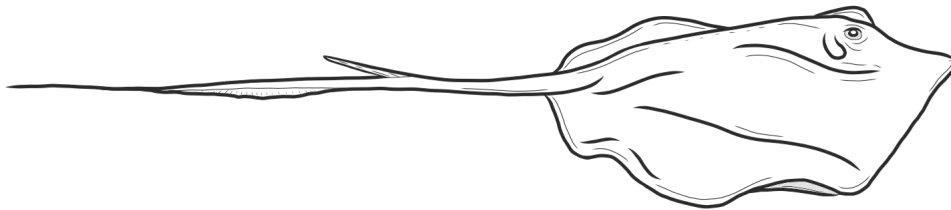


Florida's Fintastic Sharks and Rays

An at-home lesson for grades 3-5

Produced by:  Florida
Oceanographic
Society



This educational workbook was produced through the support of the Indian River Lagoon National Estuary Program.

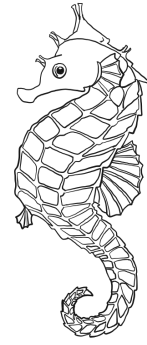


ONE LAGOON
ONE COMMUNITY · ONE VOICE
INDIAN RIVER LAGOON
NATIONAL ESTUARY PROGRAM



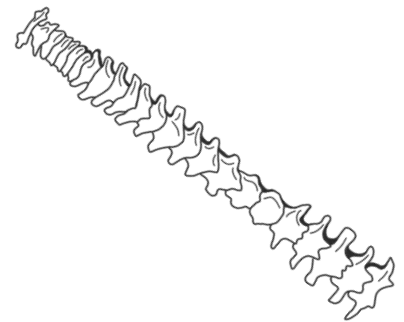
What are sharks and rays?

Believe it or not, they're a type of fish! When you think "fish," you probably picture a trout or tuna, but fishes come in all shapes and sizes. All fishes share the following key characteristics that classify them into this group:

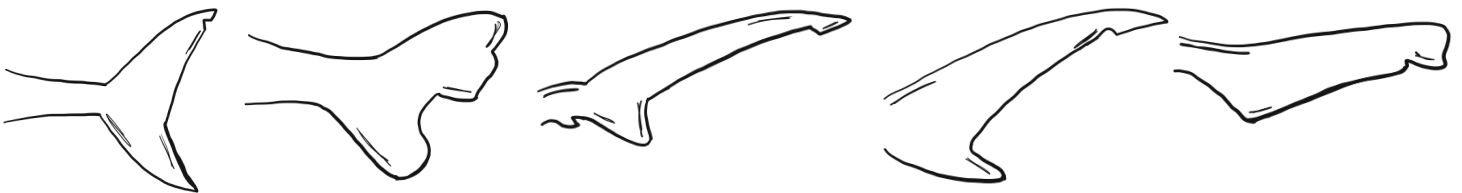


Fishes have the simplest of vertebrate hearts with only two chambers- one atrium and one ventricle.

The spine in a fish runs down the middle of its back just like ours, making fish **vertebrates**. All fishes have skeletons, but not all fish skeletons are made out of bones. Some fishes have skeletons made out of cartilage, just like your nose and ears.

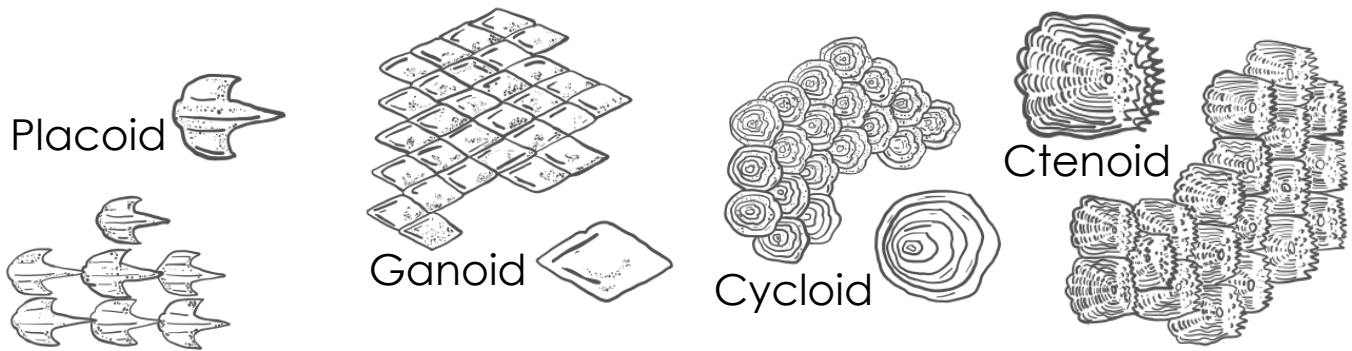


Fishes are **cold-blooded**. Cold-blooded animals use their environment to warm up or cool down.

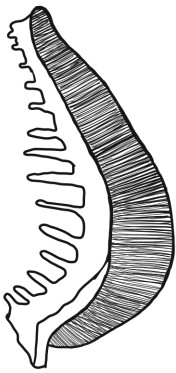


Fins help fish swim. Fins come in pairs, like pectoral and pelvic fins or are singular, like caudal or anal fins. Later in this packet, we will look at the different types of fins that fishes have and some of the unique ways they are used.



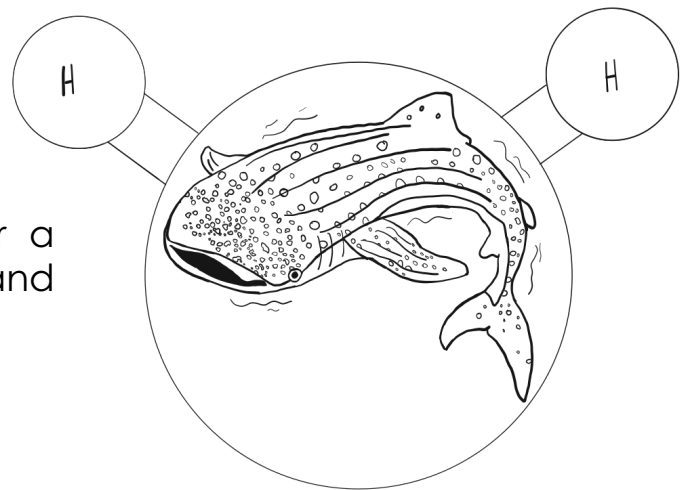


Hard protective **scales** cover the skin of many fish species. Scales can act as “fingerprints” to help identify some fish species. There are several different scale types found in bony fishes, including **cycloid** (round), **ganoid** (rectangular or diamond), and **ctenoid** (scalloped). Cartilaginous fishes have **dermal denticles (Placoid)** that resemble tiny teeth on their skin.



Fishes use **gills** to draw oxygen from the water and provide it to the body, just like air-breathing animals use lungs to pull oxygen from the atmosphere. Some fishes use gill rakers, thin bony extensions on the front of the gill arch, to strain food out of the water.

Water provides everything needed for a fish to live. Even walking catfish and lungfish still need water to survive.



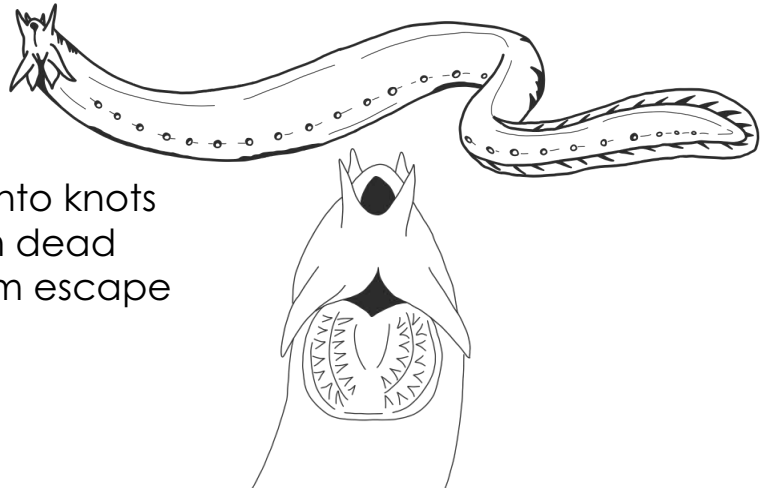
What is the correct **plural** version of the word “fish”? Well, it depends. If you are talking about more than one individual fish, the correct plural form is “fish” (I caught a bunch of fish today.). However, when scientists talk about multiple different types or groups of fish, the plural is “fishes” (My research focuses on coral reef fishes.)

Types of Fishes

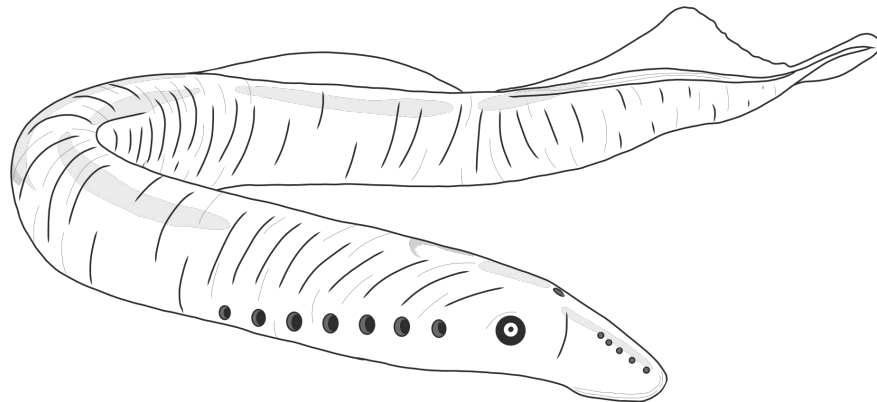
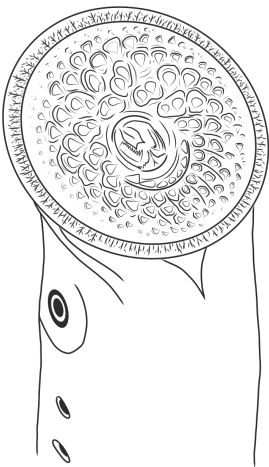
Now that we know what makes a fish a fish and how fishes deal with life in the water, it's time to start thinking about specific types of fishes.

Fishes come in many different shapes and sizes. Most fishes have a jaw, just like we do. But some very primitive fishes are completely jawless! Two separate groups of jawless fishes are still alive today. Hagfish and lampreys use suction, razor-sharp teeth, and specialized maneuvers to feed.

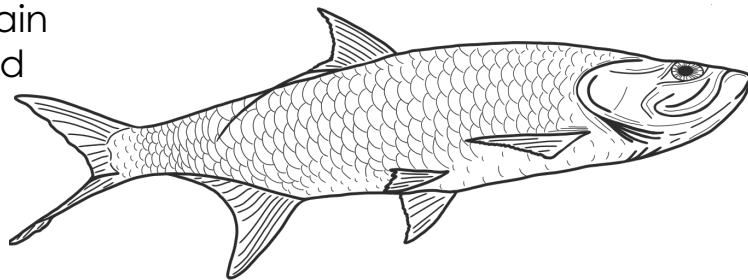
Hagfish twist and tie themselves into knots to help pull off bites of meat from dead animals. Their slimy skin helps them escape from would-be predators.



Lampreys are active predators that use their teeth to rasp away skin and flesh to connect to their host like a toothy suction cup. They suck on the host's blood and body fluid until it perishes.

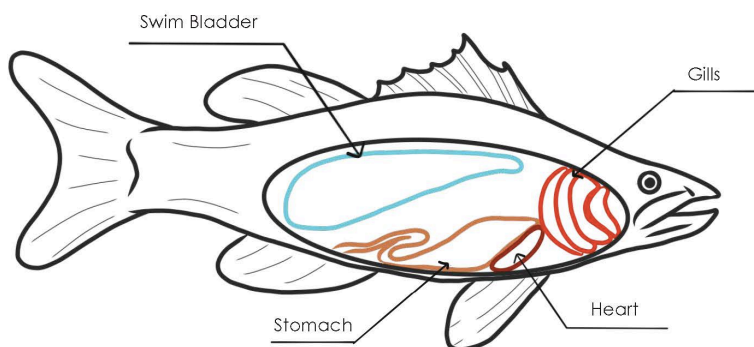


Jawed fishes can be divided into two main groupings: those with bony skeletons, and those with skeletons made of cartilage.

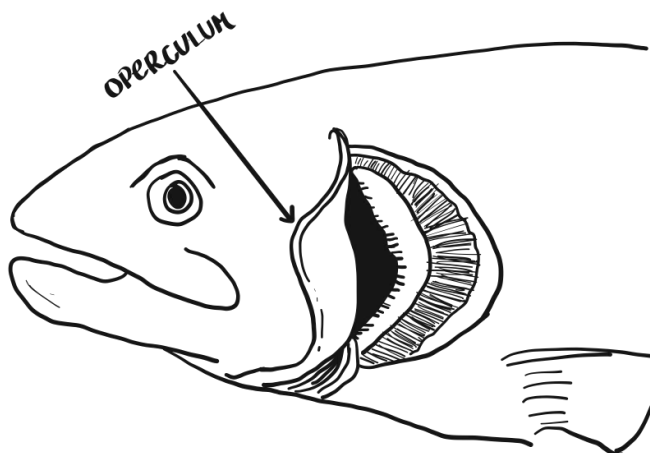


Bony fishes are the most common and numerous fishes on Earth-- there are over 29,000 species of bony fishes found on the planet! We can classify bony fishes even further based on the characteristics of their fins: bony fishes are either **ray-finned** or **lobe-finned** (with fleshy fins). Fishes with fleshier fins are prehistoric. Only eight species from this group exist today. Coelacanths, prehistoric lobe-finned fish, were once considered extinct until rediscovered by accident in 1938.

Bony fishes have a bony skeleton, two pelvic and pectoral fins, and one dorsal, anal, and caudal fin. These fishes use a **swim bladder**, a gas-filled chamber, to control how high or low they are in the water. The swim bladder can be inflated when the fish swallows air from the surface, or for some fishes, by gas going from the bloodstream into the bladder.



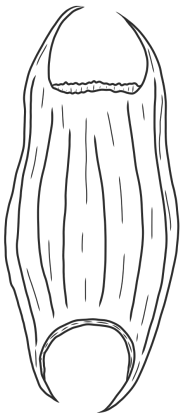
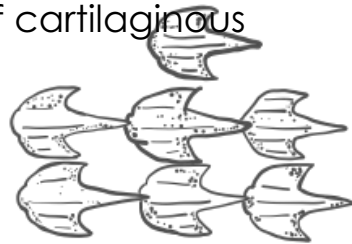
They also have a bony-plated gill covering called the **operculum**. These bony plates protect the delicate gills and help the fish to breathe when motionless or hovering by acting as a pump.



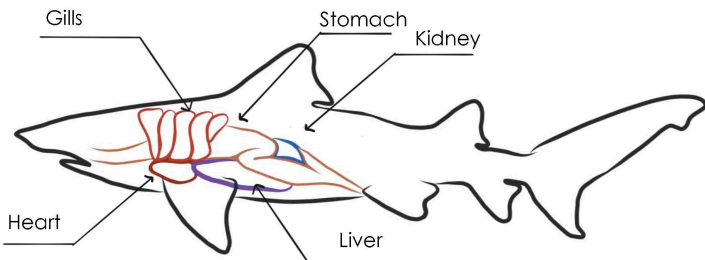
Cartilaginous fishes: Chondrichthyes

The class Chondrichthyes is made up of two subclasses: chimaeras and sharks, skates, and rays.

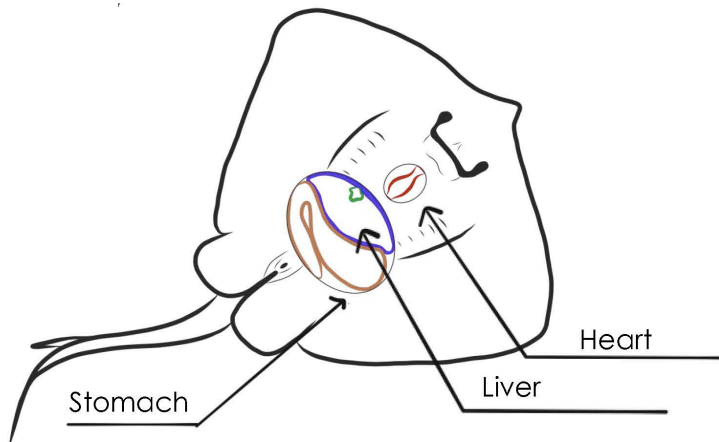
Cartilaginous fishes have **gills** that are located just inside of narrow openings, or gill slits. The number of gill slits depends on the species. In addition to gill slits, some cartilaginous fishes breathe through the use of spiracles. These openings are on top of the body, directly behind the eyes. **Spiracles** act as water pumps. They draw water through the top of the animal, pushing water across the gills and out the gill slits underneath. Spiracles help bottom-dwelling sharks and rays avoid sucking in sand as they breathe. Another characteristic of cartilaginous fishes is that they have **dermal denticles**.



Some cartilaginous fishes lay eggs, while others give birth to live young. All rays and many shark species give birth to live young, which develop within the mother. Skates and some shark species lay eggs. Empty skate egg cases, which are called **mermaid's purses**, are sometimes found washed up on the beach.

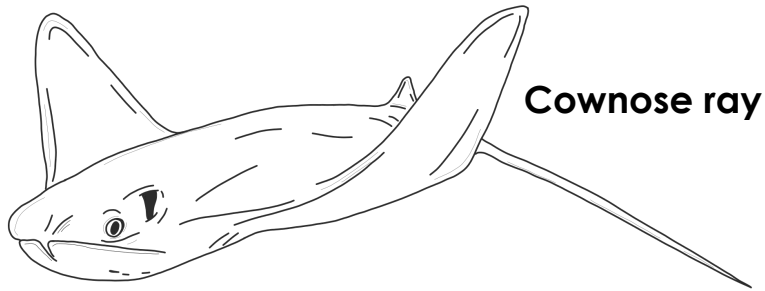


Cartilaginous fishes do not have a **swim bladder** to help control their buoyancy. Instead, these animals have a very **oily liver**.

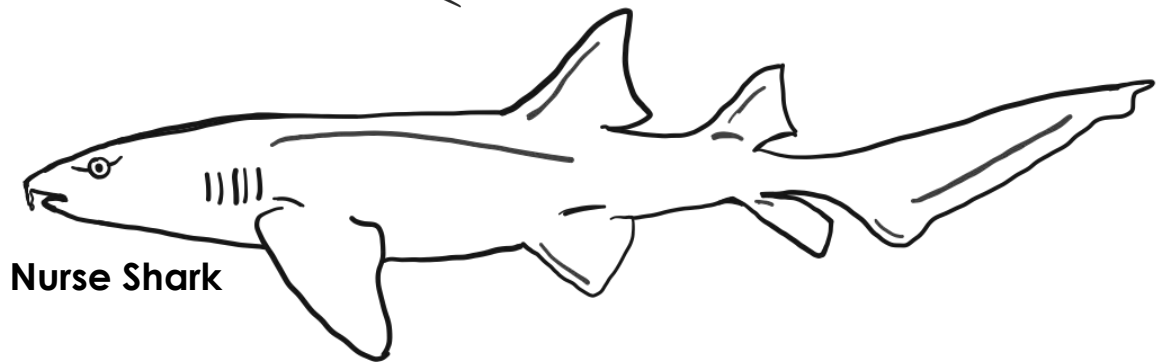


The liver of a cartilaginous fish takes up a lot of space within its body. The liver aids in food digestion, filtering waste, and the storage of fat deposits to provide energy. The liver produces an oil called **squalene** which is lighter or less dense than water. The larger the liver, the more oil is produced. Without a buoyant, oil-filled liver, cartilaginous fishes would use up a lot of energy while trying to swim.

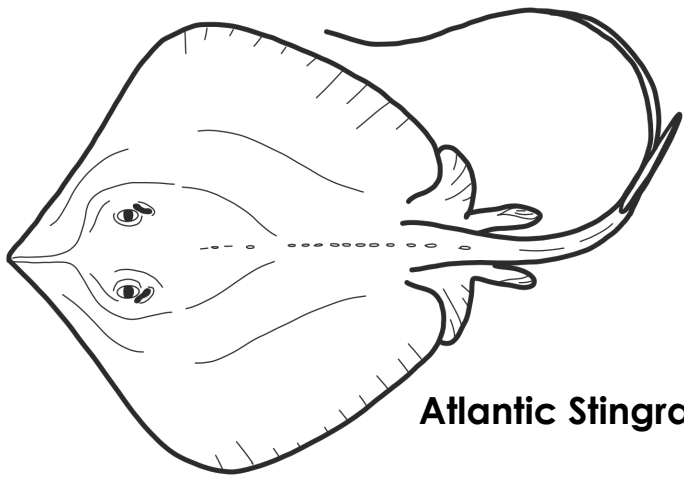
At **Florida Oceanographic Society**, we have 4 species of cartilaginous fishes: nurse sharks, cownose stingrays, southern stingrays, and atlantic stingrays.



Cownose ray



Nurse Shark



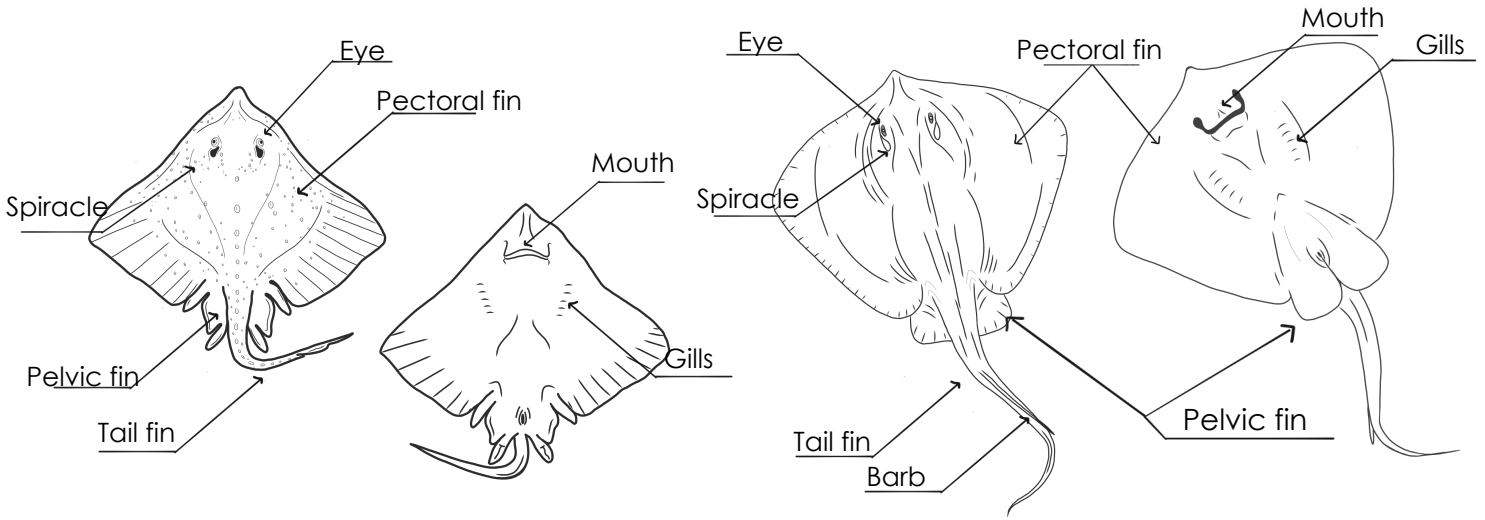
Atlantic Stingray



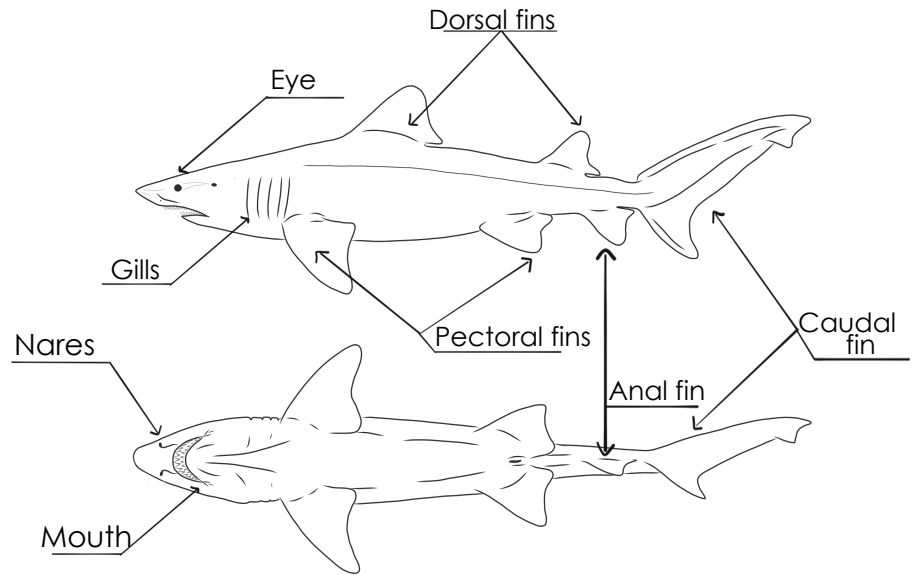
Southern Stingray

Anatomy

The body structure, or anatomy, of cartilaginous fishes, is not all that different from bony fishes. Important structures to know are the mouth, eyes, gills, spiracles, barbs, and nares. Look at these **fins**: pectoral, caudal, and dorsal



Rays and skates have a flattened body that connects directly to their pectoral fins. Depending on the species, rays have different ways of swimming. Some rays flap their pectoral fins similar to a flying bird, and others ripple them.

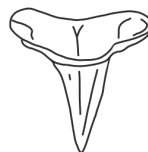
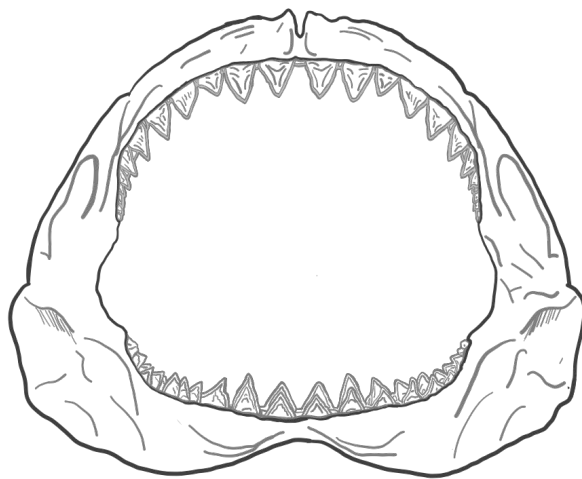
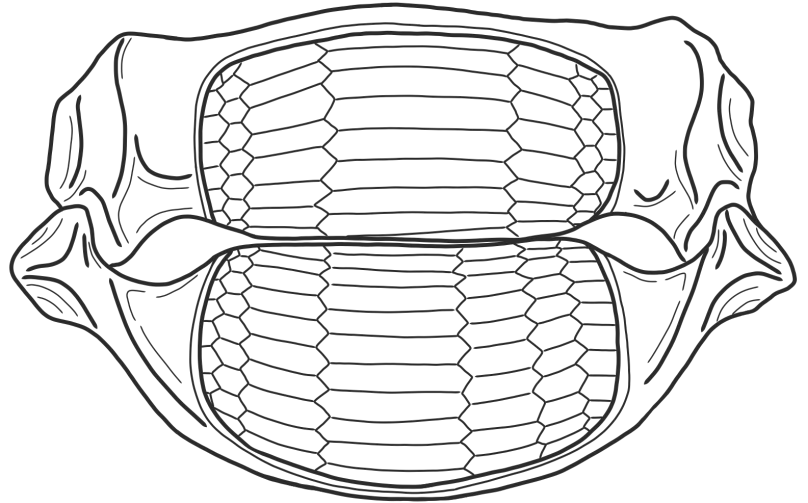


Sharks use the caudal fin to propel, or push, through the water. Different shark species have different caudal fin shapes. The dorsal fin helps balance sharks while they swim, and pectoral fins are used as rudders to help with steering.

Diet

Humans only have 32 teeth, and we only replace most of them once (our baby teeth), but cartilaginous fishes can have over 30,000 in their lifetime! As the teeth of these fishes wear down or fall out over time, a tooth from behind moves forward to take its place- just like a conveyor belt, continually rotating through teeth.

Many species have flat plate-like teeth to help them capture, crush, and ingest hard prey such as mollusks and crustaceans. Species that feed upon larger prey such as fishes, marine mammals, marine reptiles, and other sharks have teeth that are very pointed and serrated. The bottom jaw of these species hold food and the teeth along the top jaw cut the food.



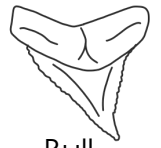
Lemon



White



Bigeye
sixgill



Bull



Nurse



Whale



Sand Tiger



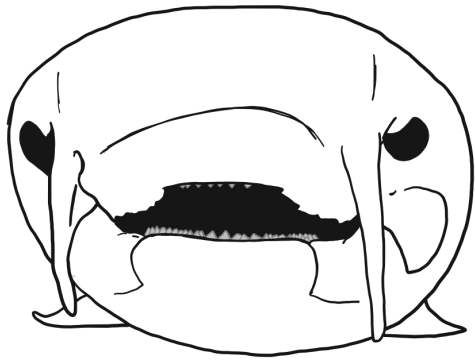
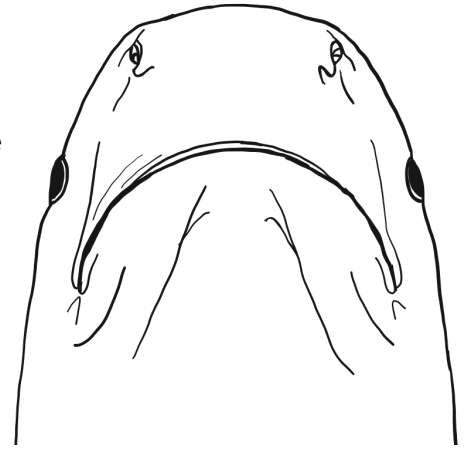
Great
Hammerhead

When it comes to feeding, sharks serve an essential purpose in the wild. Many shark species feed on sick, old, and injured prey because these animals are easier to catch. In turn, this helps to control growing populations and slow the spread of disease and infection among prey species.



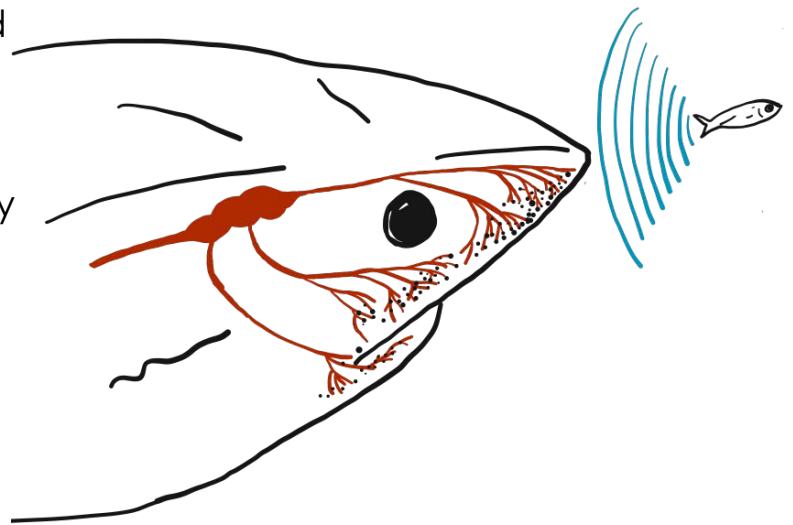
Sensory

The **nares**, nostril holes of sharks, rays, and skates, are found under the snout. There are two nares; each one has two openings - one for water to flow in, and the other for water to flow out. This process lets the shark **smell** as it swims through the water. These animals use their powerful sense of smell to figure out where to find their prey. They can smell food from hundreds of feet away, even at night or in murky water!

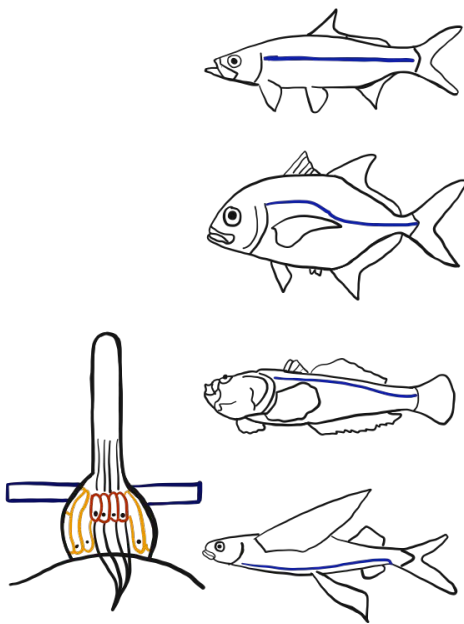
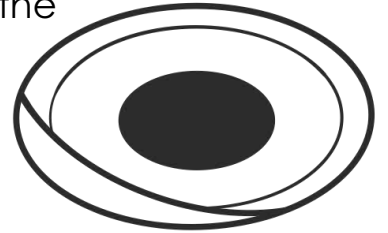


One way that some cartilaginous fishes interact with the world around them is through their **beard** or **barbels**. Fishes with barbels use these fleshy extensions to **feel** and **“taste”** around on the seafloor, which helps them find prey that is buried beneath the sand.

Cartilaginous fishes possess a superpower—they can **sense** changes in electric and magnetic fields around them. Animals make tiny amounts of electricity by swimming and using their muscles. Cartilaginous fishes have thousands of tiny electricity-sensing organs, called **ampullae of Lorenzini**, on their head and face. To the human eye, they resemble clusters of small, dark spots or pores. The ability to sense electric fields allows cartilaginous fishes to find food at night and in murky water.

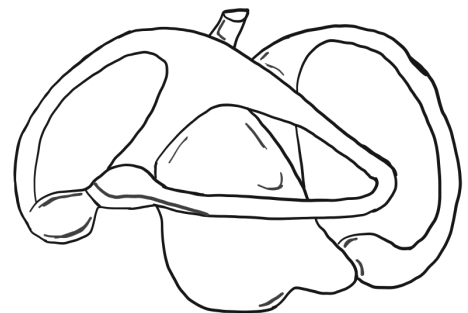


Cartilaginous fishes use their **eyes** to help **see** any threats or prey within their habitat. Sharks are only able to see through the water for a distance of about 15 meters (50 feet). Some species of shark have a third eyelid called a **nictitating membrane**, which helps to protect the eye during feeding. Sharks that do not have this specialized eyelid roll their eyes back into their head while feeding to ensure they are not damaged, which leaves just the whites of their eyes showing.



Another sensory organ found in cartilaginous and bony fishes, the **lateral line**, is used to detect **vibrations and pressure changes**. The lateral line runs the length of the body of the fish and is composed of many small pores that water can flow through. By sensing tiny pressure changes and vibrations around its body, a fish can create a map of its environment. A lateral line is helpful when navigating through reefs or around schools of fish.

Sharks also have an **inner ear** that looks like a small hole on each side of their head. Sound travels farther and faster underwater, so this sense is especially helpful when searching for prey. They can detect prey from more than two football fields away using their incredible sense of hearing!

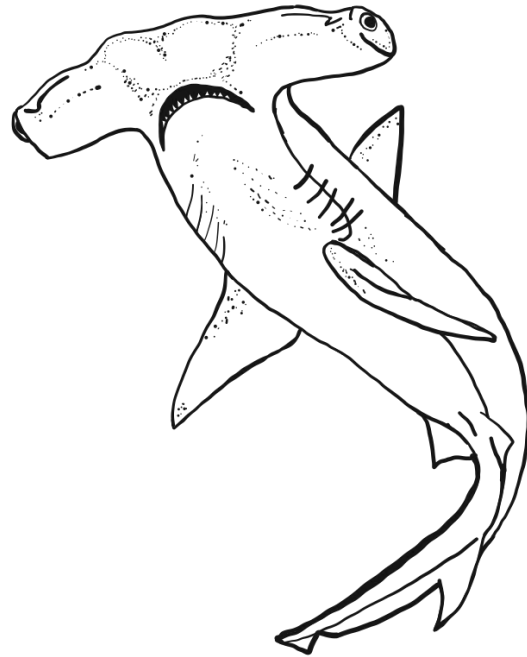


Orders (groupings) of Sharks

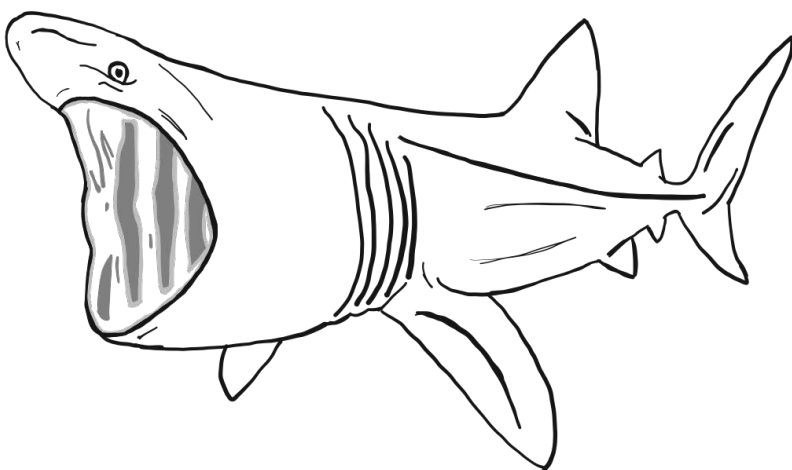
Sharks and rays are classified based upon their shared characteristics. There are over 470 known species of sharks, but not all are still alive. Some extinct shark species are only known from the fossil record.

Carcharhinids, or **ground sharks**, contain some of the most commonly seen species of sharks in our region. This group includes tiger sharks, bull sharks, blacktip sharks, and hammerhead sharks, which are all closely related.

A **hammerhead's** distinct head shape helps it sense prey hidden under the sand. The extensions that make the "hammer" head act as a sweeping detector that can pick up the electrical field of buried prey. The broad head may also serve as a rudder to help the shark change direction and depth very quickly.



Mackerel sharks contain many well-known sharks like white sharks, goblin sharks, thresher sharks, and mako sharks. Many sharks in this group are built for speed!



Although seemingly different from other members of the mackerel shark group, **basking sharks** share the same characteristics as their close cousins, including an enormous jaw. These filter-feeding sharks are the second-largest fish in the world, growing to 40 feet in length. Like the whale shark, basking sharks swim with their mouth open to filter large amounts of plankton out of the water.

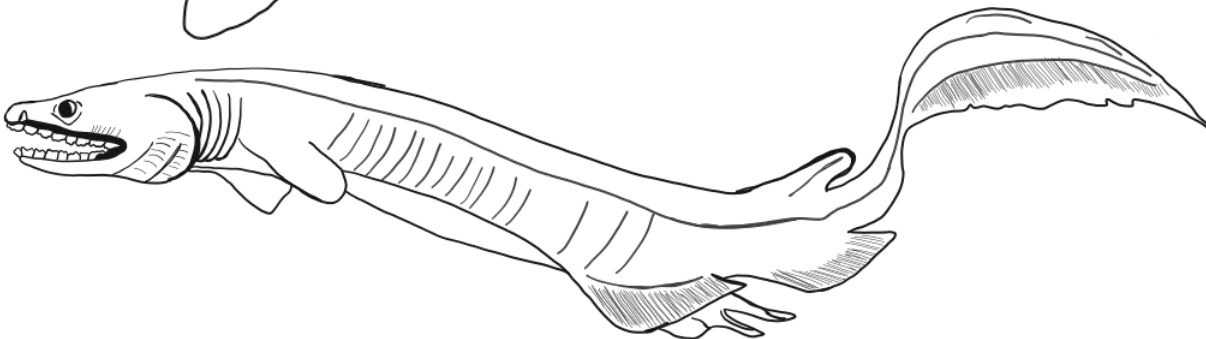
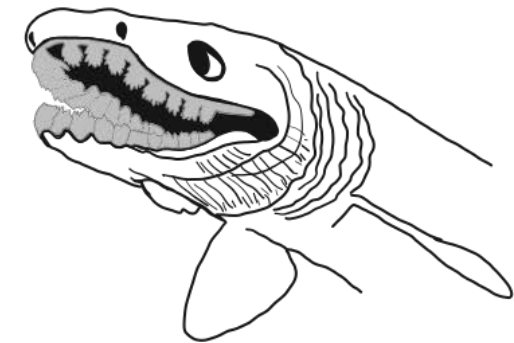
Nurse sharks, zebra sharks, wobbegong, and the enormous whale shark - the largest fish on earth - are all grouped as **carpet sharks**.

Wobbegongs sit still on the ocean floor and wait for an unsuspected meal to swim too close. Their coloration and the many fleshy lobes around their face break up their body shape, providing great camouflage from prey. Wobbegongs create a strong vacuum as they open their mouths, slurping prey animals directly into their stomachs.



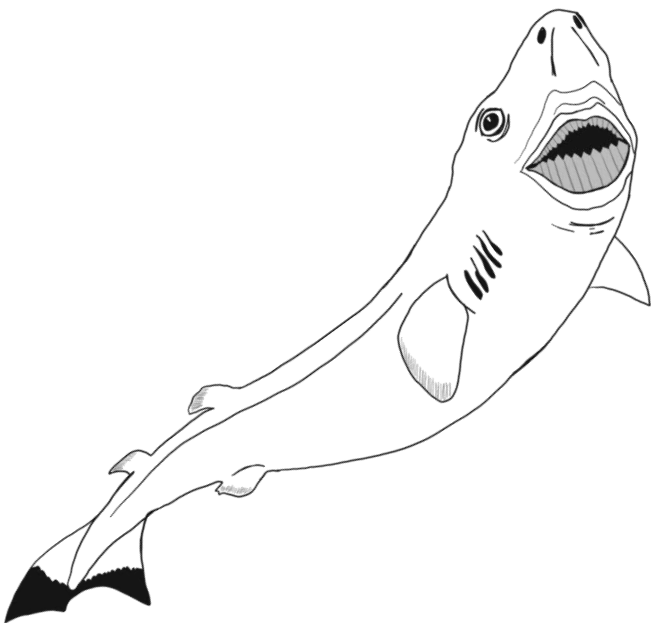
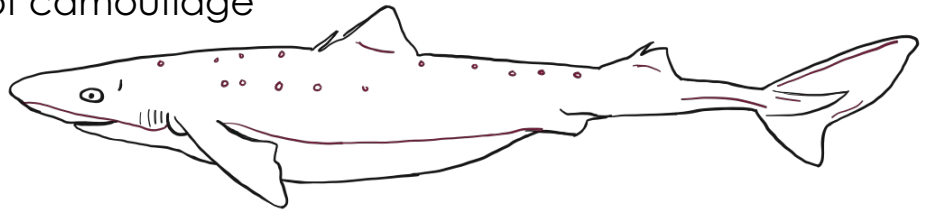
Members of one shark group - the **sixgilled sharks** - have more than five gill slits on each side of their head. These primitive, deep-sea sharks have six or sometimes seven gill slits on each side.

Frilled sharks, members of the sixgilled shark group, look like something from a sea monster legend. Their long body grows up to seven feet in length. To swim, they slither in the water like a snake. Their name comes from the frilly appearance of their gill slits.



Dogfish sharks and rough sharks have spines on their dorsal fins that help to protect them from predators. Some of these sharks even produce their light, called **bioluminescence**!

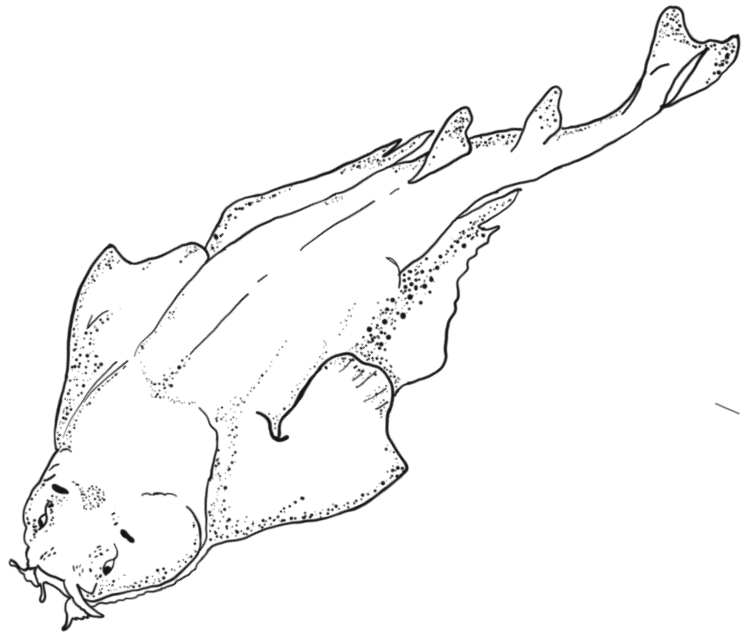
Spiny dogfish can reach sizes of up to four feet. Scientists have seen them hunting in shivers (the name given to a group of sharks). They have venomous spines in front of their dorsal fins to help protect them against predators. These sharks live up to 40 years! Many species of dogfish also use **bioluminescence** as a form of camouflage in the ocean's dark depths.



Another shark in this group is the elusive **cookiecutter shark**. This shark is considered a parasite, since it bites perfectly round chunks of flesh from much larger animals like dolphins, tuna, and even other sharks. The cookiecutter shark is a small shark, growing to no more than 20 inches in length. This shark has a weird trait that the dentist or tooth fairy wouldn't be very happy to hear about. Cookiecutter sharks swallow any teeth they lose, maybe because they live in a nutrient-poor deep-sea environment. Talk about recycling!

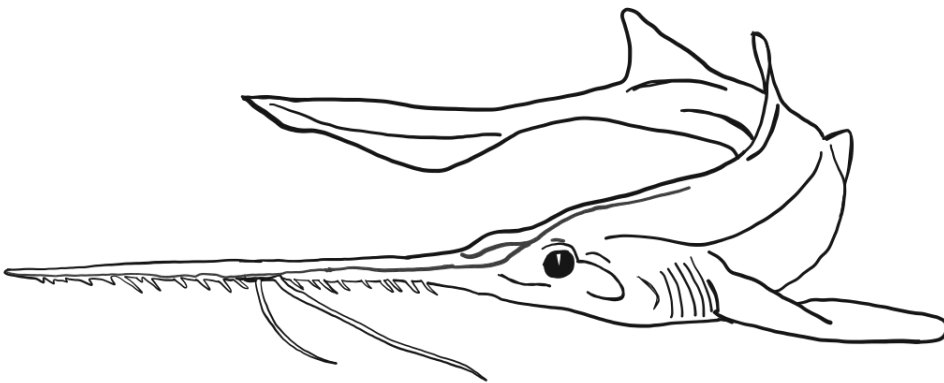
Angel sharks may resemble rays and skates, or even wobbegongs, but are classified separately.

Atlantic **angel sharks**, or sand devils, live in deeper waters around Florida and use the ocean bottom as their buffet. They give birth to up to 16 pups in a litter.



Sawsharks are easily confused with sawfish.

You can identify a **sawshark** by the two barbels underneath its long saw-like nose, or rostrum. These barbels, which look a bit like a mustache, are used to find buried prey. Unlike sawfish, sawsharks can replace the teeth on their saws. Mothers will give birth to up to 17 pups. At birth, the pups' teeth are folded back along the rostrum to avoid injuring the mother.



Horn sharks and bullhead sharks make our final group. Their Latin name, “heterodont-,” translates to “different teeth.”

Port Jackson sharks not only regularly replace their teeth like all sharks, but as they mature, their teeth change shape. As pups and young sharks, they primarily dig up small fishes, shrimp, and small crabs. As they grow to become adults, their diet transitions to include more giant crabs, sea urchins, snails, and clams. The sharp, spiky teeth they have when younger cannot break through the hard shells of these crunchy creatures. As Port Jackson sharks get older, their back teeth flatten to act like crushing molars.



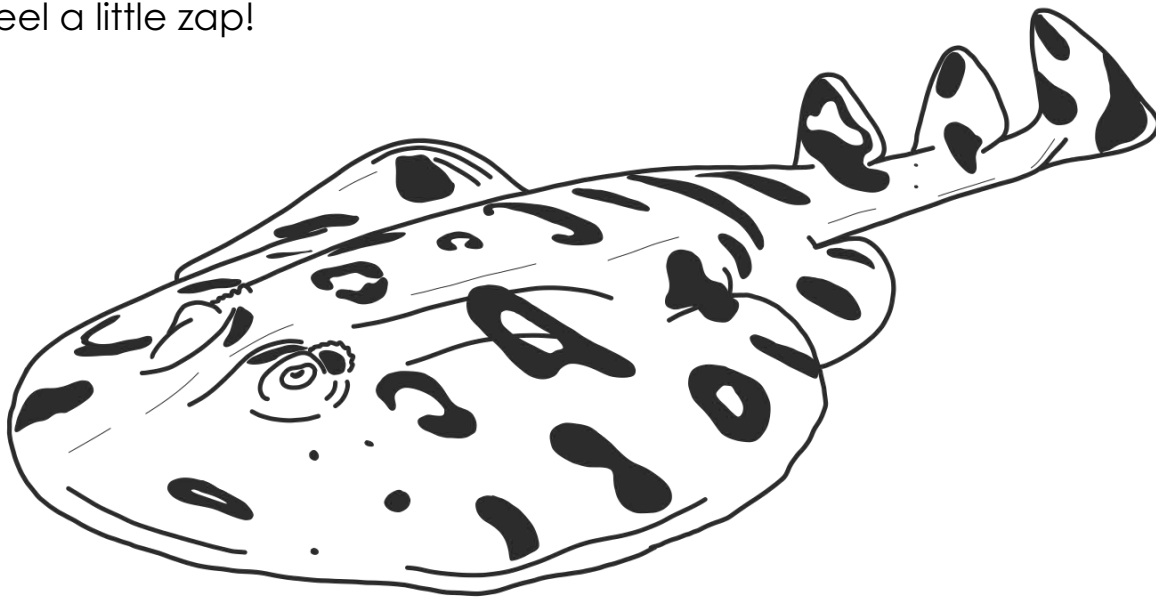
Orders (groupings) of Skates and Rays

Skates and rays belong to the superorder Batoidea, which include rays, skates, and sawfish. There are over 630 species of skates and rays.

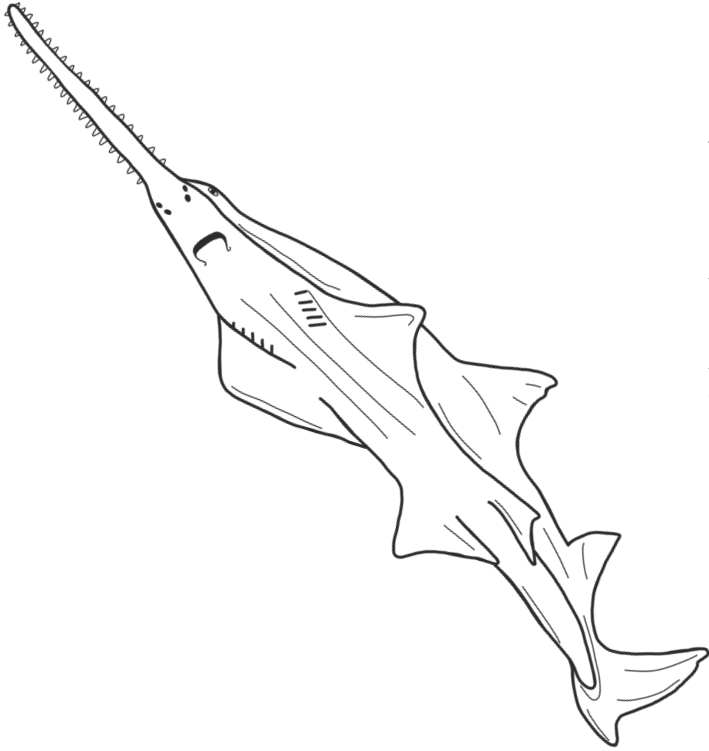
Skates and rays are related to sharks, but there are some important differences to remember. Skates and rays have flattened bodies, like underwater pancakes! Gill slits are found underneath their bodies, instead of on the sides like sharks. They are commonly found resting on or moving along the seafloor, and have large spiracles on the top of their heads, usually behind the eyes. Fins are modified; anal fins are absent, and most dorsal and caudal fins are gone or significantly reduced. Pectoral and pelvic fins are enlarged, and connect directly to the head, often creating a circular body shape.

Some rays, called **torpedo rays**, are very round and use electricity to capture their food and defend against predators. They have specialized bean-shaped organs that produce electricity. This group of rays lives in temperate and tropical oceans and estuaries.

Lesser electric rays can produce up to 37 volts of electricity. These rays are common in seagrass beds and shallow seas along the North and South American Atlantic coastline. If you step on one by accident, you'll feel a little zap!



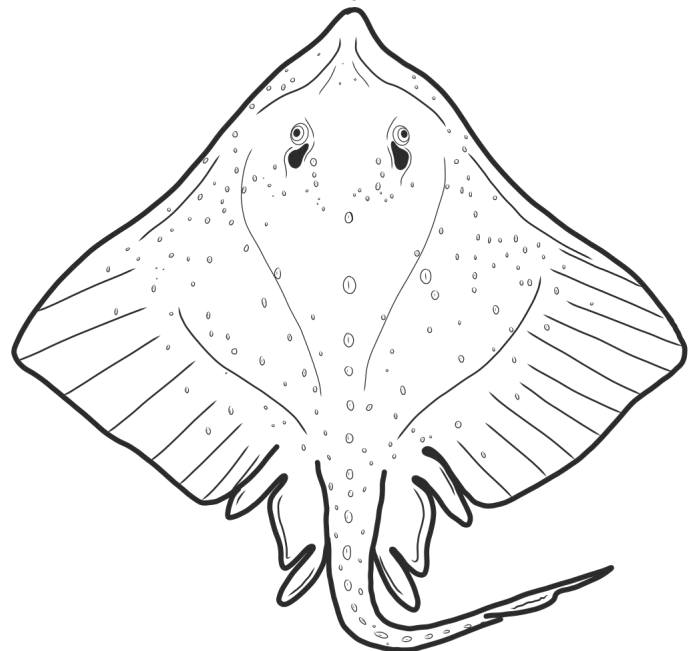
Sawfishes and sawsharks look very similar to each other. However, there are some pretty significant differences between the groups. Sawfish have a rostrum with deeply embedded teeth, but they do not have barbels. Their shape is similar to sharks, but their body is slightly more flattened, and their gills are on their underside. Sawfish have two dorsal fins and one caudal fin.



Smalltooth sawfish may have the word “small” in their name, but they grow to lengths of up to 18 feet! Unlike sawsharks, sawfish are not able to replace lost “teeth” on their rostrum, or saw. The spikes on a sawfish’s rostrum aren’t even true teeth—they are highly modified dermal denticles or scales. These animals are endangered and mysterious.

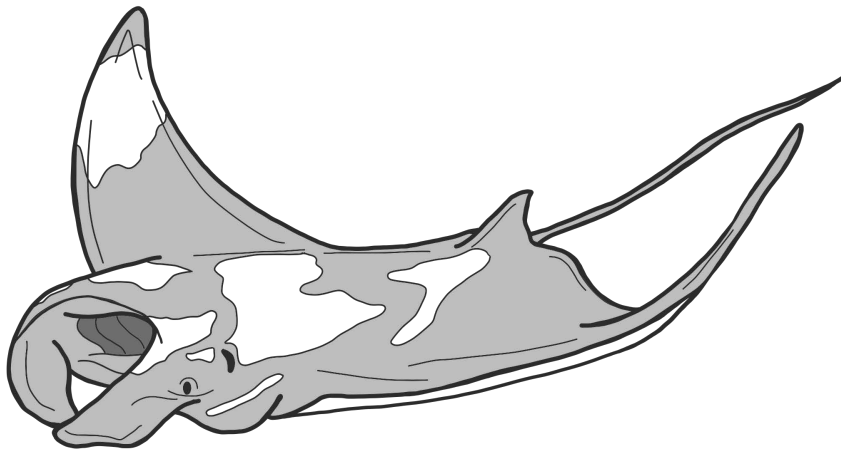
Skates belong to a different order than rays. Scientists have identified over 200 skate species, most of which live in colder waters. There are several important differences between skates and rays. The nose of a skate comes to a point, and their body is often shaped like a diamond. Unlike rays, skates lay eggs. They have a long tail and large dermal denticles on the body, but lack a venomous defensive barb on their tail.

Clearnose skates have clear areas on either side of their snout. Florida beachcombers often find clearnose skate egg cases, called “mermaid’s purses,” washed up on the beach. These skates migrate between shallow inshore water and deeper offshore waters, depending on the season and water temperatures.



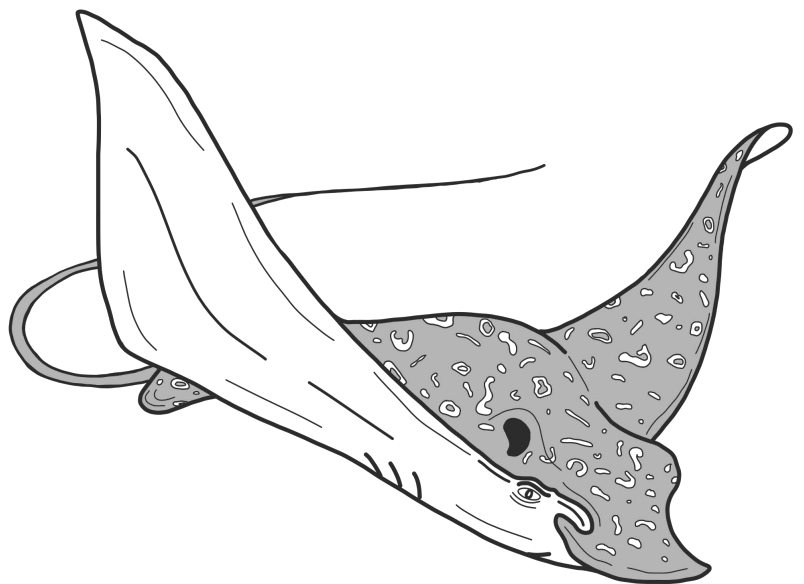
When you think of a “typical” ray, the **stingray** group might be what pops into your head. These sometimes huge animals have a diamond, oval or triangular shape. Most stingrays have a defensive barb on their long, slender tails—a great tool to help deter predators. This group is found in marine and coastal waters in temperate to tropical zones around the globe. Some species even live in fresh water!

Many of the **benthic** (bottom-dwelling) species in this order have round or diamond-shaped bodies. However, species that spend more time swimming through the water have enlarged, wing-like pectoral fins. These triangular fins allow for more lift and better propulsion through the water, as most open-water rays migrate long distances throughout their range. Some of these migrations are traveled in masses, several thousand strong. Mass migrations of rays are called “**fevers**.”



Manta ray wingspans can reach more than 25 feet in width, making them the largest rays in the world. These gentle giants filter feed on plankton, doing spirals and backflips through the water as they vacuum up their tiny prey. Cephalic lobes, a set of flaps that extend just in front of the mouth, help to funnel water into their open mouths while filter feeding.

Spotted eagle rays are often observed jumping out of the water. Scientists believe these leaps might be used by females to avoid males, for predator evasion, or to shake off parasites. The spotted eagle ray’s nose folds into a point, but opens to form a “shovel” during feeding, allowing these rays to dig through sand to find prey. Spotted eagle rays are also a type of stingray, meaning they are equipped with sharp defensive spikes known as barbs. They can grow as many as seven barbs at the base of their tail!



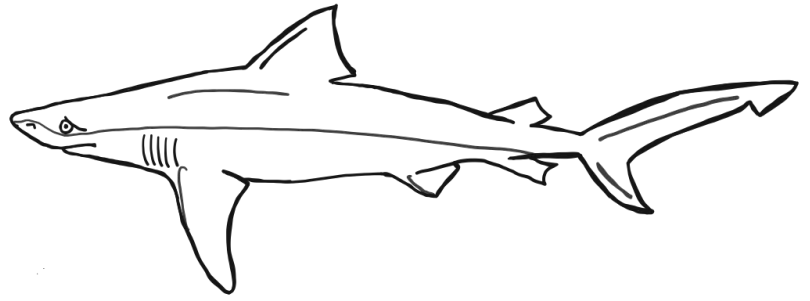
Species of Cartilaginous Fishes Found Within the Indian River Lagoon Estuary

The Indian River Lagoon Estuary is a very important body of water in our part of Florida. This shallow coastal lagoon is home to more than 4,000 different plant and animal species. Estuaries, like the Indian River Lagoon, are places where salt water and fresh water mix together, forming brackish water. Of the 4,000 total species found in the Indian River Lagoon, 23 are cartilaginous fishes.

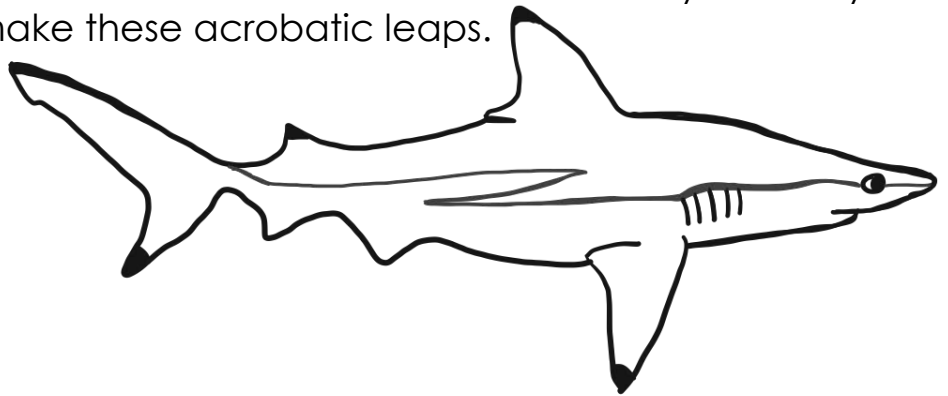
Below is a chart showing the shark and ray species found in the Indian River Lagoon and descriptions of a few of the more common species that live in the estuary.

Order	Genus/Species	Common Name
Carcharhiniformes	<i>Carcharhinus leucas</i>	Bull shark
Carcharhiniformes	<i>Carcharhinus limbatus</i>	Blacktip shark
Carcharhiniformes	<i>Carcharhinus plumbeus</i>	Sandbar shark
Carcharhiniformes	<i>Galeocerdo cuvieri</i>	Tiger shark
Carcharhiniformes	<i>Mustelus canis</i>	Smooth Dogfish
Carcharhiniformes	<i>Negaprion brevirostris</i>	Lemon shark
Carcharhiniformes	<i>Sphyrna lewini</i>	Scalloped Hammerhead
Carcharhiniformes	<i>Sphyrna mokarran</i>	Great Hammerhead
Carcharhiniformes	<i>Sphyrna tiburo</i>	Bonnethead
Orectobiformes	<i>Ginglystoma cirratum</i>	Nurse shark
Rajiformes	<i>Dasyatis Americana</i>	Southern stingray
Rajiformes	<i>Dasyatis Sabina</i>	Atlantic stingray
Rajiformes	<i>Dasyatis sayi</i>	Bluntnose stingray
Rajiformes	<i>Gymnura micura</i>	Smooth Butterfly ray
Rajiformes	<i>Manta birostris</i>	Atlantic Manta ray
Rajiformes	<i>Aetobatus narinari</i>	Spotted Eagle ray
Rajiformes	<i>Myliobatis freminvillei</i>	Bullnose ray
Rajiformes	<i>Myliobatis goodei</i>	Southern Eagle ray
Rajiformes	<i>Rhinoptera bonasus</i>	Cownose ray
Rajiformes	<i>Pristis pectinata</i>	Smalltooth sawfish
Rajiformes	<i>Rhinobatos lentiginosus</i>	Atlantic Guitarfish
Rajiformes	<i>Narcine brasiliensis</i>	Lesser Electric ray

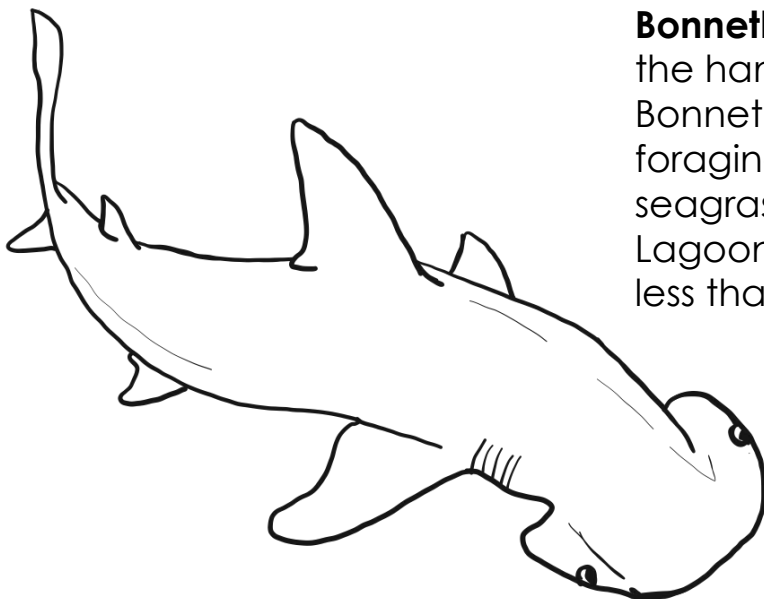
Bull sharks are one of the most common shark species found in the Indian River Lagoon. This species spends a lot of time in brackish and even fresh water. They eat a variety of prey items including bony fishes, small sharks, birds and sea turtles.



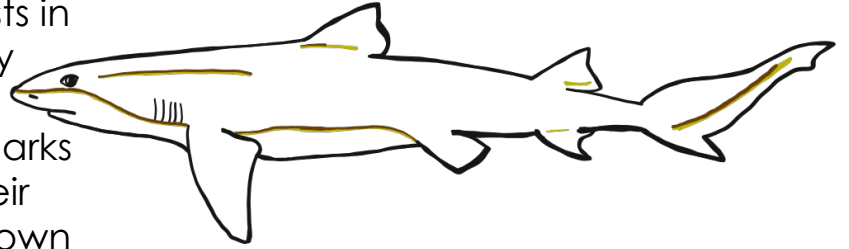
Blacktip sharks are not to be confused with blacktip reef sharks, which are a completely different species found in the Pacific Ocean. This species migrates in groups that are often separated by gender. During the winter, thousands of blacktip sharks gather right off the beach in southeast Florida. This species eats a variety of fishes and invertebrates, including many bony fishes, cephalopods, and stingrays. Blacktip sharks get their name because the tips of every fin except for the anal fin are black. The anal fin is white. Blacktip sharks are sometimes misidentified as spinner sharks because both species share a unique behavior—they jump high out of the water and spin around multiple times before splashing back to the water's surface. Scientists aren't totally sure why blacktip and spinner sharks make these acrobatic leaps.



Bonnethead sharks are tiny members of the hammerhead shark family. Bonnetheads spend much of their time foraging for crabs and shrimp on seagrass beds in the Indian River Lagoon. Most adult bonnetheads are less than 4 feet long.

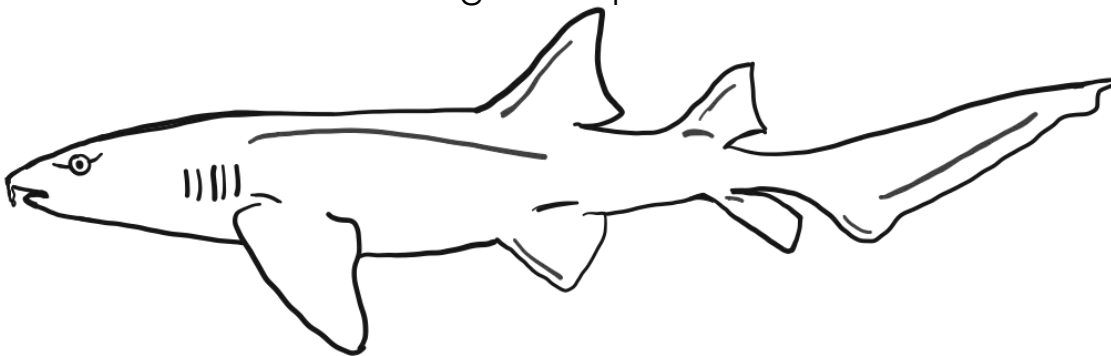


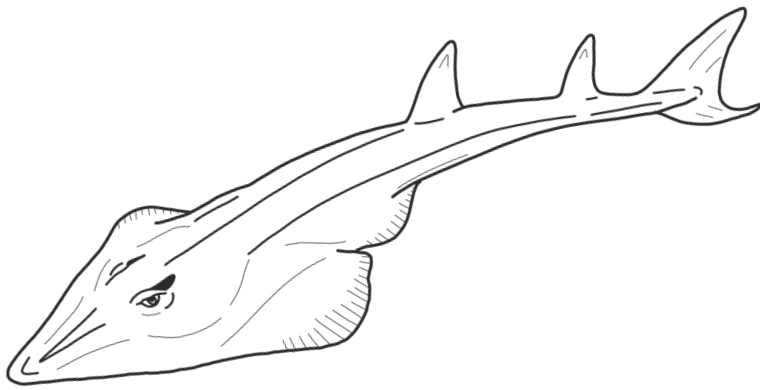
Lemon sharks are sometimes seen swimming across seagrass beds and along the edges of mangrove forests in the Indian River Lagoon, where they feed on a variety of small fishes, crustaceans, and mollusks. These sharks get their name from the color of their skin. They appear to be a yellow-brown color, which helps them blend in with the sandy bottom.



Bull, black tip, bonnethead, and lemon sharks are all in the Order **Carcharhiniformes** which includes hammerheads.

Nurse sharks are in the Order **Orectolobiformes**, along with wobbegongs and zebra sharks from the Pacific Ocean. Another name for this group of sharks is carpet sharks. This name is fitting for them because they spend most of their time resting on the bottom of the sea floor. Nurse sharks have barbels on the front of their face, which are used to help find prey. They are nocturnal, meaning that they do most of their hunting at night. Nurse sharks are suction feeders. This means that they use their mouth to slurp up food. They have such strong suction that they can vacuum a queen conch right out of its shell! You can see nurse sharks in the Gamefish Lagoon Aquarium at the Coastal Center.

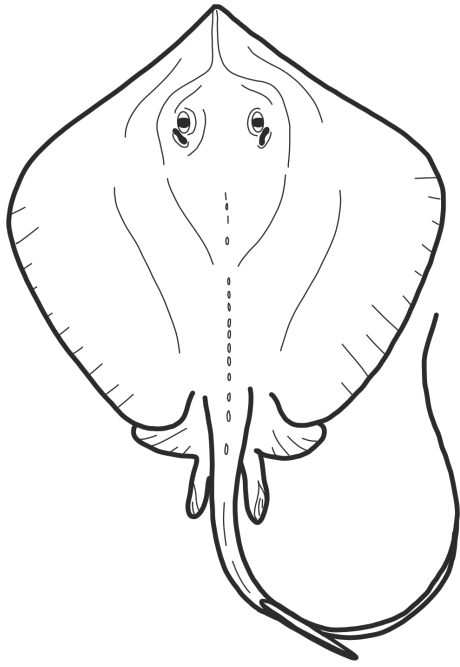




At first glance, this fish looks a lot like a shark, but it's actually a shark cousin, belonging to the order **Rajiformes**, which includes rays, sawfish, and skates. You can easily see how this **Atlantic Guitarfish** gets its name. They have a pointed anterior end, a flat, disc shaped body, and a tapered, whip-like tail – giving them the appearance of a guitar.. These are bottom dwellers, which can be found submerged in sandy or muddy bottoms of the estuary and sometimes even in freshwater habitats.

A defining feature of the **Cownose Ray** is the indented area at the anterior end of the body, which looks a little bit like a cow's nose. The color of the dorsal surface of this species varies from brown to grey coloration. On the ventral surface, these rays are white or off-white in color. This type of color pattern—where the dorsal surface is dark and the ventral surface is light—is called **countershading**. Countershading is a type of camouflage that allows a fish to blend in with the water or sea floor when viewed from above, and with the sky when viewed from below. Many **pelagic** (living in the open ocean) sharks use countershading. Because cownose rays are pelagic, and spend much of their time swimming near the water's surface, countershading makes them less visible to predators. Cownose rays are a highly migratory species, forming huge **levers** as they travel. You can meet and feed cownose rays at the Coastal Center.





Atlantic Stingrays are a smaller ray species, only growing to be between 1 to 2 feet across. Although they prefer shallow coastal and estuarine waters, and are primarily a **benthic** (bottom dwelling) species, Atlantic stingrays also have countershading. Dorsally, they are brown in color. Ventrally, they are white or grey. Along the dorsal surface of females there are rough, bumpy scales called **tubercles**. Atlantic stingrays, which can be seen at the Coastal Center, are the most abundant ray in the Indian River Lagoon.

The largest bottom-dwelling ray that you'll see in the Indian River Lagoon is the **Southern Stingray**. The tail of this much larger ray can be up to two times the length of its body! In total, they can reach 6.5 feet in length. This species is also a bottom dweller that has tubercles on its back. They prefer to live by themselves, rather than traveling in groups. They also have countershading, with a dark grey dorsal surface and a white ventral surface. Like most ray species, southern stingrays use their powerful jaws to crunch up mollusks and crustaceans for dinner. Be sure to look for southern stingrays during your next Coastal Center visit.



Shark Math

Solve each math problem below, then use the key to help you color this Wobbegong shark.



KEY

5 = Orange

12 = Black

8 = Green

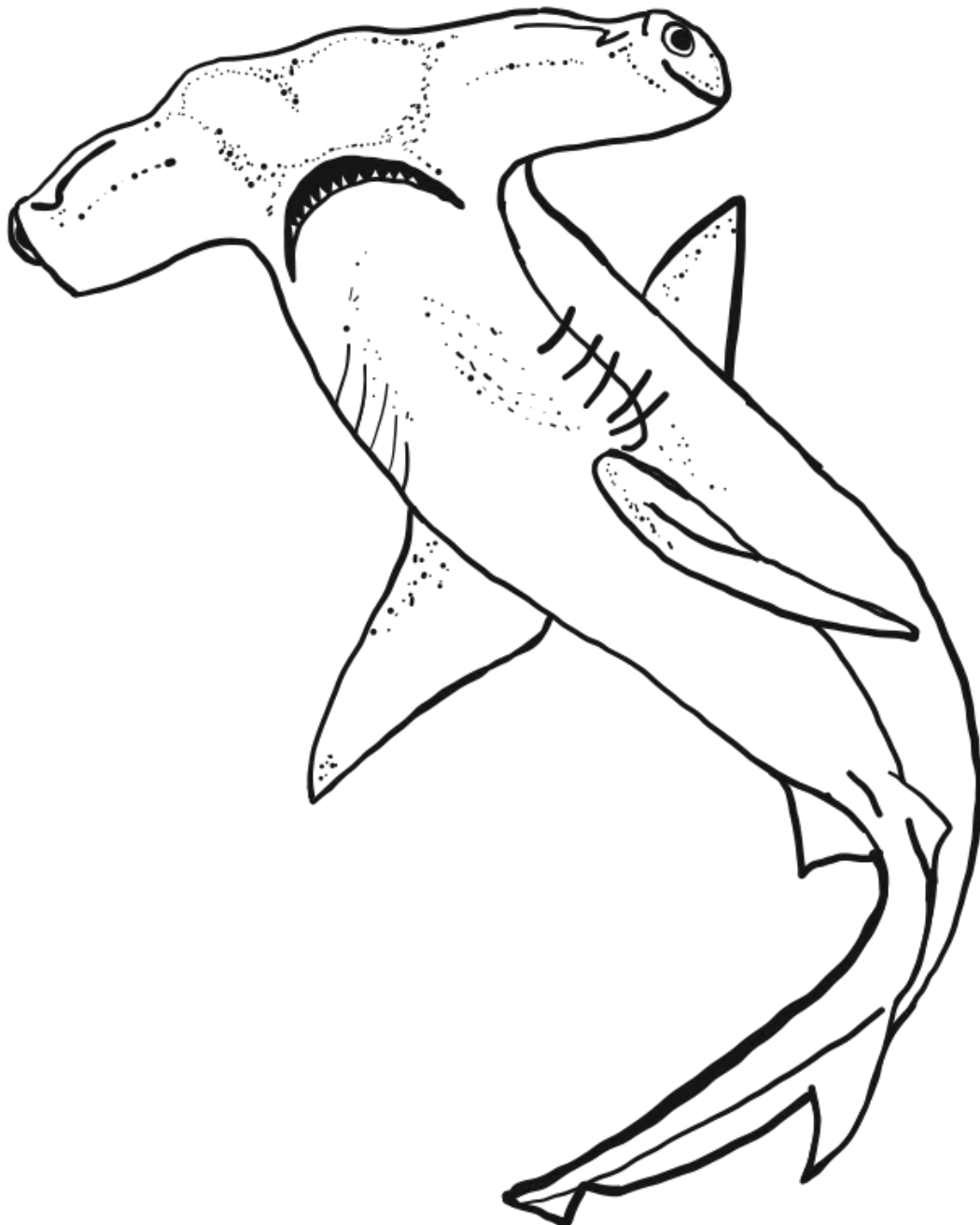
3 = Red

Decode the Shark Fact

Decode the shark fact below by using this key.

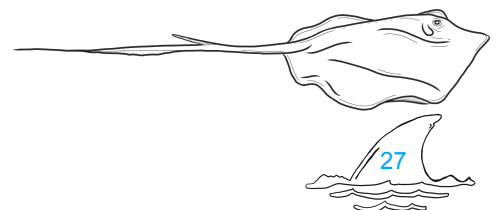
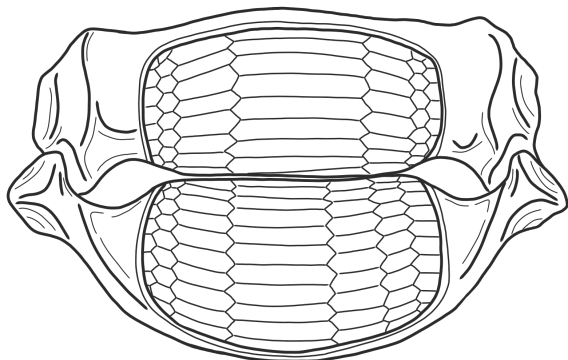
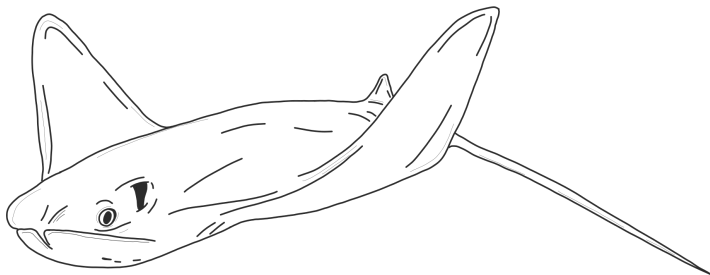
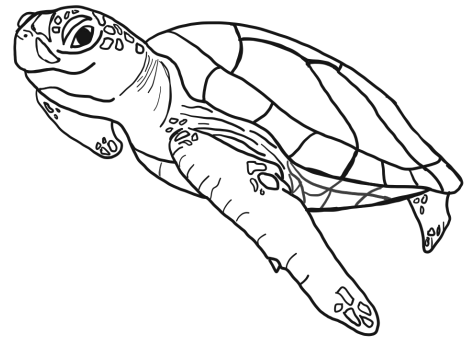
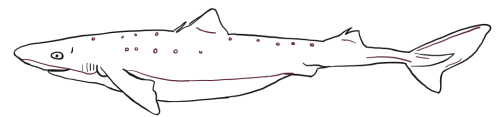
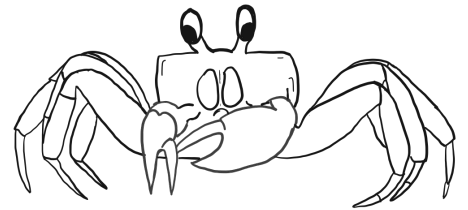
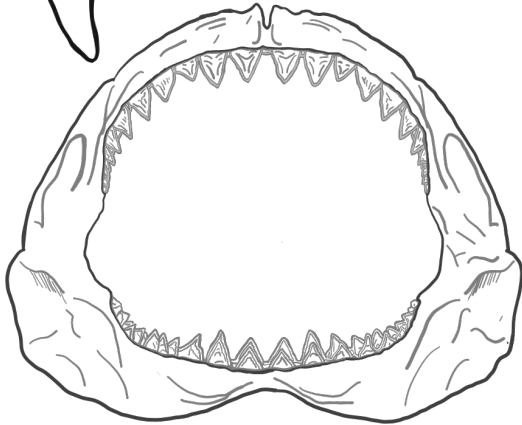
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
20	10	11	9	5	16	3	26	12	23	19	14	4	22	18	21	24	15	6	2	7	16	8	13	17	25

26 20 4 4 5 15 26 5 20 9 6 26 20 15 19 6 7 6 5 2 26 5 12 15
 26 5 20 9 2 18 21 12 22 6 2 12 22 3 15 20 17 6 2 18 2 26 5 6 5 20
 16 14 18 18 15



Dinner is Served!

Sharks and rays have different diets. Draw a line from the shark on the left to any possible shark prey items on the right. Do the same for the ray on the left. Drawings of shark teeth (sharp for cutting) and ray teeth (flat for crushing) should give you some clues!



Shark and Ray Word Match

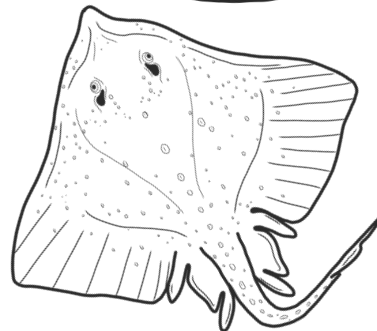
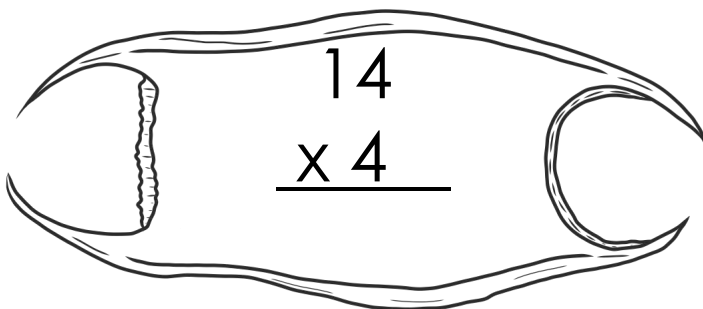
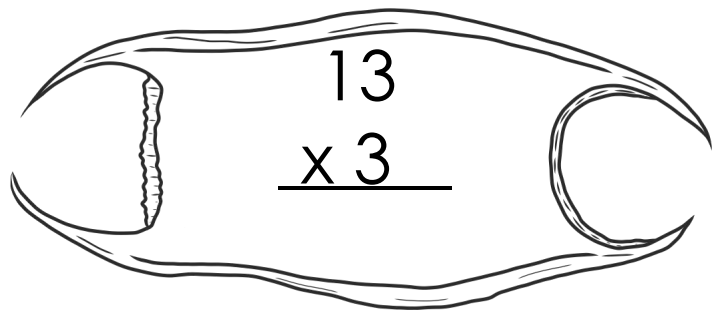
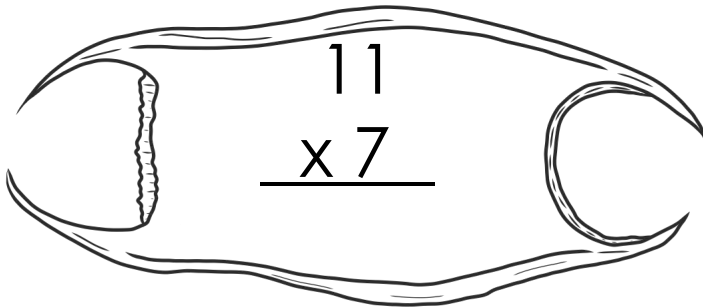
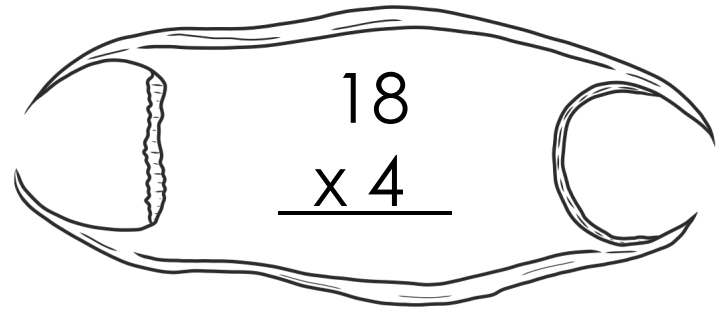
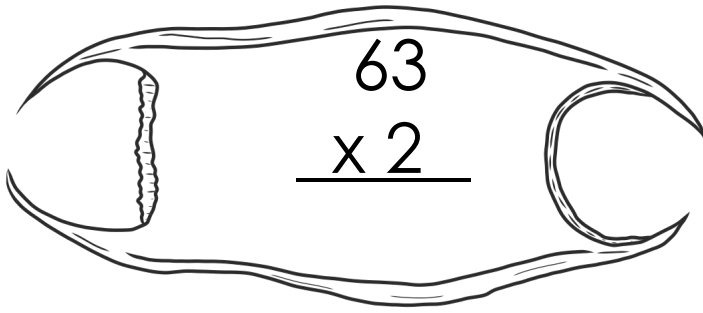
Write the letter of the correct match next to each word

1. _____Vertebrate
 2. _____Bilateral Symmetry
 3. _____Spiracles
 4. _____Placoid Scales
 5. _____Mermaid's Purse
 6. _____Swim Bladder
 7. _____Barbles
 8. _____Ampullae of Lorenzini
 9. _____Nictating membrane
 10. _____Lateral Line
 11. _____Oily liver
- a. Special sensory cells sense any pressure changes
 - b. An egg case for a skate
 - c. An extension from the face used to sense prey
 - d. Electrical sensors
 - e. Symmetrical on both sides
 - f. An organ to help bony fish float
 - g. Animal with a backbone
 - h. Scales which resemble teeth
 - i. Holes behind the eyes to help with breathing
 - j. An organ to help sharks and rays float
 - k. Helps protect the eyes while feeding



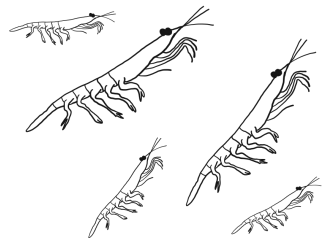
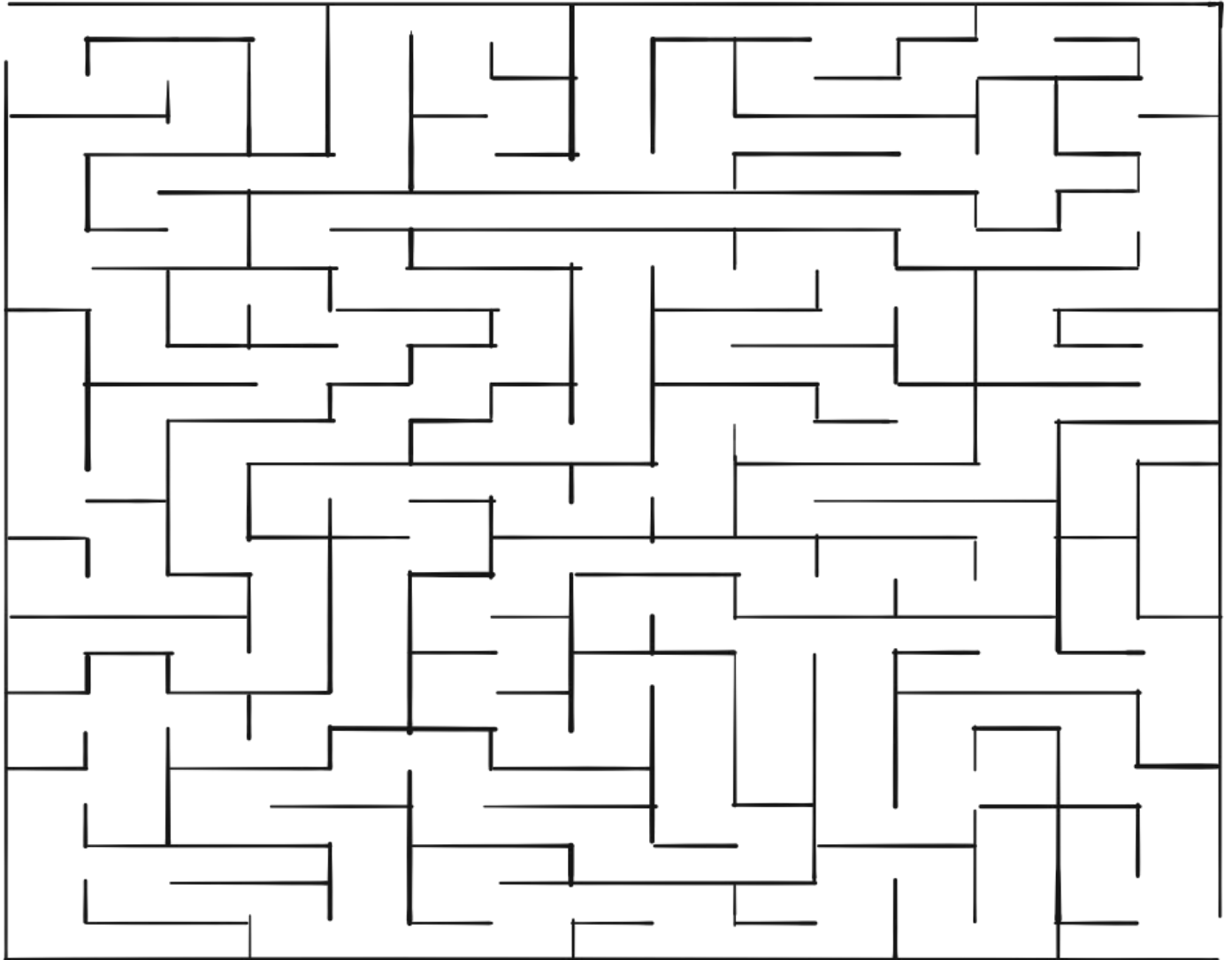
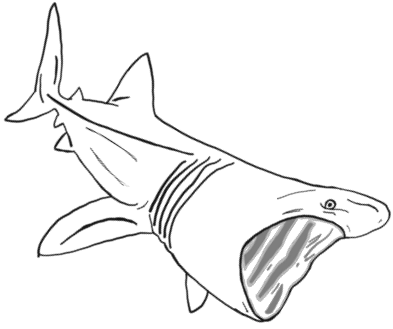
Mermaid purse Multiplication

Solve the math problems below.



Shark Maze

Help the Basking Shark make its way to its favorite food, krill



Shark and Ray Word Search

Z D K L C F X C U X A M A O L I K D I B
 Q Z A H P T F K D U A N L Y Y G I B R S
 R I W Y K V A N B C B J C Z P G I C G B
 I V T R Q T S I B U M R X Z W F K L U S
 S Q C L Y F Q W C T A R K V N V D S L A
 T J Q D U A A F I H S Z V S Z H L H B S
 I H Q C M W N J A M K O B Y Z P A J T A
 N E S R C R S G R F B B E I X M M B H W
 G U F E O G F Q E D U L E W M O P U Y S
 R W N Y R I I I W L O Q A E R L R S F U
 A B E I S A W X M O S F R D U C E Y C U
 Y O V H Z R N I I G B H R F D P Y V Q B
 K H R Q H B E L H B E Z A E L E T V R I
 M A Q S D G Y V Y A Y Q O R A P R L U Z
 A R S J R L Y Q D Y O B E L K E J P D I
 Q A S O I X K H S E L C A R I P S M G H
 E F Y V T F I N A Q A R X J M Y Z Y B Y
 N R E N N B I H V V R I P Y A U V E W T
 F R F H T X N S E Q O J R F I N S M C G
 L M N I G W H Z Q B Z B R I M M W W O L

ANGELSHARK
 FINS
 SPIRACLES
 LAMPREY

HAMMERHEAD
 SWIMBLADDER
 GILLS
 STINGRAY

NARES
 OILYLIVER
 HAGFISH



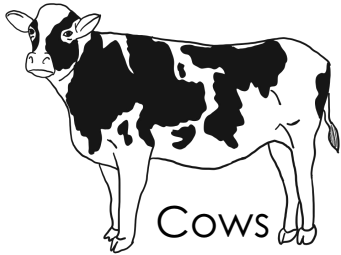
What's more dangerous?

Match the pictures to the blanks in the sentences.



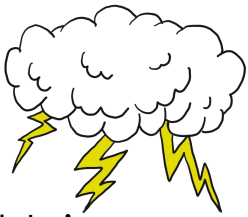
Toilet

Over 250 people have died taking _____ in the last 6 years.



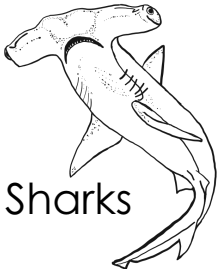
Cows

On average 2,900 people are killed by _____ each year.



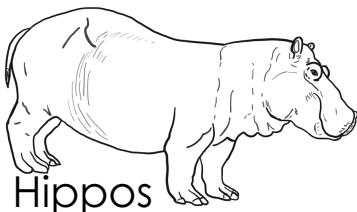
Lightning

On average there are 22 deaths a year by _____.



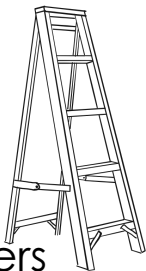
Sharks

Each year, there are 300 deaths in the US caused by falls from _____.



Hippos

The National Weather Service reports that an average of 49 people are killed by _____ each year in the US.



Ladders

Over 30,000 Americans are injured while using the _____ each year.



Selfies

On average there are only 16 injuries caused by _____ in the U.S each year.

