CARD 10

BARRACUDA

GROUP 4: FISH

ORDER *Perciformes*

FAMILY *Sphyraenidae*

GENUS & SPECIES *Sphyraena*

A deep-water hunter, the barracuda strikes with lightning speed and deadly accuracy. With its daggerlike teeth, the great barracuda can easily bite off a person's leg.

KEY FACTS

SIZES
Length: Up to 6 ft.
Weight: Heaviest recorded, 103 lb.

BREEDING
Very little known about habits. Thought to breed in open water, probably at any time of the year.

LIFESTYLE
Habit: Small or young fish found in schools. Larger fish are mainly solitary.
Diet: Almost any fish.
Lifespan: 10-15 years.

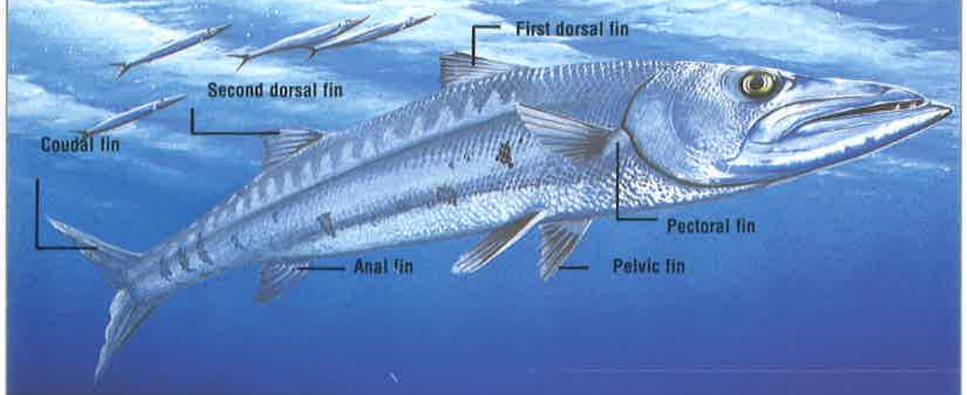
RELATED SPECIES
There are 20 species of barracuda, the best known being the California or Pacific barracuda, *S. argentea*, and the European barracuda, *S. sphyraena*. Within the *Perciformes* order, there are some 8,000 species contained in about 150 families.

Range of the barracuda.

DISTRIBUTION
Widely distributed in all tropical seas, especially around coral heads and submerged reefs, but probably most common in the western Atlantic and Caribbean oceans.

CONSERVATION
The great barracuda has no commercial value, and although a popular target of sport fishermen, it is in no danger of extinction.

FEATURES OF THE BARRACUDA



The most noticeable and menacing feature of the barracuda is its strong bottom jaw, which protrudes beyond the pointed snout of the top jaw. The jaws are equipped with formidable sets of teeth—a row of small, razor-sharp ones around the outside and a larger set of tearing teeth set just inside.

The long, slender, torpedo-shaped body has two prominent dorsal fins set well apart. The tail fin is broad and strong. The body is silver, usually with darker speckles and dark, gray-blue stripes down the side.

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Barracudas vary in size from a mere 18 inches to more than 6 feet. The 6-foot great barracuda is the most feared of all species, and the many authentic records of attacks on man has led to its being known as the "tiger of the sea."

HABITAT

Barracudas are found in the Mediterranean, western Atlantic, and tropical waters. Adult barracudas are found in the deep waters of their range. In stormy weather, they sometimes come inshore.

Young barracudas are mostly found in inshore waters, particularly over shallow, sandy, or weedy areas. They swim and hunt in small schools, which is very unusual in predatory fish. Larger fish, however, tend to be more solitary.

DID YOU KNOW?

- The barracuda is also known as the sea pike because it bears a resemblance to the freshwater pike. The two are not related, however.
- Because barracudas are attracted to yellow-colored objects, fishermen often use yellow lures to catch them.
- In the 18th century, there were alleged sightings of 15-foot barracudas.
- Barracudas adapt remarkably well to aquarium living, provided that they are given an ample supply of fish to eat.

BARRACUDA & MAN

Barracudas have been known to attack fishermen and skin divers on several occasions.

Barracudas are extremely curious and will swim around skin divers, watching their movements. They become highly excited by the splashing of fast-moving objects, perhaps mistaking them for prey.

Because the great barracuda absorbs toxins from the food it eats, it is not fished commercially. But the European barracuda, *S. sphyraena*, is a popular commercial fish.

Right: *Its two sets of razor-sharp teeth make the barracuda an efficient and feared predator.*

Left: *The tropical marine waters that are the barracuda's habitat are also much favored by divers. Consequently, the two often come into conflict.*

FOOD & HUNTING

The great barracuda's reputation for being a voracious and fierce hunter is well founded. All species of barracuda are active hunters. Their food varies according to their habitat. Groupers, grunts, bream, snapper, and even its own young fall prey to the great barracuda.

Barracudas attack swiftly, charging their prey with great speed and biting with their powerful jaws. Their eyesight is so acute that they hunt by sight even in the murkiest waters. When several barracudas hunt together, it is believed that they herd their prey into a dense school, increasing their chances of a successful attack.

The flesh of some of the coral reef fish that make up the great barracuda's diet is poisonous, so the barracuda's flesh is poisonous as well.

Left: *The barracuda's elongated body helps it to achieve lightning speed for an attack.*

BREEDING

Barracudas are such aggressive hunters that they generally live alone. But large groups of adult barracudas do come together each year to spawn (breed). The Mediterranean barracuda spawns from April to September. The females lay their eggs in the surface water of the sea, far offshore. Young fish may produce up to 5,000 eggs per season, while mature barracudas can lay 300,000 eggs. The newly hatched fish (or *fry*) immediately begin to prey on other fish.

CARD 9

LIONFISH

GROUP 4: FISH

ORDER *Scorpaeniformes*

FAMILY *Scorpaenidae*

GENUS & SPECIES *Pterois volitans*

With its vivid coloration and poisonous spines, this scorpionfish species effectively deters predators and, consequently, can swim freely without fear of attack.

KEY FACTS

SIZES
Length: Lionfish grow to 15 in., with pectoral fins spanning 30 in.

BREEDING
Mating season: Spring for temperate species.
No. of young: Up to 20,000 in some species.

LIFESTYLE
Habit: Solitary. Lionfish are free-swimming; other species are mainly bottom-dwellers.
Diet: Smaller fish, small crabs, prawns, and shrimp.

RELATED SPECIES
There are 300 species of related scorpionfish, found mainly in the Indian and Pacific Oceans, but *Sebastes marina*, the redfish or ocean perch, is found throughout the north Atlantic.

Range of the lionfish.

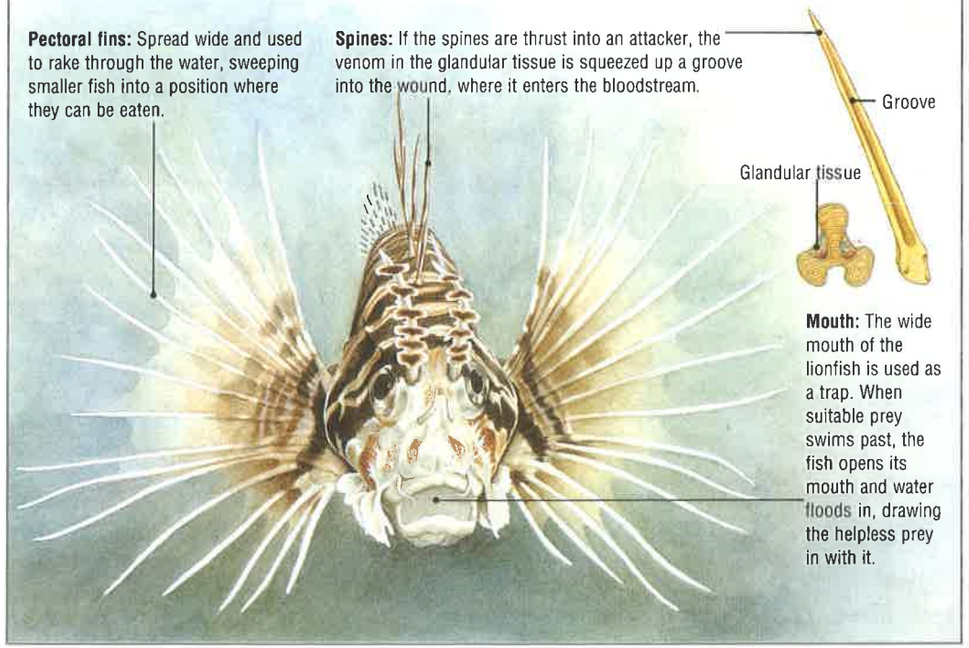
DISTRIBUTION
Reefs and coastal shallows in the Indian and Pacific oceans, from eastern Africa to New Guinea, Australia, the Philippines, and the western Pacific islands.

CONSERVATION
Despite some commercial collection for aquariums, the lionfish is in no immediate danger.

SPECIAL FEATURES OF THE LIONFISH

Pectoral fins: Spread wide and used to rake through the water, sweeping smaller fish into a position where they can be eaten.

Spines: If the spines are thrust into an attacker, the venom in the glandular tissue is squeezed up a groove into the wound, where it enters the bloodstream.



Mouth: The wide mouth of the lionfish is used as a trap. When suitable prey swims past, the fish opens its mouth and water floods in, drawing the helpless prey in with it.

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The lionfish is a type of scorpionfish. Its beautiful fins conceal an array of poisonous spines capable of inflicting severe pain. Like many scorpionfish, it does not have many predators, since few animals will dare to attack it.

DID YOU KNOW?

- An Indian species of scorpionfish has a *symbiotic*, or mutually beneficial, relationship with the *hydroid* (a small species resembling the sea anemone). The hydroids attach themselves to the skin of the scorpionfish and provide it with camouflage. In return, they are transported by the fish.
- The closely related stonefish is the most poisonous fish in the world. Its 13 dorsal spines deliver a poison that can kill a person in six hours.

HABITS

The lionfish lives in shallow water among the rocks and coral reefs of warm and temperate seas.

Its featherlike fins and bristling spines are not merely decorative but, rather, serve as camouflage that helps protect the fish among the seaweed and coral on the seabed. The lionfish spends most of its time lurking or resting among the rocks on the bottom of the seabed. It is rarely detected unless it moves. This behavior is typical of most scorpionfish (members of the *Scorpaenidae* family).

Unlike the lionfish, some other species of scorpionfish do not hide but, rather, swim through the water seemingly indifferent to predators. They have poisonous spines and, like brightly colored wasps, they advertise the presence of the spines with their gaudy coloration. Would-be predators seem to recognize the possible danger and avoid swimming too close. As a result, the scorpionfish is virtually immune to attack by other fish.

Right and below: *The lionfish is one of the few aggressive scorpionfish. It will raise its spines, point them at an intruder, and even advance threateningly.*

BREEDING

Most fish lay eggs. Many produce millions at a time, leaving them to the ocean currents and to predators, so that only a small proportion survive to maturity.

Some scorpionfish species, including the lionfish, have large numbers of eggs that reach maturity. These fish are *ovoviviparous* (the eggs stay in the female's body until they hatch), ensuring that the eggs are safe. Still, when the hatchlings are released into the water, many fall prey to other fish. Several thousand young must be produced each season so that a sufficient number will survive.

The Californian scorpionfish and some tropical species also lay eggs. The eggs are embedded in a large, hollow, gelatinous balloon that floats on the water's surface. As soon as the young hatch, they sink rapidly to the seabed to avoid being eaten by predators.

FOOD & FEEDING

The lionfish eats any fish and crustaceans it can catch.

It expends a great deal of energy chasing its prey, so it must eat a large amount to compensate for this loss. Still, like all predators, the lionfish has an instinctive awareness that causes it to give up the chase if it seems likely to use more energy than it is worth.

Above: *A lionfish opens its mouth wide, and its prey floods in with the water.*

Some species of scorpionfish are bottom-dwelling and remain motionless and virtually invisible when not feeding. Its inactivity uses up little energy, so a single feeding will sustain the fish for several days.

DEFENSE

Scorpionfish spines are barbed and dagger-sharp, and each has an elongated poison gland. The more elaborately finned shallow-water species are the most poisonous.

The effect of the poison on an animal can be fatal. Lionfish venom is a *neurotoxin*, or nerve poison, and when injected into a predatory fish, it paralyzes its muscles—including its heart. For a human, the consequences are usually less drastic, but still extremely painful.

Left: *The stonefish is a close relative of the lionfish. Its harmless appearance disguises venomous spines that are lethal to humans.*

CARD 7

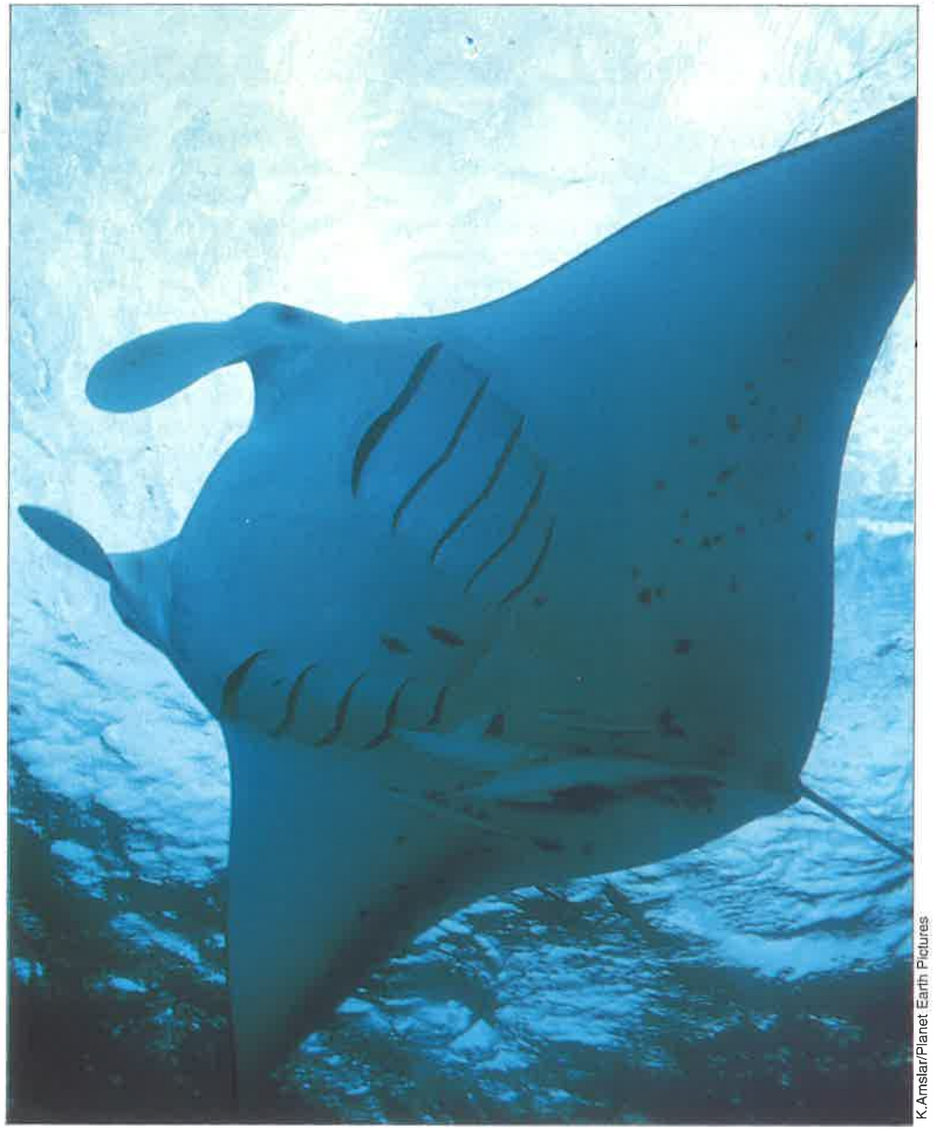
MANTA RAY

GROUP 4: FISH

ORDER *Batoidea*

FAMILY *Mobulidae*

GENUS & SPECIES *Manta birostris*



K.Amslar/Planet Earth Pictures

The largest member of the ray family, the manta looks like a giant bat. It has been known to leap out of the water, occasionally destroying small fishing boats.

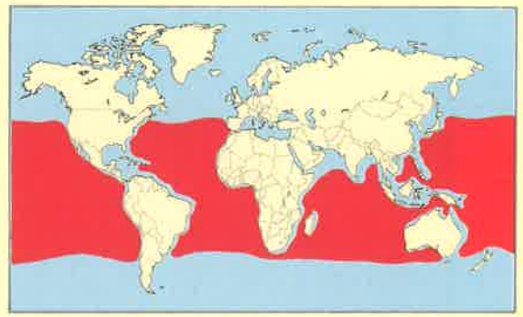
KEY FACTS

SIZES
Length: 10-16 ft.
Span: 14-20 ft.
Weight: Estimated at up to 3,000 lb.

BREEDING
Mating season: Year round.
Gestation: Not known.
No. of young: 1
Lifespan: Not known.

LIFESTYLE
Habit: Large specimens solitary; smaller fish may move in shoals of 5 or 6 in food-rich areas.
Diet: Mainly shrimp and plankton; occasionally small fish, such as mullet.

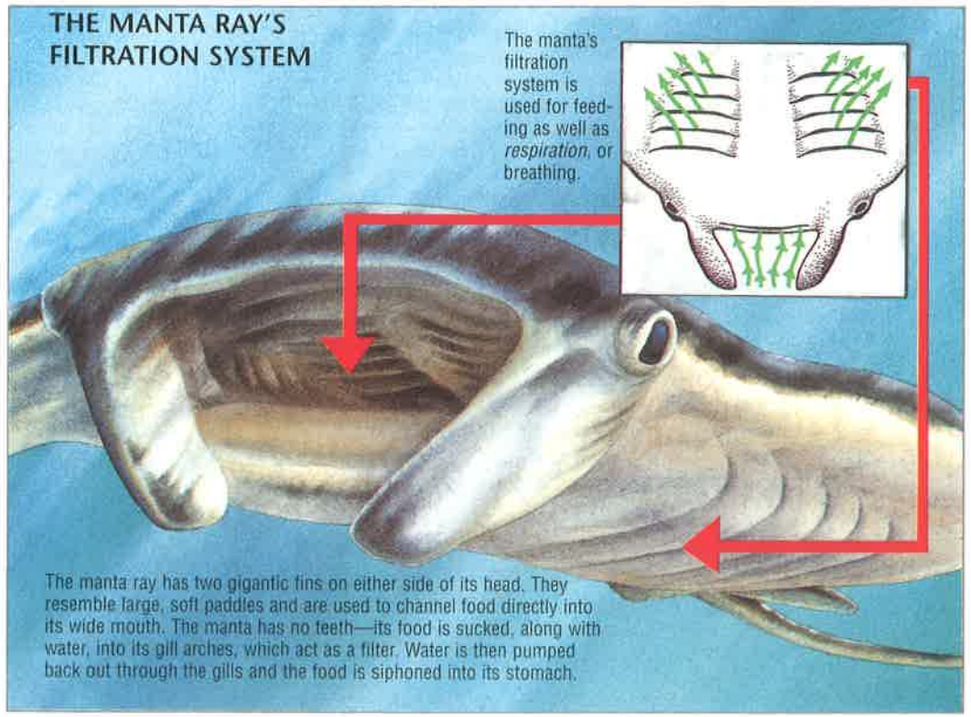
RELATED SPECIES
Other members of the ray family include the common eagle ray (*Myliobatis aquila*), spotted eagle ray (*Actobatus narinari*), and blunt-nosed sting ray (*Dasyatis sayii*).



Range of the manta ray.

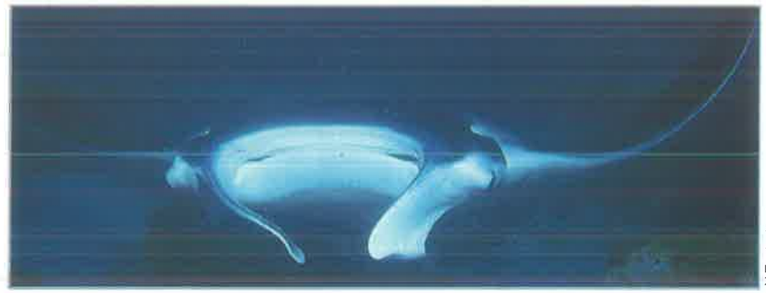
DISTRIBUTION
The western Atlantic, Pacific, and Indian oceans, in both inshore and offshore waters.

CONSERVATION
Manta rays have little commercial value and are not considered good sport fish by fishermen, so they are generally left in peace. It is not known how many manta rays exist in the wild.



R.H.Johnson/Planet Earth Pictures

Right: *The manta ray may look menacing as it glides through the water, but its giant mouth is toothless.*



V.Taylor/Ardea

Known as the devilfish because of its terrifying habit of slowly circling small boats, in reality, the manta ray is one of the ocean's more harmless giants. Its strange appearance is enhanced by the way its broad, flat fins move slowly up and down to propel it through the water.

HABITAT

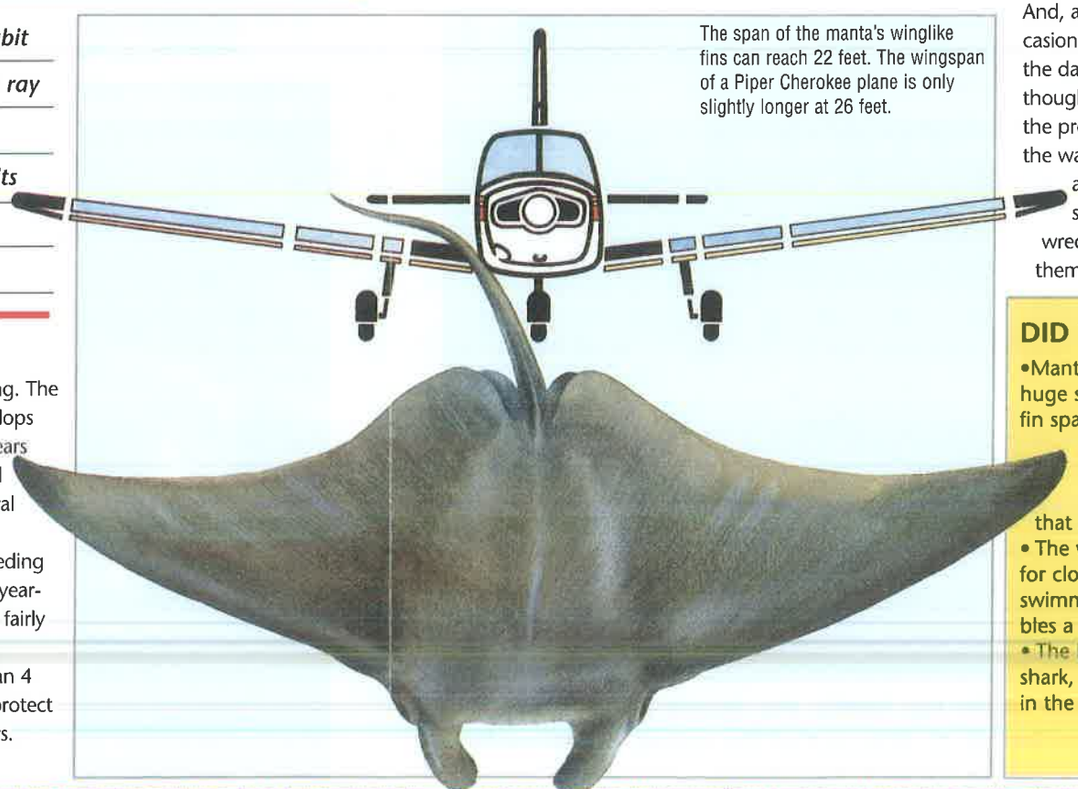
The manta ray is found both inshore and offshore in the warmer oceans. Although mantas can be found on the seabed, they feed mostly near the ocean's surface.

Large species of ray, such as the manta, tend to be solitary, although they are often accompanied by a shoal of pilot fish. While feeding, small and medium-sized species may form shoals.

BREEDING

Manta rays bear live young. The single, fertilized egg develops inside the mother. It appears that mantas do not breed until their winglike pectoral fins reach 13 to 15 feet.

There is no specific breeding season: manta rays mate year-round. The newborns are fairly large, weighing 20 to 30 pounds, with fins that span 4 feet. They can generally protect themselves from predators.



The span of the manta's winglike fins can reach 22 feet. The wingspan of a Piper Cherokee plane is only slightly longer at 26 feet.

FOOD & FEEDING

Manta rays feed mainly on shrimp and plankton, although they will occassionally eat small fish, such as mullet.

The manta's gill arches help it to feed by operating as a filtration system. During respiration, water is sucked in through the mouth and pumped out through the gill slits. The plankton that is sucked into the manta's mouth along with the water is caught by the gill arches and siphoned into its stomach.

When mantas encounter a shoal of fish, they quickly move in to feed, swallowing as many fish as they can.

MANTA & MAN

The manta ray has long been regarded by fishermen as dangerous. Stories of mantas killing scuba divers and deliberately jumping onto small boats are numerous, but unsubstantiated.

However, the manta's habit of circling small boats can be frightening to those aboard. And, although mantas do occasionally jump onto boats, the damage they cause is thought to be accidental. In the process of leaping out of the water, done possibly as an aid in giving birth or for sport, manta rays have wrecked small boats, earning them the name "devilfish".

DID YOU KNOW?

- Manta rays can grow to a huge size: it is common for fin spans to reach more than 20 feet. One 17-foot-long manta caught in the Bahamas had fins that spanned 22 feet.
- The word *manta* is Spanish for cloak or blanket. When swimming, the manta resembles a spread-out cape.
- The blue whale, basking shark, and whale shark feed in the same way as a manta.

CARD 6

STINGRAY

GROUP 4: FISH

ORDER *Hypotremata*

FAMILY *Dasyatidae*

GENUS *Dasyatis*

Varying in shape from almost rectangular to circular, with spotted or mottled markings, stingrays are found in all of the world's tropical and temperate seas.

KEY FACTS

SIZES
Width: Depending on species, from 1-15 ft.
Length: Up to 14 ft.
Weight: 1-750 lb.

BREEDING
Sexual maturity: Not known.
Breeding season: Spring.
Gestation: 4 months-1 year.
No. of young: 2-9 young are born, depending on species, from late summer to winter.

LIFESTYLE
Habit: Solitary, bottom-dwelling.
Diet: Mollusks, crustaceans, fish.
Lifespan: Not known.

RELATED SPECIES
More than 100 species of stingray are distributed worldwide. The European *D. pastinaca* reaches 8 ft. in length. *D. americana* grows to just 5 ft long.

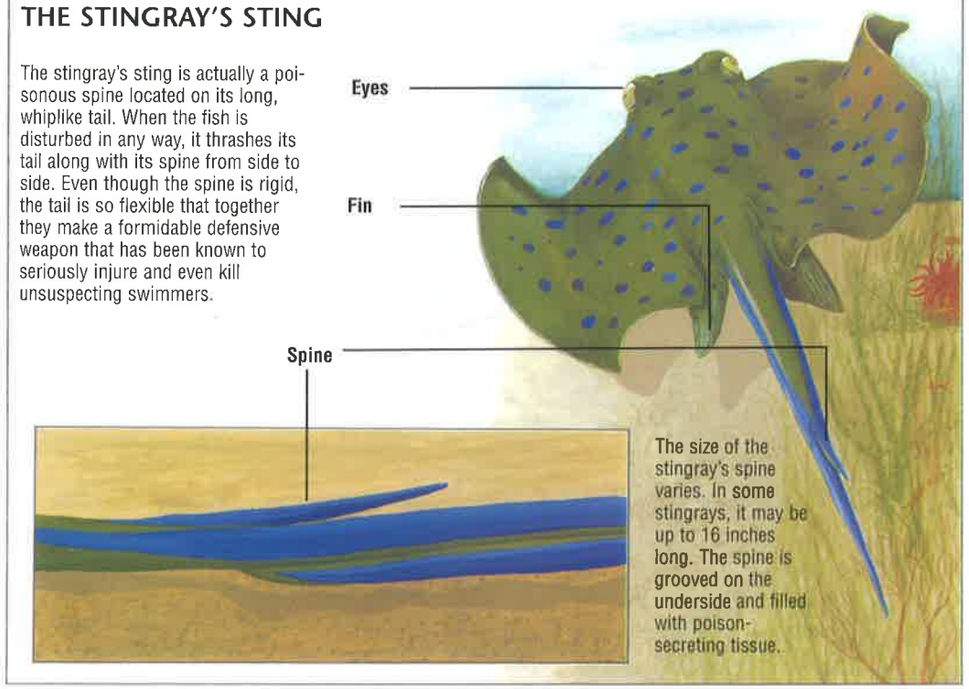
Range of the stingray.

DISTRIBUTION
Found in tropical and temperate seas worldwide. Ranges as far north as southern Scandinavia.

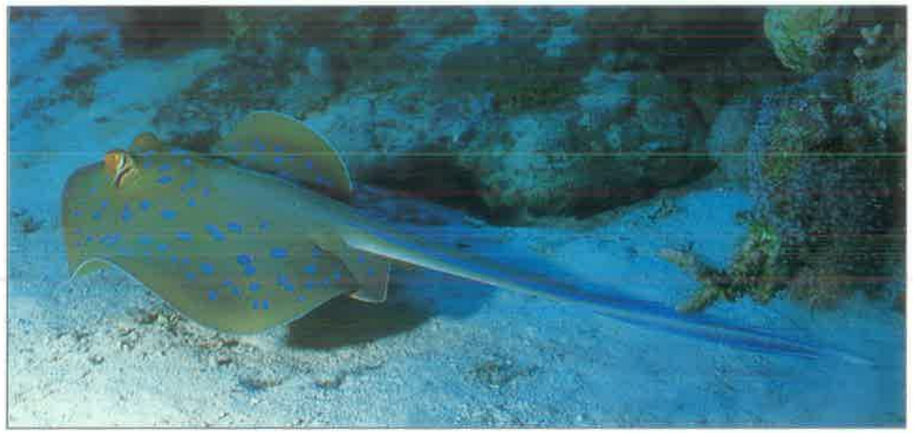
CONSERVATION
In general, the stingray is not under threat of extinction, although it is dependent on shellfish for much of its food and shellfish are adversely affected by pollution.

THE STINGRAY'S STING

The stingray's sting is actually a poisonous spine located on its long, whiplike tail. When the fish is disturbed in any way, it thrashes its tail along with its spine from side to side. Even though the spine is rigid, the tail is so flexible that together they make a formidable defensive weapon that has been known to seriously injure and even kill unsuspecting swimmers.



The size of the stingray's spine varies. In some stingrays, it may be up to 16 inches long. The spine is grooved on the underside and filled with poison-secreting tissue.



There are more than 100 species of stingray, ranging in size from 1 to 15 feet across and weighing between 1 and 750 pounds. All are able to inflict a severe wound with their long tails and poisonous, swordlike spines.

HABITS

Stingrays prefer to live in shallow water and like to spend their time buried in soft sand or mud. They are strong, active swimmers, moving rapidly through the water with their large, winglike fins.

Some scientists believe that, with the onset of winter, stingrays make long migrations to warmer waters. Others believe, however, that the fish dig themselves into the soft seabed and spend the winter in hibernation. Nevertheless, stingrays are usually found in colder waters only during the summer months.

Top: *A blue-spotted stingray glides over the seabed.*

Left: *Lying covered in sand, this* **D. americana** *stingray of the Caribbean displays its ability to conceal itself from view.*

BREEDING

Little is known about the stingray's mating behavior. However, it is known that stingrays produce two to nine young, which hatch from eggs inside the female's body.

As they are first developing, the young feed from the yolk. Later, they take in food that is secreted through the female's uterine wall. At birth, the stingrays measure 7 inches across. Most are born in late spring or early summer.

DID YOU KNOW?

- Stingray spines have been used to make spear tips, daggers, needles, and awls.
- When stingrays are caught in commercial fishing nets, the fishermen often cut off their spines before throwing them back in the sea.
- Hammerhead sharks often prey on small to medium-sized stingrays. Some scientists believe that the strange, hammer-shaped head of this shark has evolved so as to keep its eyes clear of the stingray's lashing tail and poisonous spine.
- In Mexican waters, hundreds of stingrays gather into seabed depressions known as ray pits.
- In southern England, there is a belief among old fishermen that the oil extracted from the stingray's liver is a preventive for pneumonia.

FOOD & FEEDING

Stingrays feed mainly on worms, mollusks, and crustaceans that they dig out of the seabed. Larger stingrays may also eat dead fish and squid.

The stingray's mouth is on the underside of its body. Its wide jaws and several rows of blunt, broad teeth are used to crush the shells of prey. Its muddy coloration provides a good camouflage. Still, the stingray often gives its presence away by creating a cloud of sediment in the water.

Right: *The stingray's harmless-looking closed mouth conceals rows of strong teeth.*

STINGRAY & MAN

The stingray has little commercial value, although it is killed for its meat, spines, and oil. It is a dangerous animal because it can inflict serious wounds with its tail and spine. People have been killed by stingrays, often as a result of standing on one buried in the sand and being struck by its lashing tail and spine.

Stingrays are also considered a nuisance because of their habit of raiding oyster and shellfish farms. Even the hard shell of an oyster can be cracked by the stingray's strong, blunt teeth.

DIFFERENT SPECIES

In the oceans surrounding North and South America, the most common species is the southern stingray, *D. americana*. The species native to the Indian Ocean is the huge *D. brevicaudata*, which reaches a length of 14 feet.

Some species, such as the South American *potamotrygon*, travel up rivers and spend their entire lives in fresh water.

The color of the stingray varies according to where it is found. In some areas, stingrays are dark brown and black, while elsewhere, they are dark gray. The underside is usually a white or cream color.

Large specimens weighing more than 50 pounds tend to be very dark in color, and their white undersides take on a bluish appearance.

Right: *A common stingray rests on the seabed off the coast of Minorca, near Spain. Stingrays live in both temperate and tropical seas, and some species are even found in the waters off Scandinavia.*

CARD 5

MUDSKIPPER

GROUP 4: FISH

ORDER *Perciformes*

FAMILY *Gobiidae*

GENUS *Periopthalmus*

It is likely that the first fish to move from sea to land millions of years ago resembled the strange-looking, bulbous-eyed mudskippers found in the tidal mangrove swamps of the tropics.

KEY FACTS

SIZES
Length: 6-12 in.

BREEDING
Mating season: May to July.
No. of eggs: Several hundred laid in burrows.
Hatching time: 2-3 weeks.

LIFESTYLE
Habit: Solitary, lives in burrows dug out of mud.
Diet: Smaller species: algae and minute forms of aquatic life. Larger species: small crabs, insects, and small fish.
Lifespan: Approximately 5 years.

RELATED SPECIES
There are approximately 600 species in the family *Gobiidae*. They are generally small, spiny-finned fishes with elongated bodies, found in coastal or brackish waters.

Range of the mudskipper.

DISTRIBUTION
Found in tropical and subtropical waters throughout the Indian Ocean in a range extending from Africa to Australia. Able to live on land as well as in water, they particularly frequent mangrove swamps.

CONSERVATION
Because they have no commercial value and their habitats are not threatened, mudskippers are not endangered.

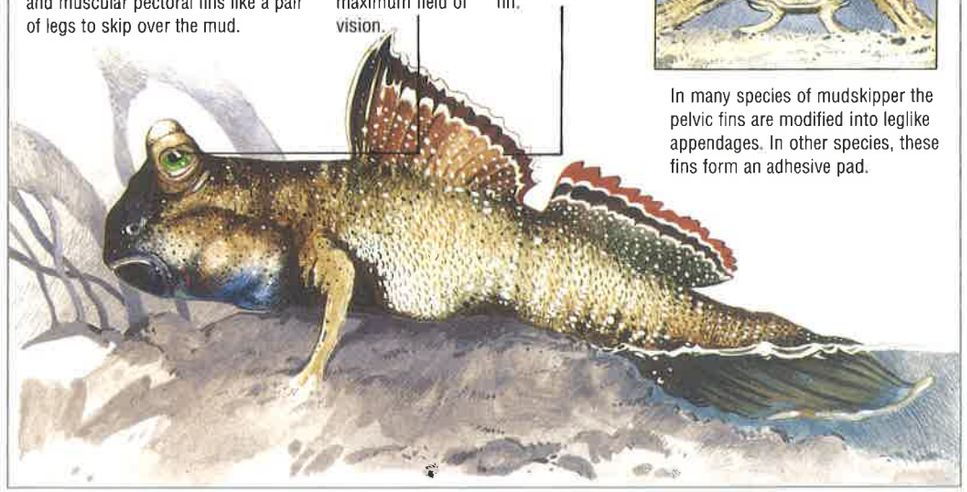
FEATURES OF THE MUDSKIPPER

The mudskipper has an elongated, muscular body with huge, bulbous eyes on the top of its head. These are protected by a thick layer of clear skin. The mudskipper uses its large and muscular pectoral fins like a pair of legs to skip over the mud.

Eyes: Its eyes are large and round and can swivel around in their sockets to give maximum field of vision.

Fins: Some species have no dorsal fin; the male in other species has a high, brightly colored fin.

In many species of mudskipper the pelvic fins are modified into leglike appendages. In other species, these fins form an adhesive pad.



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There are several different species of mudskipper, all belonging to the family of fish known as gobies. Mudskippers are unusual in that they spend most of their time on land, using their large, muscular pectoral fins like a pair of legs to skip over the mud and sand of their habitat.

Left: *Different species of mudskipper vary in color and appearance. This male has a prominent, brightly colored dorsal fin.*

HABITAT

Mudskippers are most commonly found in mangrove swamps, where they live in burrows among tree stems and roots. Although some may climb up the trunks and branches of the trees, they dart back down and into their burrows at the first sign of danger.

The trees provide shelter and cover from predators such as gulls and terns.

Below: *The mudskipper can retract its prominent eyes into their sockets.*

SPECIAL ADAPTATIONS

A mudskipper can take in oxygen through the mass of tiny blood vessels in its mouth and throat. But, as with other fish, most of its oxygen comes through its gills.

The gills are contained in an enlarged chamber that must be kept filled with water for oxygen exchange to occur. By frequently splashing about in shallow pools, the fish keeps the two pulpy reservoirs above its gill chambers filled with oxygen-containing water.

DID YOU KNOW?

- Mudskippers dig burrows that are 20 inches or deeper by spitting large mouthfuls of mud away from the burrow's entrance.
- The mudskipper's eyes are adapted for both above and below water. They can also be moved separately.
- Mudskippers do not move with the tide. Instead, they spend most of their time out of water. But at high tide they can remain completely submerged in their burrows for up to two hours.

FOOD & FEEDING

Some types of mudskipper feed on *diatoms* (microscopic algae) that live in the mud. To catch them, mudskippers scrape off a thin layer of mud by skimming their heads across its surface.

Other species of mudskipper feed on larger prey, including shrimp, worms, and insects. They also eat crabs, despite the thick shells. But sometimes mudskippers fall prey themselves to larger crabs.

Above: *Mudskippers defend their burrows by charging and snapping at intruders while raising their dorsal fins.*

Right: *A pair of mudskippers watches for insects from a dry perch.*

BREEDING

Male and female mudskippers look identical except in breeding season, when the males develop brighter colors on their backs and sides.

Males attract females by moving up and down rhythmically. When a female shows interest, the male leads her into his burrow. The female then lays her eggs and the male fertilizes them.

When the eggs hatch two to three weeks later, the hatchlings swim from the burrow while it is submerged at high tide. The young mudskippers can fall prey to a variety of marine predators, including adult mudskippers.

CARD 4

TIGER SHARK

GROUP 4: FISH

ORDER *Carcharhiniformes*

FAMILY *Carcharhinidae*

GENUS & SPECIES *Galeocerdo cuvier*

The tiger shark is a deadly predator. It is a solitary hunter that will eat anything it can get down its throat—including other sharks.

KEY FACTS

SIZES
Length: 10-16 ft. average, but probably up to 23 ft.
Weight: 2,200 lb. average.

BREEDING
Breeding system: Tiger sharks are ovoviviparous, which means that they produce eggs that hatch within the female's body.
Gestation: About 9 months.
No. of young: 10-80.

LIFESTYLE
Habit: Solitary, nomadic.
Diet: Anything it can catch.
Lifespan: Not known, but probably 30-40 years.

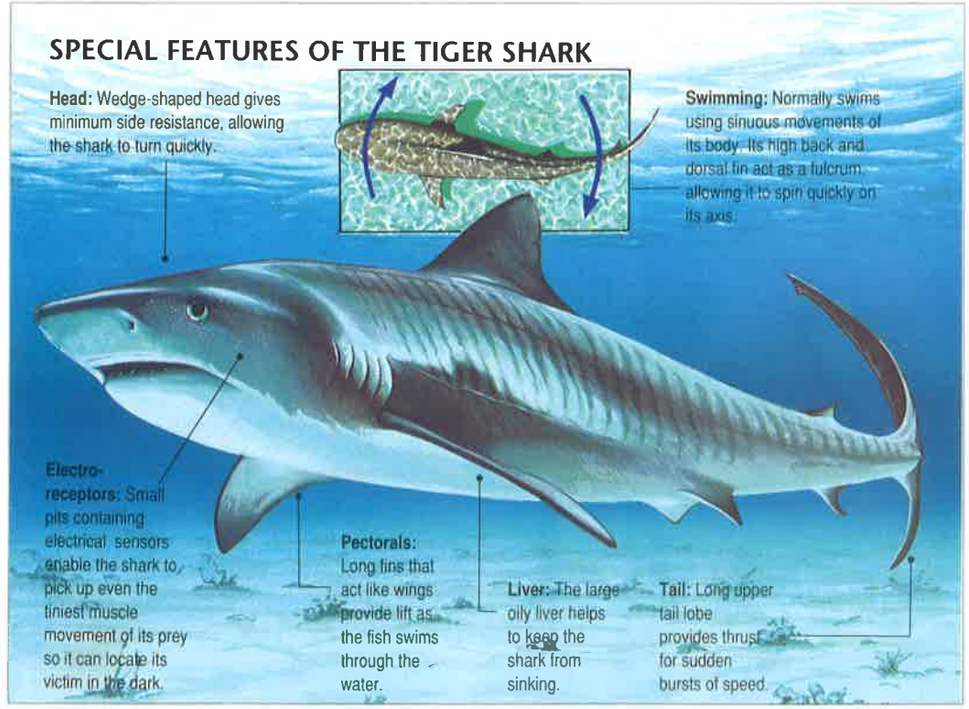
RELATED SPECIES
The tiger is one of the requiem sharks, a large family which includes the lemon shark, blue shark, and bull shark.

Range of the tiger shark.

DISTRIBUTION
Mainly tropical, coastal waters throughout the world in winter, spreading north and south in summer.

CONSERVATION
The tiger shark has less commercial value than many other sharks, so although it is prized by sport fishermen, it is under no direct threat.

SPECIAL FEATURES OF THE TIGER SHARK



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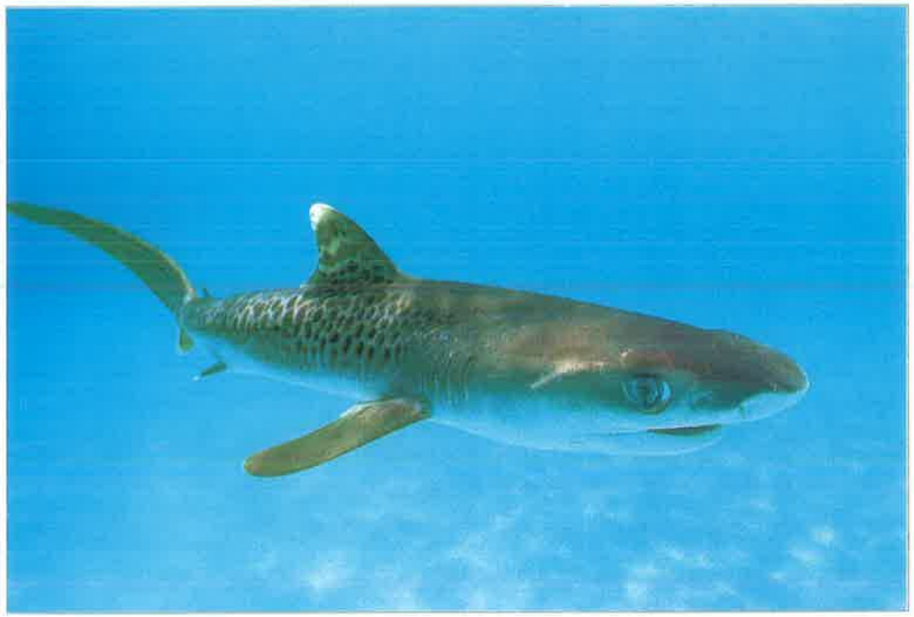


The tiger shark gets its name because of the dark stripes across its back. It is an efficient killer, armed with an extraordinary sense of smell and serrated teeth that can slice through flesh and bone. A proven man-eater, it is one of the most feared sharks in the world.

HABITS

The large, powerful, solitary tiger shark cruises the coastal and offshore waters of tropical seas. It will travel up to fifty miles a day, rarely stopping except to eat.

In summer, the tiger shark may follow warm water currents as far south as New Zealand, or north to Japan or the northern United States. In winter it stays closer to the equator near the coral reefs of the Caribbean and the Pacific and Indian Oceans where it is the largest and most dominant of all the reef predators, eating anything it can find.

The tiger shark tends to stay in the deep waters on the fringe of reefs, occasionally penetrating the channels to attack in the shallows. It glides day and night over the reef and ocean bed.

Above: ***The dark stripes that give the tiger shark its name are clearly visible on this young animal but will eventually fade as it grows older.***

TIGER SHARK & MAN

The tiger shark has been responsible for more fatal attacks on man than any other species of shark. Because it will eat anything, including man, it is one of the most feared sharks in tropical waters.

Most killer sharks are not man-eaters; they may attack or kill people, but they won't actually eat the remains. But accounts of tiger sharks swallowing their human victims abound. In one report, a tiger shark attacked two men and a woman on a life raft, killed and swallowed one of the men, then came back and snatched the woman. Their companion reached the safety of a nearby reef and escaped unharmed.

Still, despite such tales, some shark experts and divers insist that tiger sharks are really quite gentle. But the common perception for most people is that the tiger shark means trouble.

Below: ***This trusting shark expert proves that the tiger's fearsome reputation can be taken too seriously.***

FOOD & HUNTING

The tiger shark is an indiscriminate feeder; it will eat anything. In addition to its main diet of fish, squid, sea turtles, seals, and smaller sharks, items such as car license plates and gasoline cans have been found in its stomach.

A tiger shark has a large mouth and massive, powerful jaws lined with flat, triangular, notched teeth with serrated edges. As teeth are broken or lost, new teeth grow in to replace them.

The tiger shark has good eyesight, but it relies mostly on other senses to track and catch its prey. It has an acute sense of smell, which enables it to pick up even the faintest traces of blood in the water and follow them to their source. It is also sensitive to low-frequency pressure waves produced by movements in the water. Even tiny nerve and muscle twinges reach its sensitive electroreceptors, so the shark can pinpoint prey in the darkest, murkiest water.

Once the tiger shark has located its prey, it may circle it for a while or nudge it with its snout before making the kill. The final attack is frenzied; the shark will devour anything in its path.

Below: ***The powerful jaws and teeth are pushed out as the tiger shark closes in on its prey.***

DID YOU KNOW?

- Sharks were once thought to be instinctive killing machines, but it is now believed that they learn to hunt by experience.
- The sense of smell is so important to a shark that nearly two-thirds of its brain is devoted to processing scent information.

BREEDING

Most fish produce large numbers of eggs that are fertilized by sperm ejected into the water. Sharks, however, breed by internal fertilization, in much the same way as mammals do.

During mating, one of the male's pelvic fins is introduced into the female's genital opening to act as a guide for the sperm. Mating can be painful for the female, since the male will often use his teeth to hold her still.

The young (between 10 and 80 in each brood) are nourished inside their mother's body for approximately nine months. When they are born, they are completely independent and equipped with a full set of teeth. They are able to swim away as soon as they emerge and begin to hunt for themselves immediately.

CARD 2

SPOTTED GROUPER

GROUP 4: FISH

ORDER *Perciformes*

FAMILY *Serranidae*

GENUS *Epinephelus and others*

Spotted groupers are large, placid-looking fish that have the startling ability to change their appearance. They may look harmless, but they are dangerous hunters.

KEY FACTS

SIZES
Length: Up to 13 ft.
Weight: Up to 650 lbs.

BREEDING
Sexual maturity: Spend 2-5 years as females. Change to males at 7-10 years.
Spawning season: Late spring (some species).
No. of eggs: Not known.

LIFESTYLE
Habit: Sedentary. No fixed territories. Hunt alone or in small groups.
Diet: Principally smaller fish.
Lifespan: Not known.

RELATED SPECIES
Groupers are a family of more than 370 spiny-finned perchlike fish (*Serranidae*). They are closely related to sea basses such as the North Atlantic's black sea bass, *Centropristis striala*.

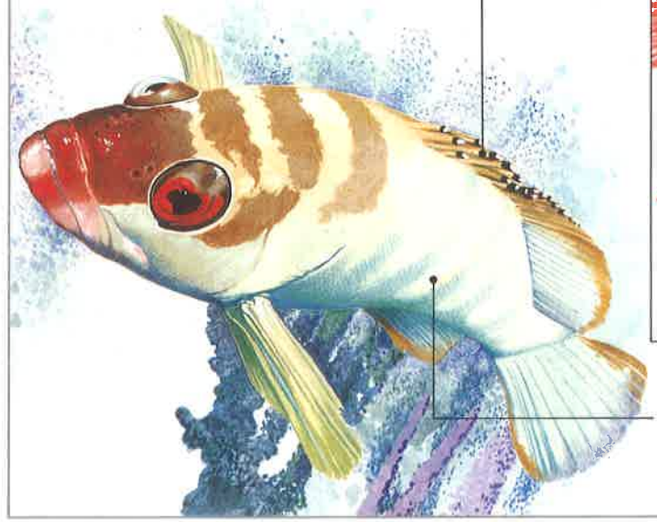
Range of groupers.

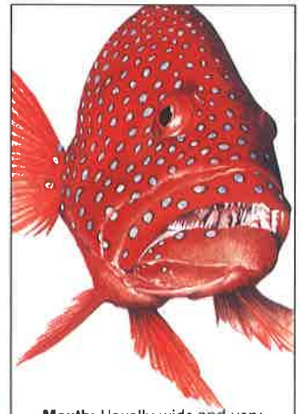
DISTRIBUTION
Found in shallow seas and coral reefs all over the world. Most live in tropical waters, but some inhabit temperate seas.

CONSERVATION
Spotted groupers are widespread and adaptable fish. Some of the larger species are popular food and sport fish and may be fished too heavily.

FEATURES OF GROUPERS

Dorsal fin: Long and spined. Some groupers are named for their spine color, as is the case with the black-tipped grouper below.





Mouth: Usually wide and very roomy, with peglike teeth. Prey is sucked in with water, which is later expelled.

Skin: Contains color cells that can be opened at will, enabling the fish to change appearance.

Spotted groupers are stealthy hunters that lurk in the shelter of coral reefs to stalk their prey. These unusual fish can change color in seconds, blending in with their background to avoid detection by their predators. They also change their sex. All begin as egg-laying females and become males as they mature.

HABITAT

Spotted groupers are found in warm, shallow seas—most often around coral reefs.

Coral reefs are rich ecosystems, teeming with underwater life. For big predatory fish like spotted groupers, a reef is a plentiful food source.

Small fish, such as "tropical fish" found in aquariums, are eaten by larger, meat-eating fish. These predators in turn fall victim to sharks, barracudas, and groupers.

There are many species of grouper, and the biggest are near the top of this undersea food chain. Even a shark will hesitate before taking on a 650-pound jewfish grouper.

FOOD & HUNTING

Despite their bulky lines and placid appearance, groupers are dangerous predators. They cannot make a lightning strike like a shark. Instead, they lurk in the shelter of coral formations and watch the smaller fish feed nearby.

The small fish are wary of the big groupers, but sooner or later one ventures too close. Lunging forward, the grouper opens its great mouth and raises its gill covers to suck in its victim in a mass of water. Its mouth snaps shut, expelling the water through its gills, and the prey is gone in an instant. The other small fish often do not notice and continue to feed nearby.

A spotted grouper's teeth are simple spikes that securely grip struggling fish, but their bite is rarely fatal. As a result, groupers usually swallow their prey alive. If the prey is spiny, swallowing it can be painful. Sharp-tailed eels, for example, may pierce their captor's gut and squeeze through the slit into the fish's body cavity. There the grouper's digestive juices cannot get at them.

Left: ***This dazzling grouper is called the rock cod.***

Inset: ***A grouper's teeth.***

BREEDING

Most groupers do not have a fixed territory and feed wherever the pickings are richest. But in the breeding season, a particular species may migrate many miles and converge on a traditional spawning site.

For example, Nassau groupers gather in huge schools of 30,000 to 100,000 fish, which are easily caught by local fishermen who know where to find them. A few similar sites have been found elsewhere, but little more is known about groupers' breeding behavior.

One fact we do know is that groupers change sex. When they become sexually mature, they are all females and can lay eggs. But their bodies contain the beginnings of male sex organs. Those who survive to be 7 to 10 years old become males.

The advantage of this shift is not clear. It is possible that each older, male fish fertilizes several females and so passes on its talent for survival.

Above: ***Cleaning fish, such as these tiny gobies, can approach the grouper unharmed.***

DEFENSES

The biggest groupers have no enemies, but smaller species are at risk from larger predators such as sharks. Too slow to flee and unable to fight back, they rely instead on camouflage.

Like many fish, groupers can alter their appearance to match the background. Their skin has tiny color cells that can be blinked open or shut. By opening one set of cells and closing another, groupers change color.

A single grouper may display a variety of blotches, bands, and stripes in a range of colors. It may change several times in succession to confuse its predators.

Left: ***In a Red Sea reef, a grouper waits for prey to swim by. Its skin has changed color to match the background.***

DID YOU KNOW?

- Although groupers feed on other fish, they allow the small cleaner wrasse to swim into their mouths. The wrasse helps by taking parasites from the grouper's mouth lining.
- Large groupers such as *Epinephelus lanceolatus* may stalk divers. A big one could even eat a man.
- Most groupers are active only by day. At night they doze in shelter spots, and divers have picked them up without waking them.
- Groupers can be good to eat, but they may contain *ciguatera,* a potentially deadly natural poison.

CARD 1

PIRANHA

GROUP 4: FISH

ORDER *Cypriniformes*

FAMILY *Characidae*

GENUS & SPECIES *Serrasalmus nattereri*

Lanceau/Natrue

The relatively small piranha is one of the most feared of all river fish. It will attack prey many times larger than itself, but its reputation as a man-eater is questionable.

KEY FACTS

SIZES
Length: Average 8 in., but some species are up to 20 in. long.
Weight: Seldom more than 3 lb.

BREEDING
Spawning season: March-August.
No. of eggs: Several thousand laid at a time.
Hatching period: 10-15 days, depending on water temperature.

LIFESTYLE
Habit: Move constantly in huge shoals or packs.
Diet: Primarily fish, but will also attack mammals and birds as they swim or stand in the water.

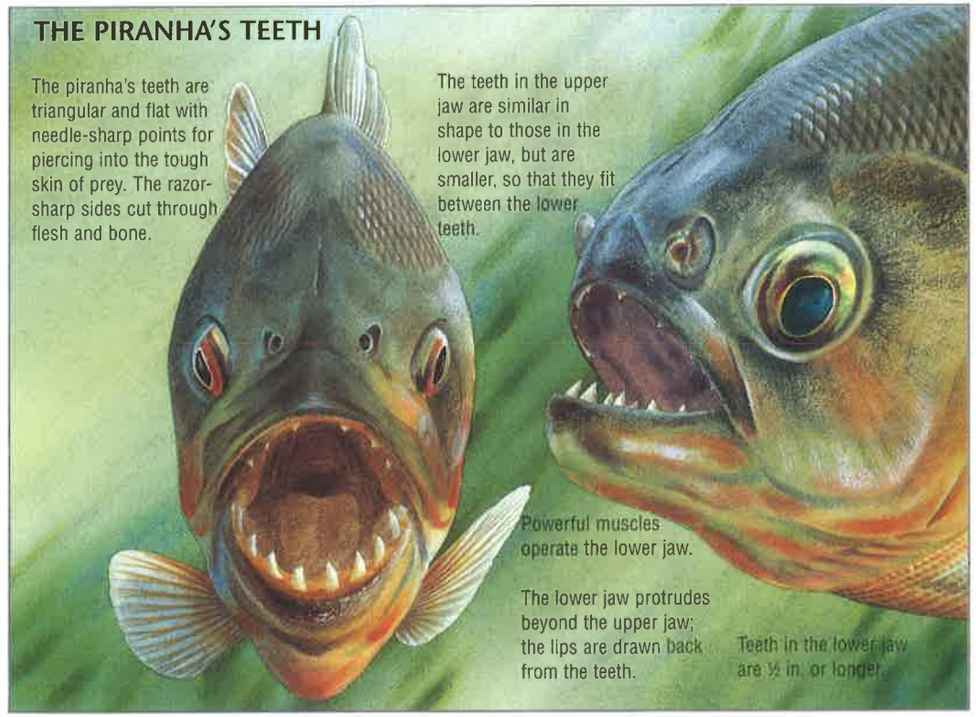
RELATED SPECIES
Of the 18 or so species of piranha, four are thought to be dangerous to humans, and there are many accounts of fatalities.

Range of the piranha.

DISTRIBUTION
Confined to the South American continent, but widespread throughout the rivers of Colombia, Venezuela, Guyana, Paraguay, Brazil, and central Argentina.

CONSERVATION
Because they will eat any prey and are shunned by fishermen, none of the 18 species of piranha is in any danger.

THE PIRANHA'S TEETH



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