertoire in its tropical habitat is a complex, repeating song. Some studies indicate that humpbacks sing mainly in or near their tropical breeding areas and may be largely silent at other stages of migration. However, along the east coast of Australia, singing humpbacks have been recorded at Coffs Harbour, in New South Wales, at least 1000 kilometres south of their breeding grounds.

The 16 species of toothed whales that occur in the waters of the Great Barrier Reef range in size from the giant sperm whale, the males of which average 15 metres in length, to slender dolphins less than two metres long. The sperm whale is an oceanic species that prefers deep water while the small whales and dolphins form two groups on the basis of their broad ecological requirements. The first

oceanic spinner dolphin occurs in schools of varied size and composition. In contrast, breeding schools of some other oceanic species, such as sperm whales, pilot whales and killer whales, are believed to consist primarily of stable groups of closely related females and their young.

Experiments with several species of captive toothed whales suggests that they can detect prey by echo location. Echo-locating animals scan their environment acoustically by emitting intense series of high-frequency clicks and interpreting the time and direction of their return. Only some of these clicks are audible to the human ear.

Longman's beaked whale, *Indopacetus pacificus*, a toothed whale first discovered in Great Barrier Reef waters, is probably the rarest whale in the world. This species was described from the skull and jaw of a specimen found near Mackay, Queensland, in 1881, and since then only one other skull has been

Δ Irrawaddy River dolphins are often mistaken for dugongs. Both species occur in the coastal waters of the Great Barrier Reef region. The mistake probably arises because Irrawaddy River dolphins, usually less than three metres long, lack the typical beak of better-known species such as the bottlenose dolphin. The easiest way to distinguish an Irrawaddy River dolphin from a dugong is to look for a dorsal fin, which a dugong does not have.

Δ ◁ Minke whales visit the reef each winter. They are often inquisitive and appear to inspect boats and divers. Swimming with a minke is an exciting experience; however, it is comforting to remember that minke whales, which grow up to ten metres long, have no teeth. Unlike the minkes seen in Antarctic waters each summer, the minke whales that visit the reef waters have distinctive white markings on their flippers and shoulder regions.

'Dolphins must come to the surface to breathe, and in the process of evolution their nostrils have moved to a position high on top of the head.'

◁ Schools of spinner dolphins, like this one bow-riding a boat on the outer Great Barrier Reef, are common worldwide in warm seas. The spinner dolphin is so-called because of its habit of spinning around on its tail up to four times in the course of a single leap. Some scientists believe that this is done to make noise and may be an important means of communication, especially when animals are dispersed. An oceanic species, the spinner dolphin is slim-bodied and reaches at least two metres in length.



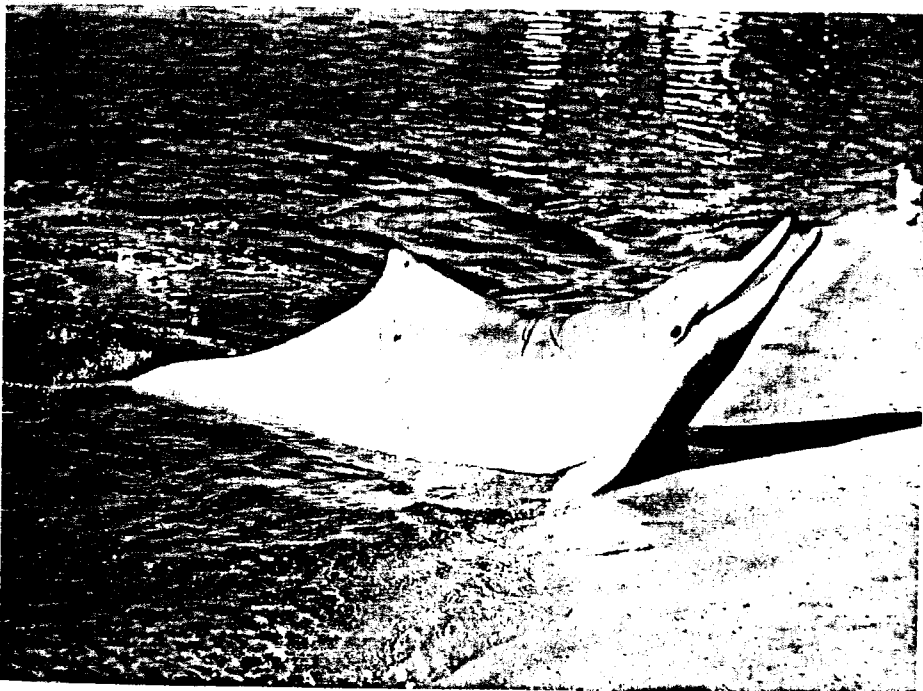
Spinner dolphin, *Stenella longirostris*



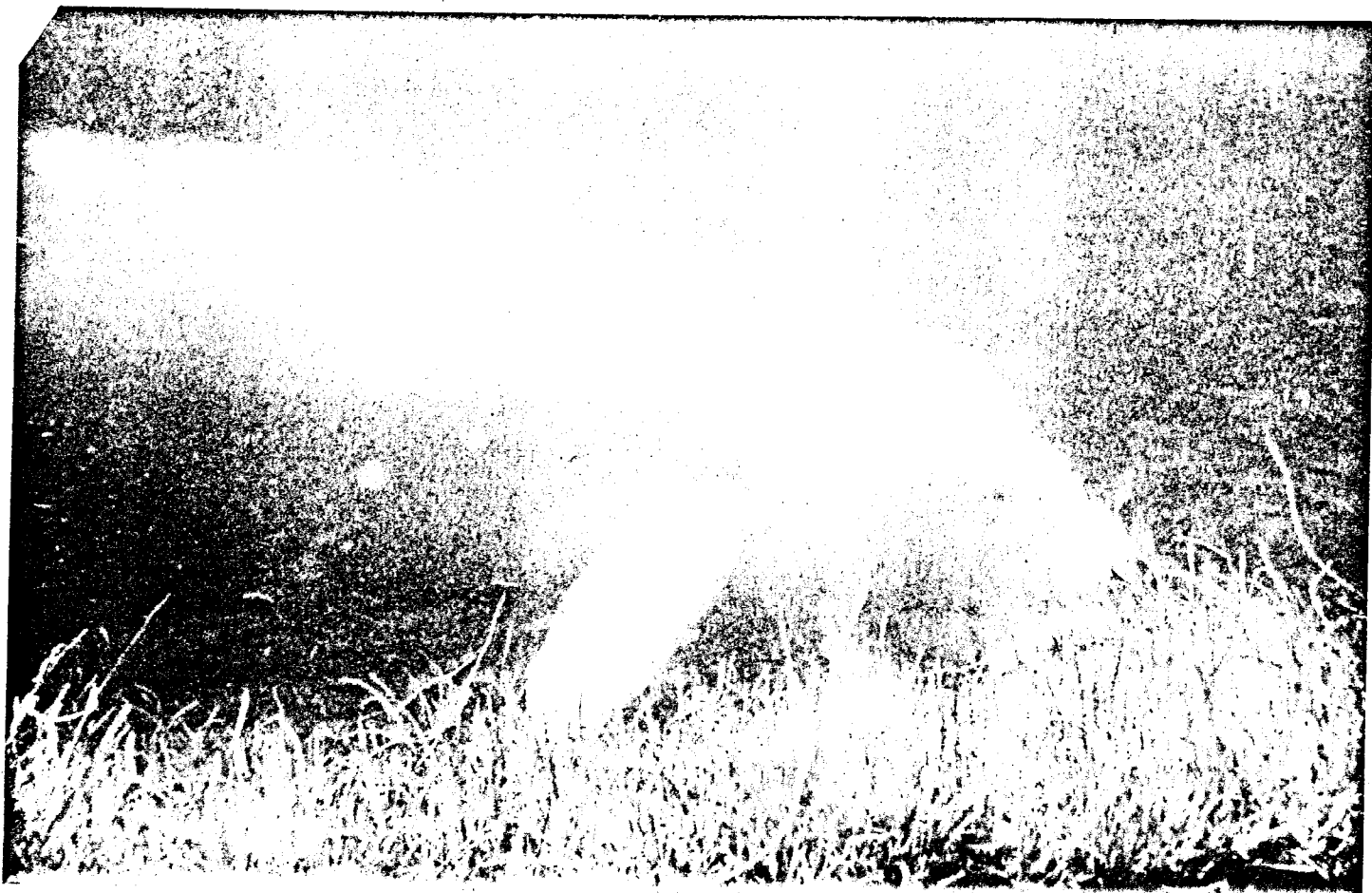
Bottlenose dolphin, *Tursiops truncatus*

Δ Recent research suggests that dolphins swimming near the surface at high speed save energy by leaping. These bottlenose dolphins, photographed leaping in the waters between Townsville and Wheeler Reef, are the species most often kept in oceanaria. Bottlenose dolphins are distributed widely in coastal waters of the Pacific, Atlantic and Indian Oceans and they are common in reef waters where they are often seen riding the bow waves of boats. Adult bottlenose dolphins grow to three metres.

◁ The Indo-Pacific humpback dolphin is a rather slow-moving coastal species that is common inshore in Great Barrier Reef waters. It tends to occur in small groups of about six that may spread out to hunt fishes. Humpback dolphins can enter very shallow water and have been observed feeding within a few metres of shore. Adult humpback dolphins are about two metres long.



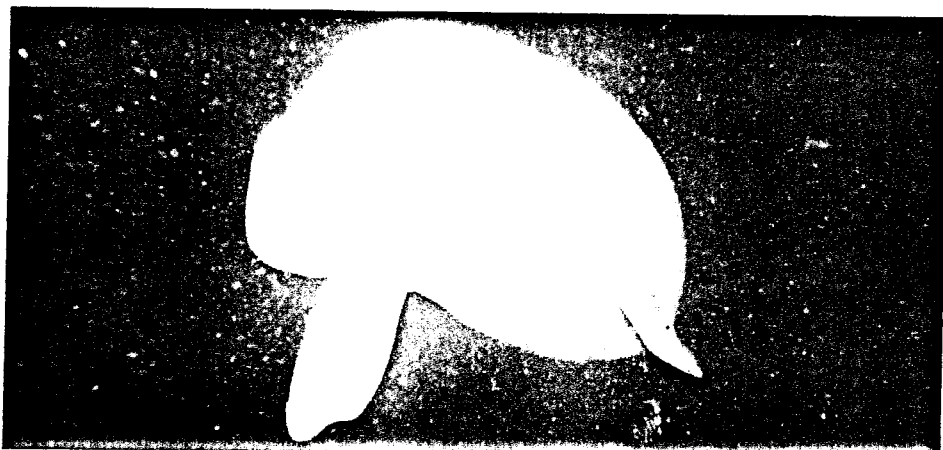
Indo-Pacific humpback dolphin, *Sousa chinensis*



Dugong, *Dugong dugon*

Δ Dugongs feed mainly on sea grasses, although algae are often eaten incidentally as well. In Great Barrier Reef waters, dugongs prefer to feed on soft and delicate sea grasses, presumably because they are more nutritious than fibrous species. The whole plant, including the roots and rhizomes, is dug up leaving a serpentine feeding trail in the sea grass bed. The dugong's upper lip area, covered with sensory bristles, is a versatile and complex structure used to grasp the sea grasses and convey them to the mouth. An adult dugong can eat up to 40 kilograms of sea grass a day.

'The only sounds that have been recorded from captive dugongs are bird-like chirps, rather like those of a budgerigar.'



Dugong, *Dugong dugon*

# Dugongs: shy sea cows

The dugong, *Dugong dugon*, is one of only four surviving species of sirenians or sea cows. Its closest relative, the giant eight-metre Steller's sea cow, was exterminated by man in the 18th century. The only other surviving sirenians are the three species of manatee that occur in the Caribbean region, the Amazon and West Africa respectively. Depending on the species, manatees usually spend some or all of their lives in fresh water, whereas the dugong is the only herbivorous mammal that is marine.

Like whales and dolphins, dugongs spend their entire lives in the sea and their bodies show similar adaptations to a life of swimming and diving. Dugongs grow to about three metres and from a distance look rather like dolphins with their fish-like shape, whale-like tail fluke and paddle-shaped flippers. Unlike dolphins, however, dugongs are not active predators. They feed instead on sea grasses that grow in warm, sheltered, shallow inshore waters. As a result, dugongs tend to be bulkier, less streamlined and slower moving than dolphins. They have sparse body hair apart from thick sensory bristles. The most noticeable of these are believed to be important in identifying suitable food plants.

Unlike cetaceans, dugongs do not seem to be able to communicate over long distances or to echolocate. The only sounds that have been recorded

from captive dugongs are bird-like chirps, rather like those of a budgerigar!

Historically, the dugong occurred throughout the tropical and subtropical coastal and island waters of the Indian and west Pacific oceans from East Africa to the Solomon Islands. It is now considered to be rare in most of these areas and vulnerable to extinction. Aerial surveys conducted since the mid-1970s, however, have shown herds (sometimes numbering more than 1000 dugongs) in the shallow seas of northern Australia, and it is likely that this region now harbours most of the world's dugongs.

Dugongs occur along the coast or on large flat reefs such as Corbett Reef in Princess Charlotte Bay where they can feed on sea grasses. Up to 600 dugongs have been seen from the air near the mouth of the Starcke River north of Cooktown, making this the most important dugong habitat yet identified in the world.

The age of a dugong can be determined by counting the growth layers in its tusks, which are laid down like the growth rings of a tree. Dugongs live for up to 70 years and females do not bear their first calf until they are at least ten years old; one calf is produced at intervals of three to seven years. Calving, which has been observed only rarely, takes place in very shallow water with the mother aground but in the wash of the waves. The cow-calf bond is well developed, and calves remain with their mothers for at least two years.

Dugongs have long been prized for their delicious meat (which has been likened to veal, beef and pork) and for the medicinal value of their oil. In the 1920s Aborigines netted dugongs in the Starcke River area to obtain oil that was then supplied to Aboriginal communities throughout Queensland.

The dugong was the basis of the whole culture of the sandbeach tribes whose territories extended from Princess Charlotte Bay north almost to Cape York. The dugong hunting practised by these people has been described as undoubtedly the most spectacular occupation of any Australian Aborigine.

Dugongs are now protected in Australia except for subsistence hunting by Aborigines and Torres Strait islanders living in native communities. These people, who usually hunt from an outboard-powered aluminium dinghy, using a harpoon with a detachable head called a *map*, still regard the dugong as a very important part of their traditions.

The dugong is very vulnerable to over-exploitation because it is such a slow breeder. A major threat to dugongs in Great Barrier Reef waters is their tendency to drown after becoming tangled accidentally in fishing nets. Marine parks and other sanctuaries from which net-fishing is banned, and in which native hunting is regulated, need to be established in important dugong areas; the first of these has been declared at the Starcke River. Without such properly enforced protection the dugong faces extinction. □

Although about the size and shape of a round dolphin, the dugong is more closely related to the elephant. Adult dugongs are between two and a half and three metres long and weigh from 250 to 500 kilograms. Their skin is very thick and smooth and is often heavily scarred. The nostrils, which are covered with valve-like flaps when the animal is submerged, are close together and situated near the front of the snout so that the dugong can breathe with most of its body below the surface. Dugongs are quiet, gentle animals and because they often occur in muddy waters they are rarely seen by the casual observer.

The bond between the female dugong and her calf is strong and long lasting. A single calf is born and may be suckled for up to two years, although it usually starts eating sea grass soon after birth. The mother has two mammary glands, one under each flipper, a position similar to that of human breasts. Despite legendary sailors' tales claiming that the female dugong suckled her calf while upright and half out of the water, modern research has shown that the calf suckles while the mother swims or feeds, apparently taking little notice.



Dugong, *Dugong dugon*