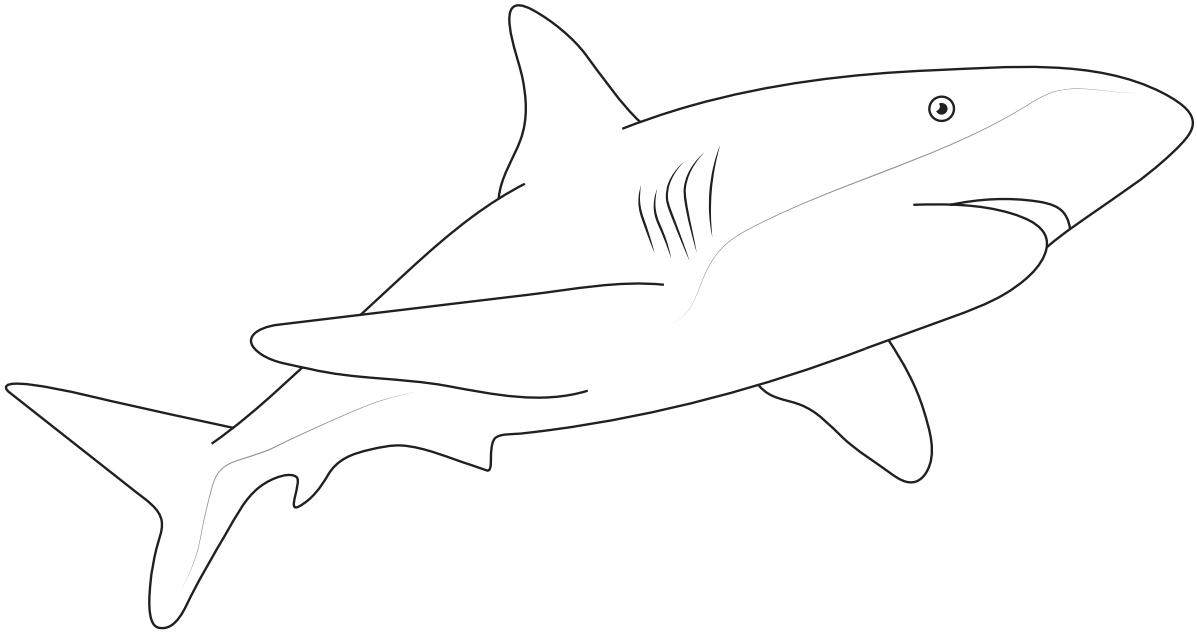


# COLOR AND LEARN:

## ***SHARKS OF MASSACHUSETTS!***



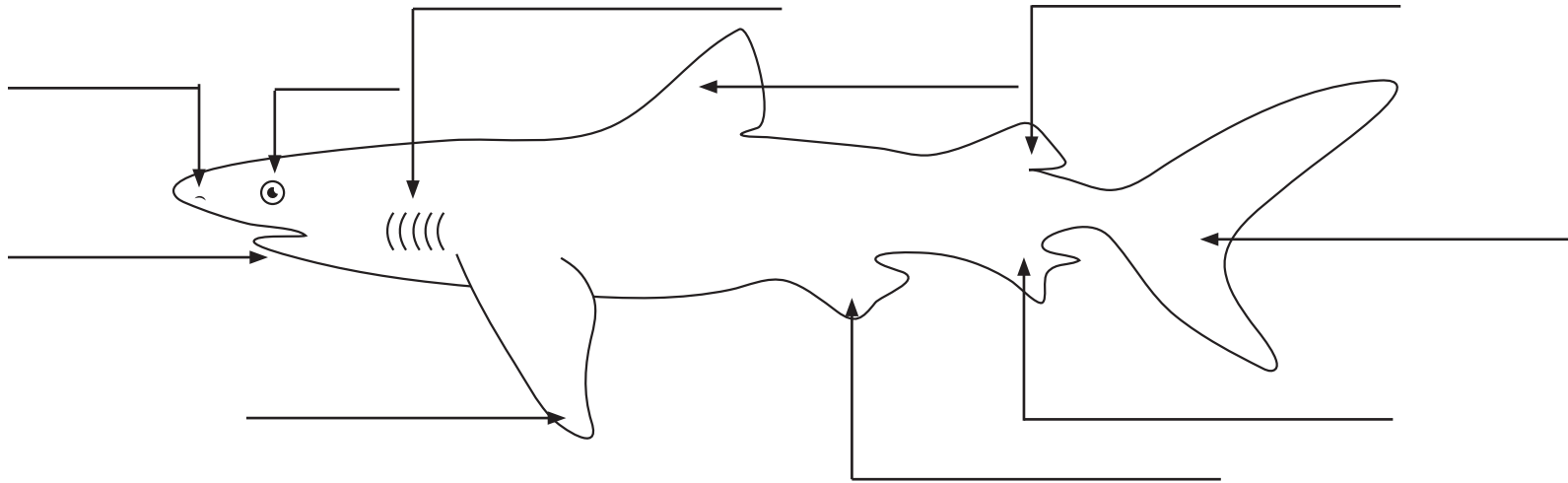
This book belongs to: \_\_\_\_\_





# WHAT IS A SHARK?

Sharks are fish that have vertebrae (skeletons) made of **cartilage** instead of bones. Sharks come in all different shapes, sizes, and colors. Sharks have different kinds of teeth, feeding patterns, swimming styles, and behaviors that help them to survive in all different kinds of aquatic habitats!



Can you label the different parts of a shark?

**second dorsal fin**

**caudal (tail) fin**

**pelvic fin**

**gills**

**anal fin**

**pectoral fin**

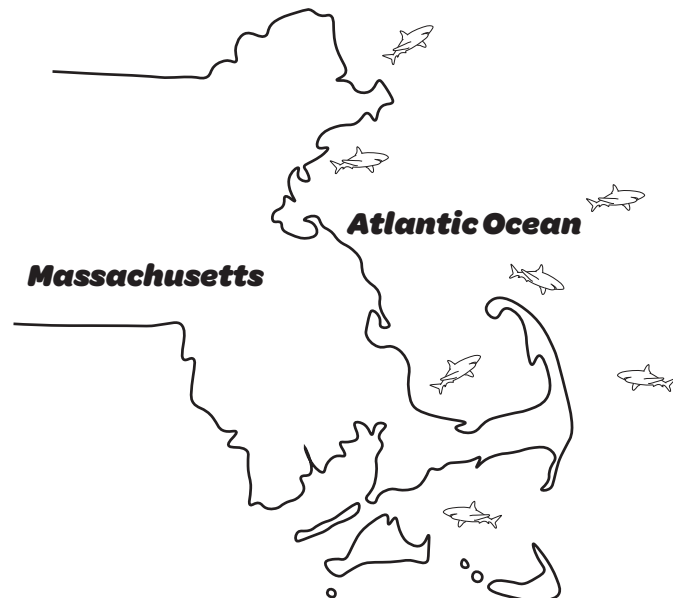
**nostril**

**mouth**

**eye**

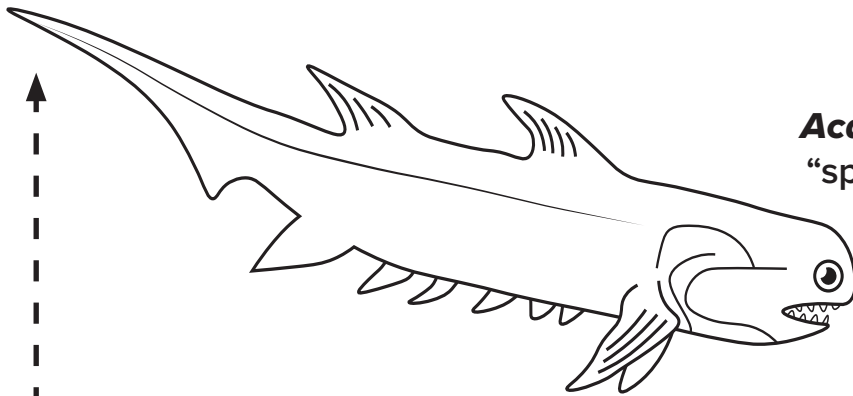
**Dorsal fin**

There are around 500 **species** of sharks in the world. Massachusetts coastal waters provide ideal habitat for several kinds of sharks that visit our waters each season!

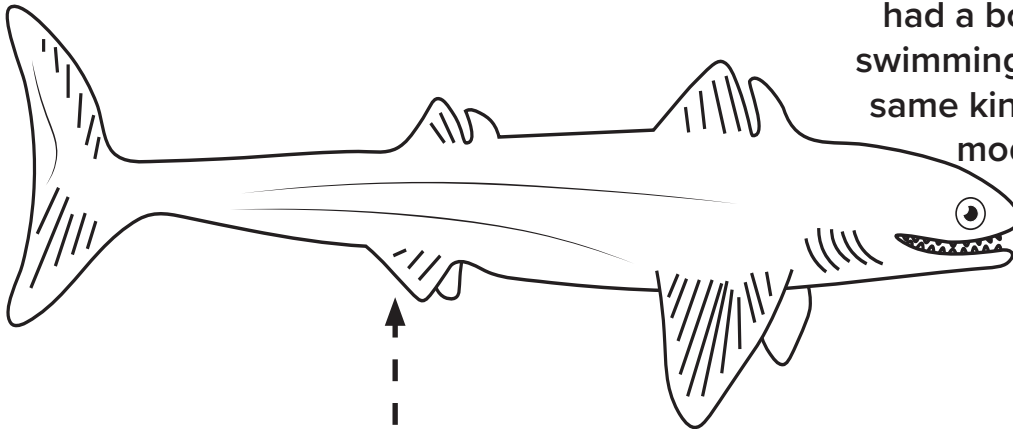


# HOW LONG HAVE SHARKS BEEN ON EARTH?

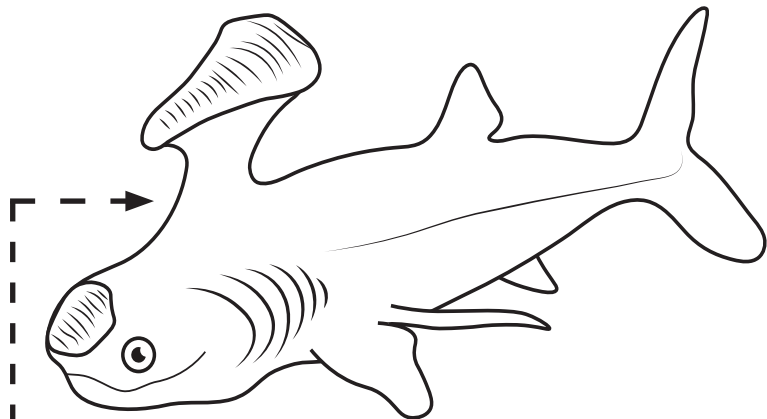
Sharks have been on Earth since before the dinosaurs! Scientists learn about early sharks by studying fossils. Shark fossils can tell us a lot about what food the shark ate, what their habitat looked like, and how they are related to other sharks. The ancient sharks on this page are extinct.



***Acanthodes*** (ah-can-tho-deez), or “spiny shark,” was the first fish to have a cartilage skeleton!



***Cladoselache*** (clay-do-sel-ah-kee) had a body and tail shaped for swimming fast. It did not have the same kind of skin that we see in modern sharks today.



***Stethacanthus*** (stef-ah-can-thus), or “anvil shark”, had a dorsal fin shaped like an ironing board!

450

370

360



200

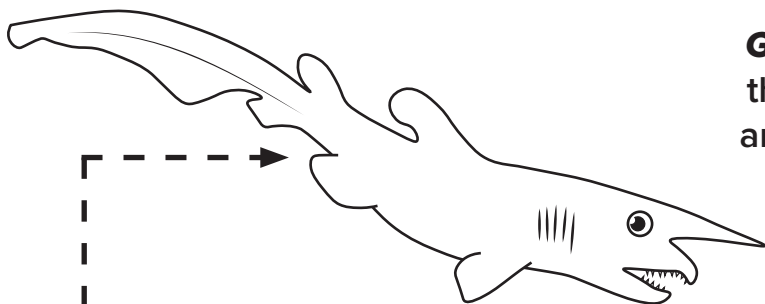
MILLIONS OF YEARS AGO

DINOSAURS EVOLVE

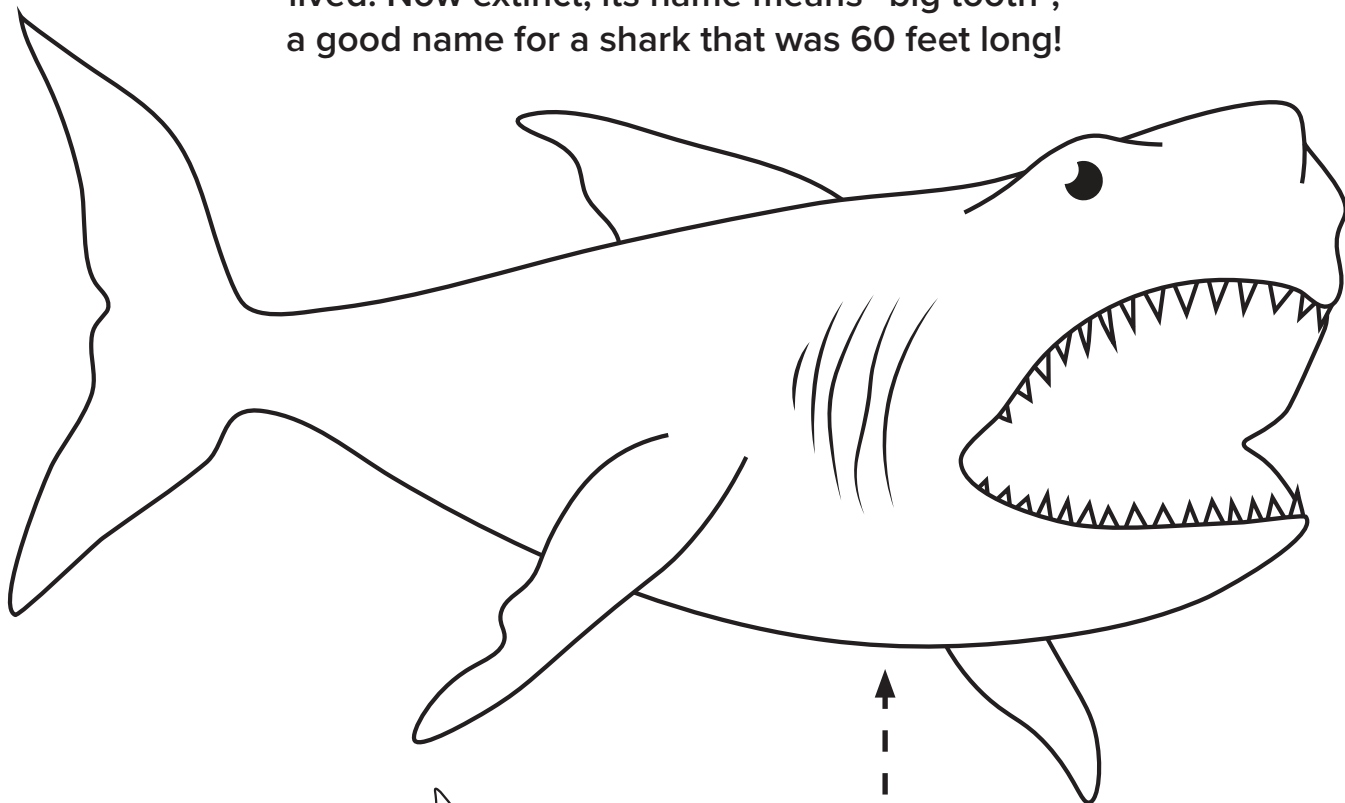
# WHAT ARE “MODERN” SHARKS?

“Modern” sharks are species that have body parts (both inside and out!) that can be found on sharks living today.

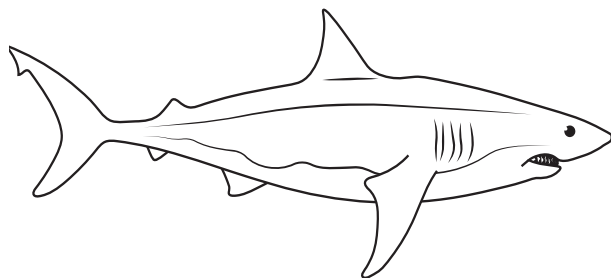
**Goblin sharks** are deep sea dwellers that still exist today! With a flat snout and a jaw that “pops” forward to grab fish, it is a very odd looking shark!



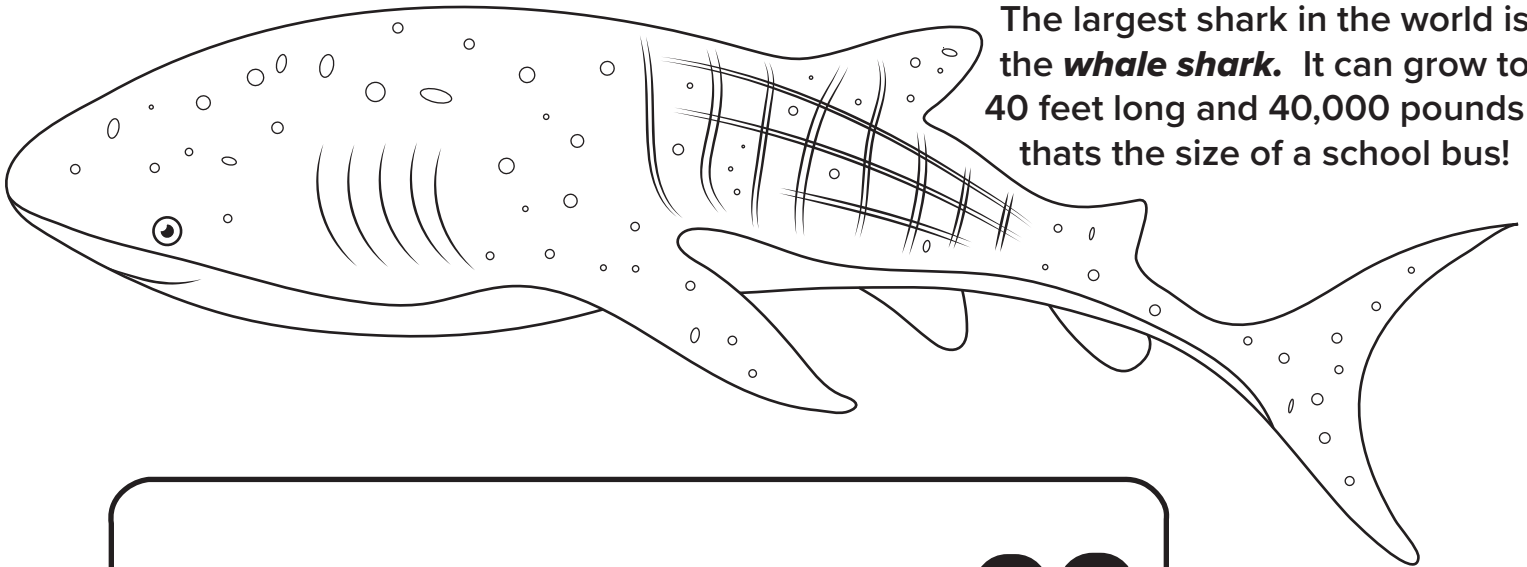
**Megalodon** is the largest fish to have ever lived! Now extinct, its name means “big tooth”, a good name for a shark that was 60 feet long!



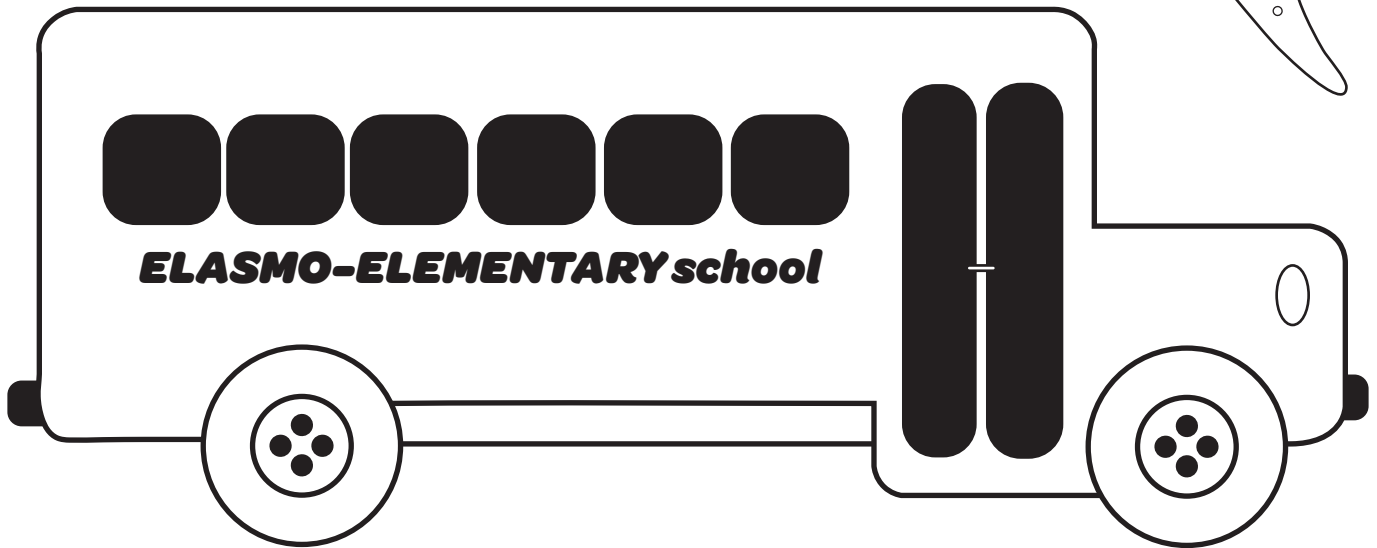
**White sharks** appeared only very recently. When compared to a Megalodon this modern day predator looks tiny!



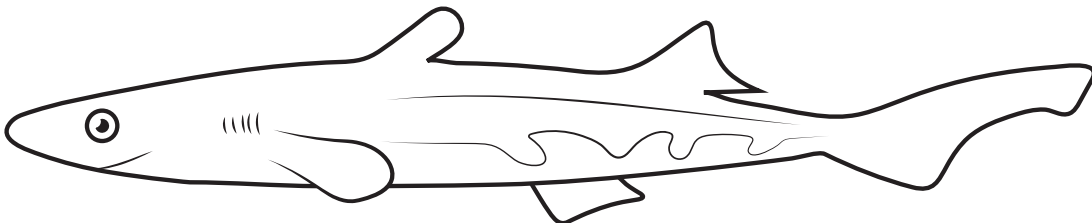
# HOW BIG DO SHARKS GET?



The largest shark in the world is the **whale shark**. It can grow to 40 feet long and 40,000 pounds - that's the size of a school bus!



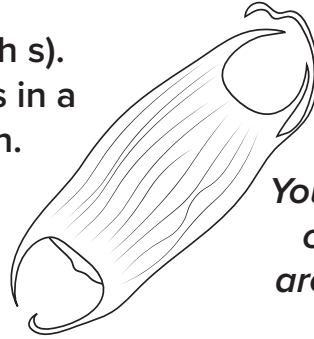
The smallest shark in the world is the **dwarf lantern shark**. At just 8 inches long, it's the same length as your pencil!



# WHERE DO PUPS COME FROM?

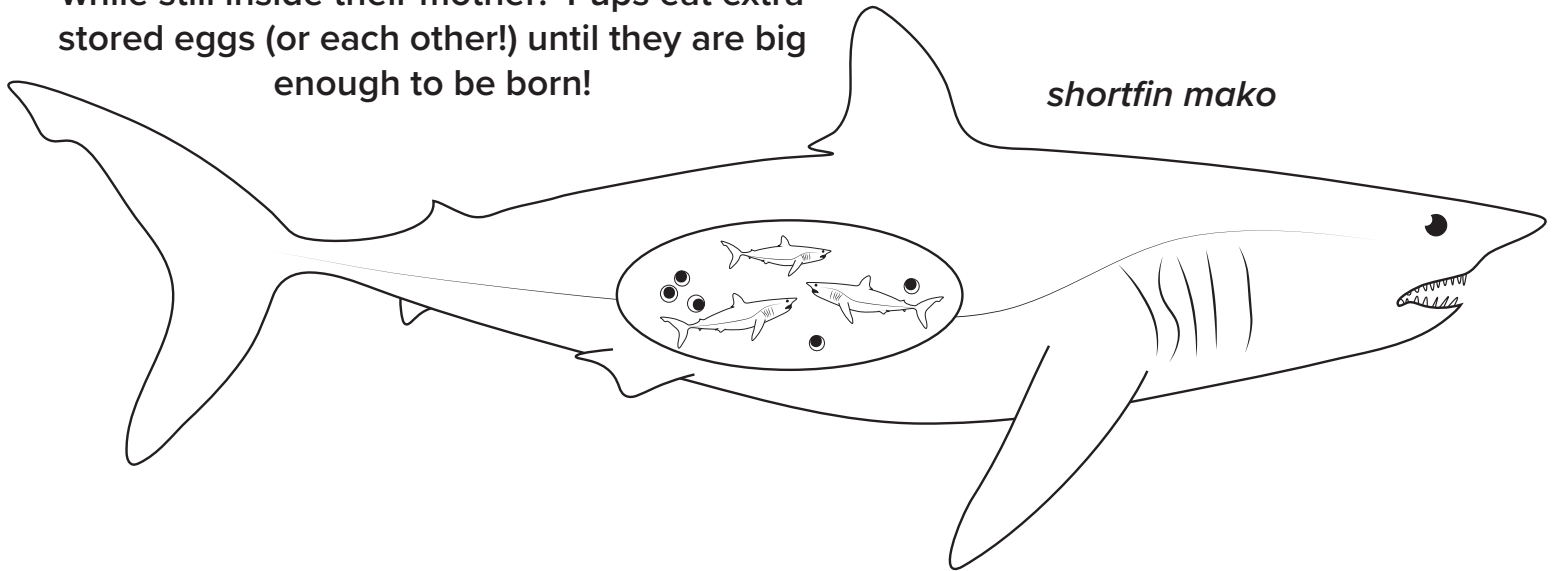
Baby sharks are called pups, and amazingly there are **THREE** different kinds of ways shark pups can make their way into this world. Sharks pups are born ready to swim and hunt, with no help from mom or dad needed!

Some sharks are **oviparous** (oh-vip-er-uh s). These sharks lay tough, leather-like eggs in a safe place on the bottom of the ocean.

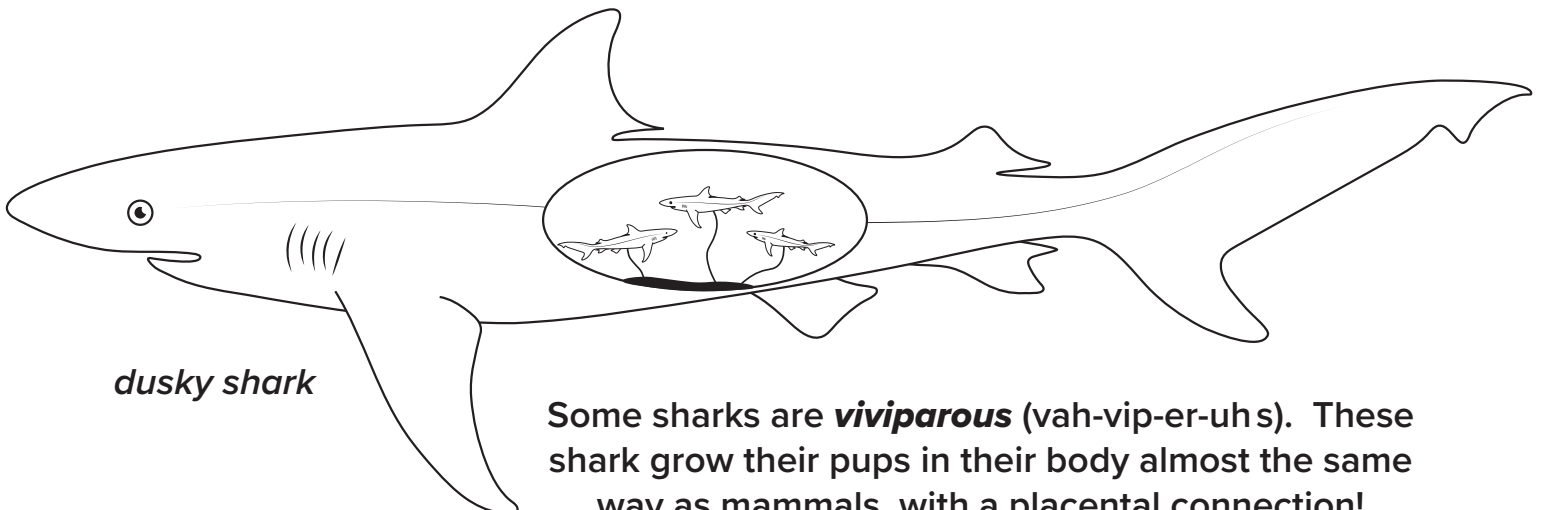


*You might find a “mermaid purse” on your next beach trip! These are the (usually) empty egg cases from sharks and rays!*

Some sharks are **ovoviviparous** (oh-voh-vah-vip-er-uh s). The pups hatch out of their eggs while still inside their mother! Pups eat extra stored eggs (or each other!) until they are big enough to be born!



*shortfin mako*



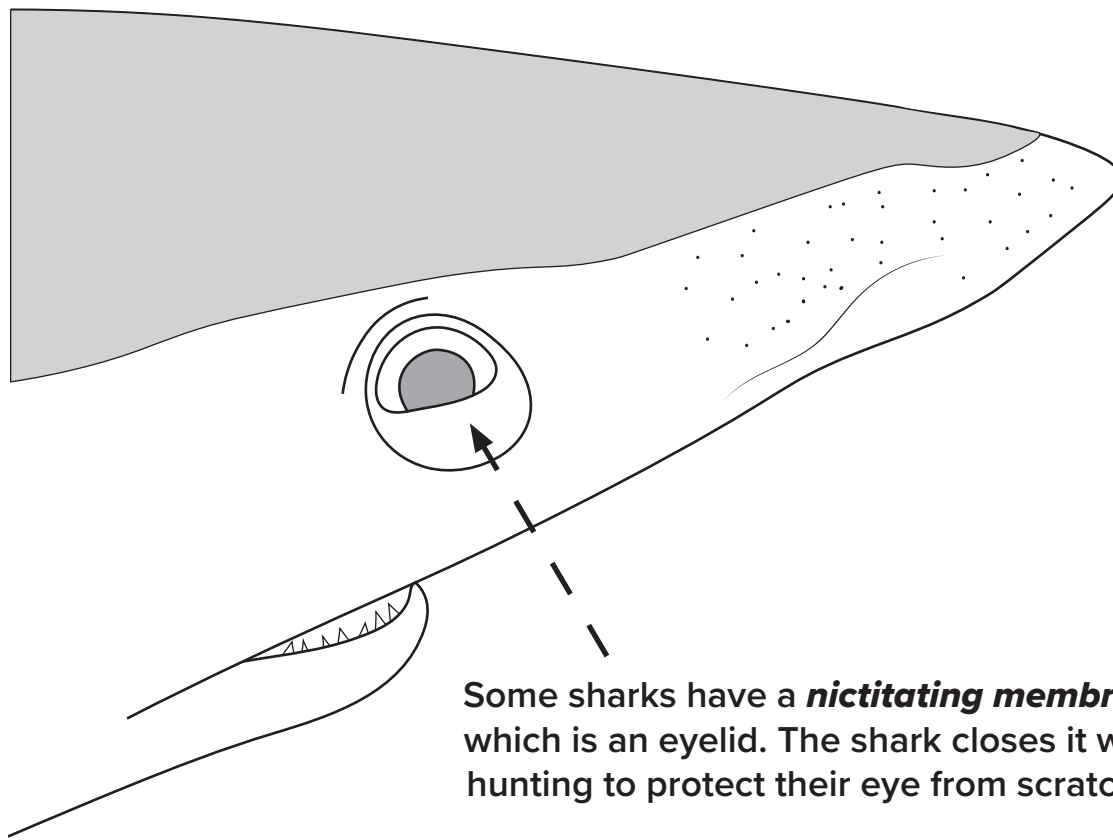
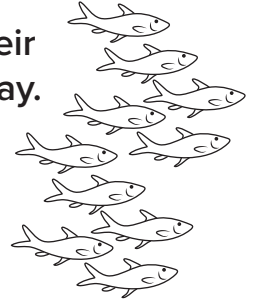
*dusky shark*

Some sharks are **viviparous** (vah-vip-er-uh s). These shark grow their pups in their body almost the same way as mammals, with a placental connection!

# DO SHARKS HAVE GOOD VISION?

Most sharks can see very well and are even able to detect movement in very dark, murky water!

In clear water, sharks will see their prey when its is 70 - 100 feet away.



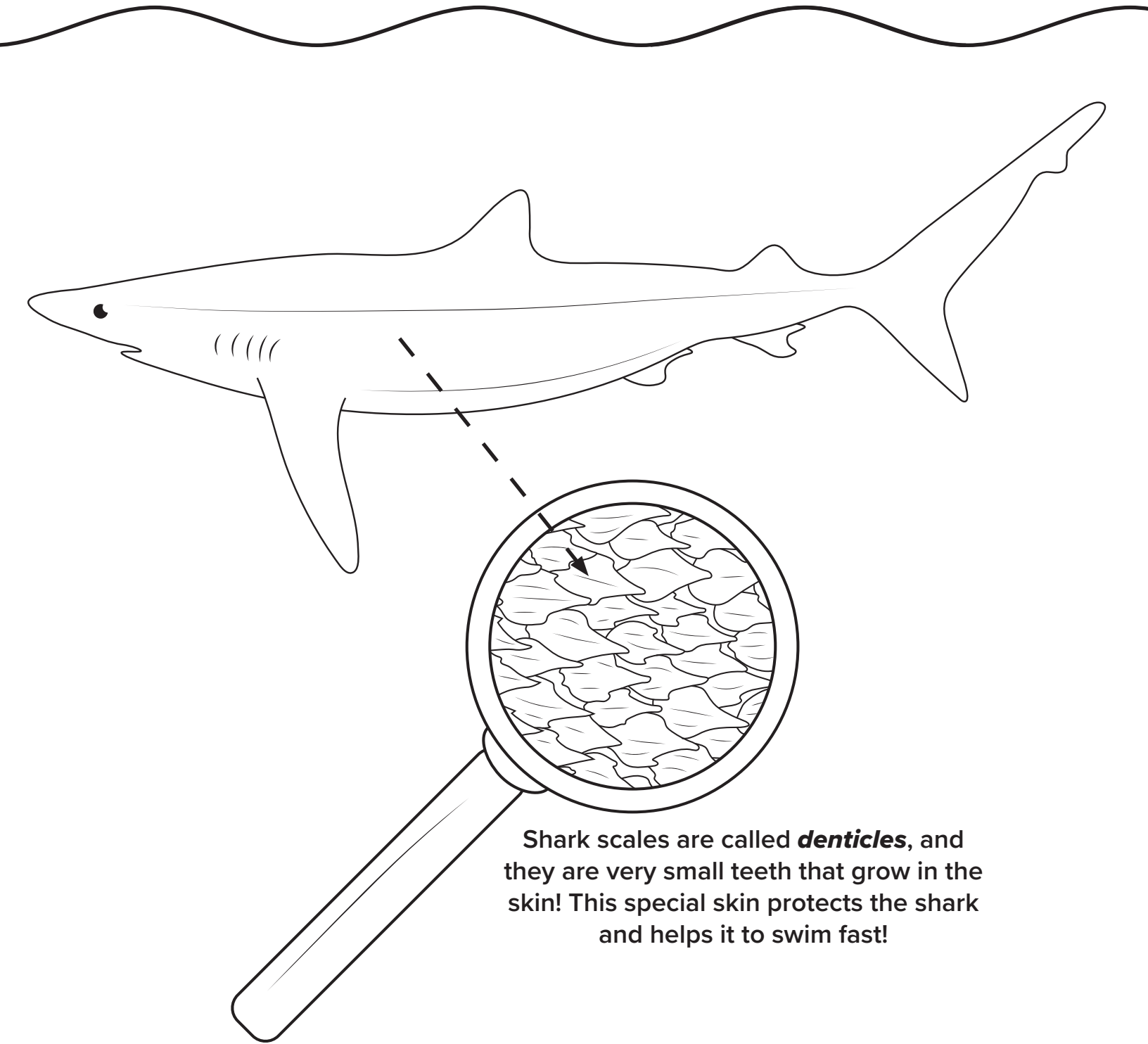
Some sharks have a ***nictitating membrane***, which is an eyelid. The shark closes it when hunting to protect their eye from scratches!

Sharks that do not have a nictitating membrane can roll their eyes into the back of their head!  
This is why white sharks have totally white eyes when they attack their prey and feed!



# DO SHARKS HAVE SCALES?

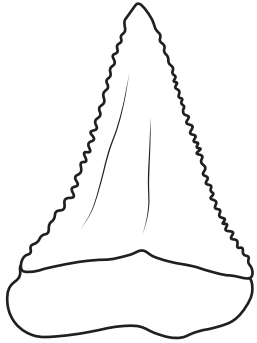
Like most fish, sharks do have scales!



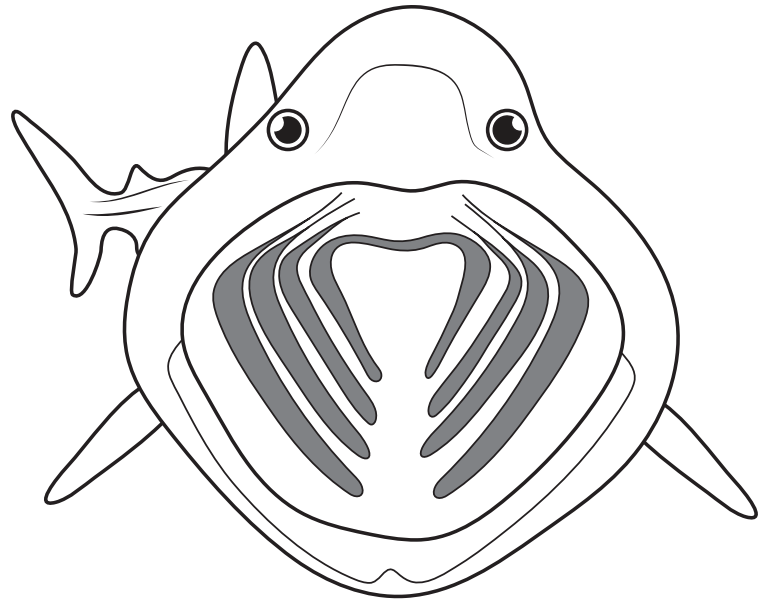
Shark scales are called **denticles**, and they are very small teeth that grow in the skin! This special skin protects the shark and helps it to swim fast!

# HOW MANY TEETH DO SHARKS HAVE?

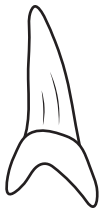
Some sharks, like the sandbar, can grow and lose over 35,000 teeth in their lifetime! ALL sharks have teeth, but the shape and number of teeth depends on the kind of food they eat.



Sharks that tear off big bites of food have sharp, **serrated cutting teeth**. The white shark has teeth the size of quarters!

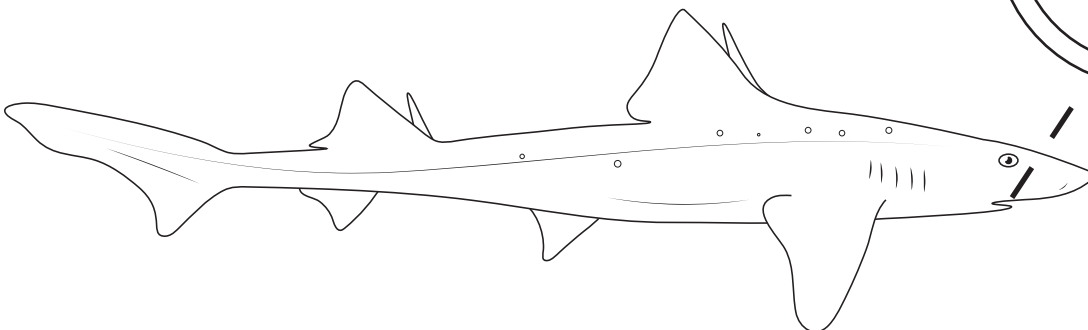
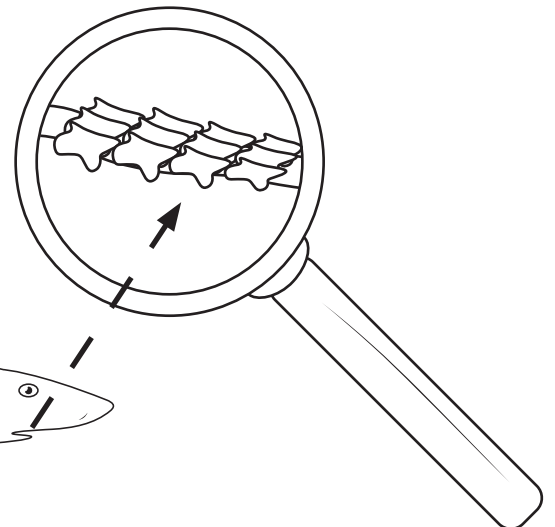


Yes, even basking sharks have tiny little teeth lining their mouth! They are called **non-functional teeth**, since the shark doesn't use them for eating.



Sharks that eat fish have long, **needle-like teeth** used for holding onto slippery food.

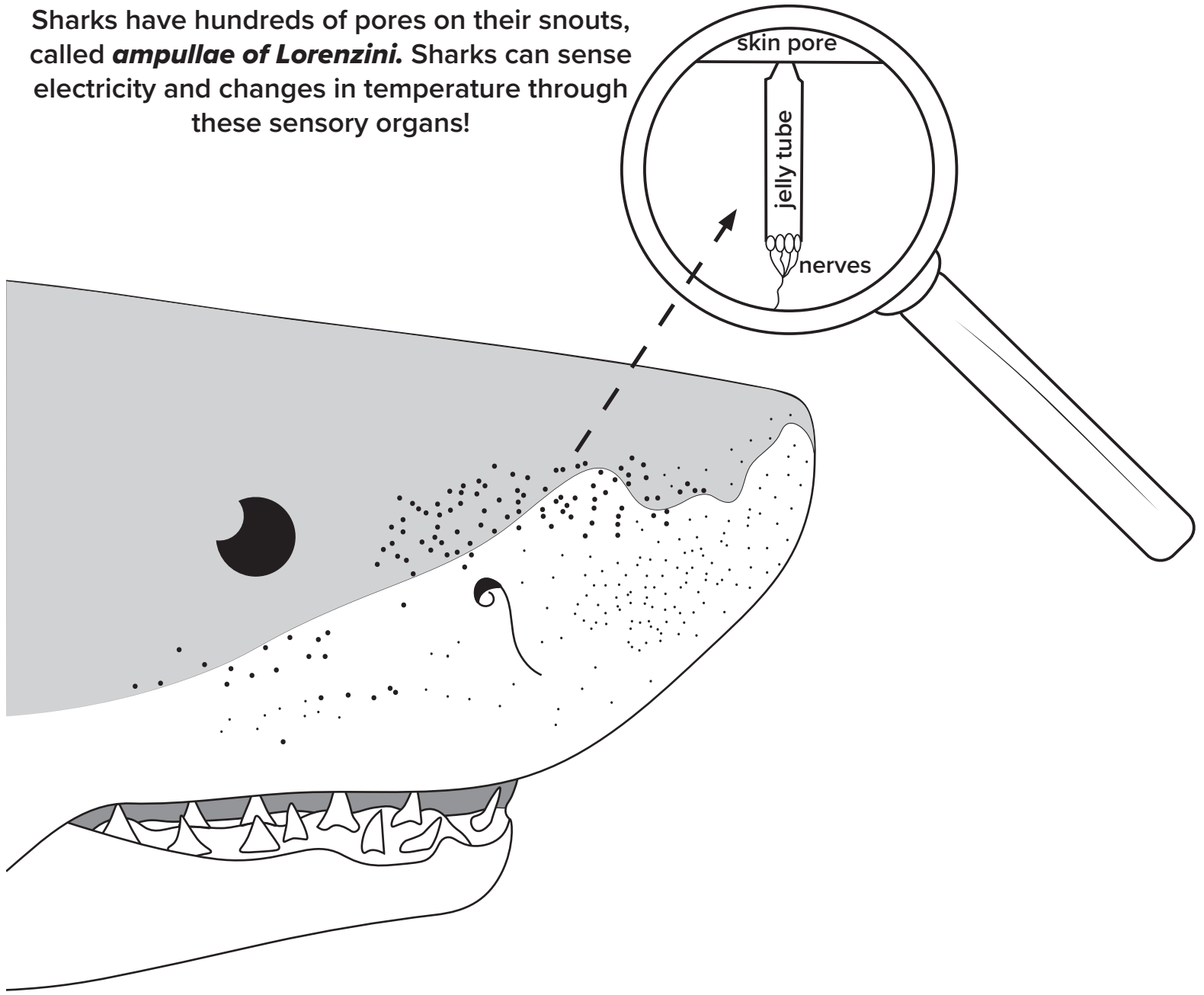
Sharks that eat hard shelled animals (like clams and lobsters) have thick, **plate-like teeth** that crush their prey.



# DO SHARKS HAVE A 6TH SENSE?

We share five senses with sharks: sight, smell, taste, touch, and hearing.  
Sharks have an additional sense called electroreception!

Sharks have hundreds of pores on their snouts, called ***ampullae of Lorenzini***. Sharks can sense electricity and changes in temperature through these sensory organs!



All living creatures produce an electrical field, which sharks can sense through these pores! They also might use the pores to help navigate around the globe, sensing the electric fields in ocean currents!

# DO SHARKS SLEEP?

While some sharks can lay still and rest, many sharks have to keep swimming in order to breathe!

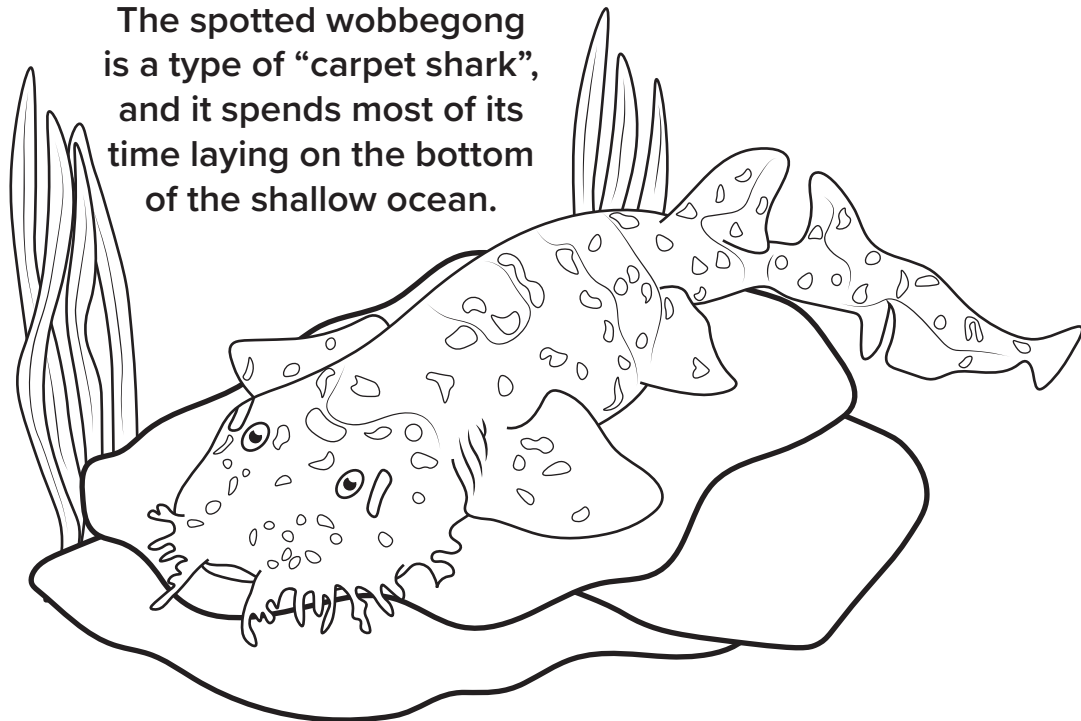
Oxygen rich water  
flows into its mouth...

and comes out  
through its gills!

The sandbar shark is a **obligant ram ventilator** shark, which means it must swim all the time to keep water moving over its gills.

The spotted wobbegong is a type of “carpet shark”, and it spends most of its time laying on the bottom of the shallow ocean.

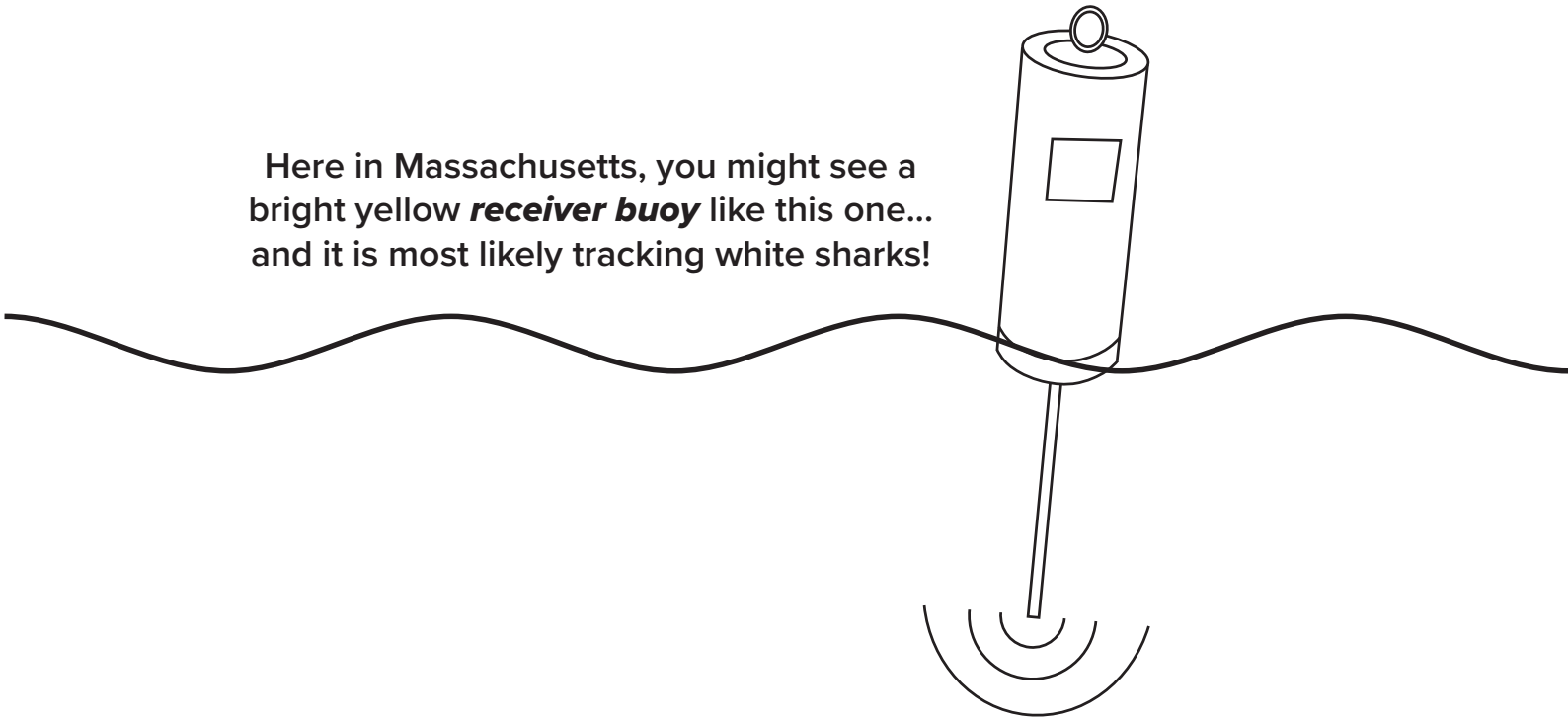
It can pump water through its gills from holes (called spiracles) on the top of its head!



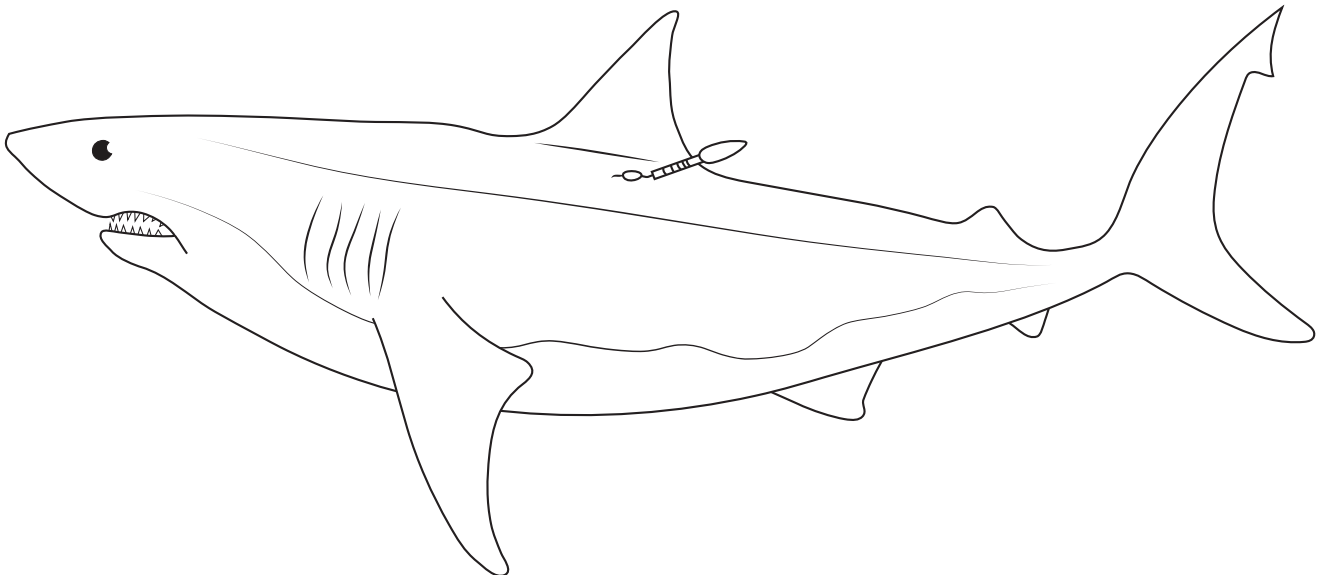
# HOW DO SCIENTISTS STUDY SHARKS?

With shark population numbers dropping, it has never been more important for scientists to study shark migrations, behavior, and life history. The more we know about these incredible creatures, the more we can help protect them!

Here in Massachusetts, you might see a bright yellow **receiver buoy** like this one... and it is most likely tracking white sharks!



Some scientists will put harmless tags on the back of sharks, which alert scientists everytime they swim close to a special buoy. The technology works a lot like the toll passes we have in our cars!



# FEEDING FRENZY!

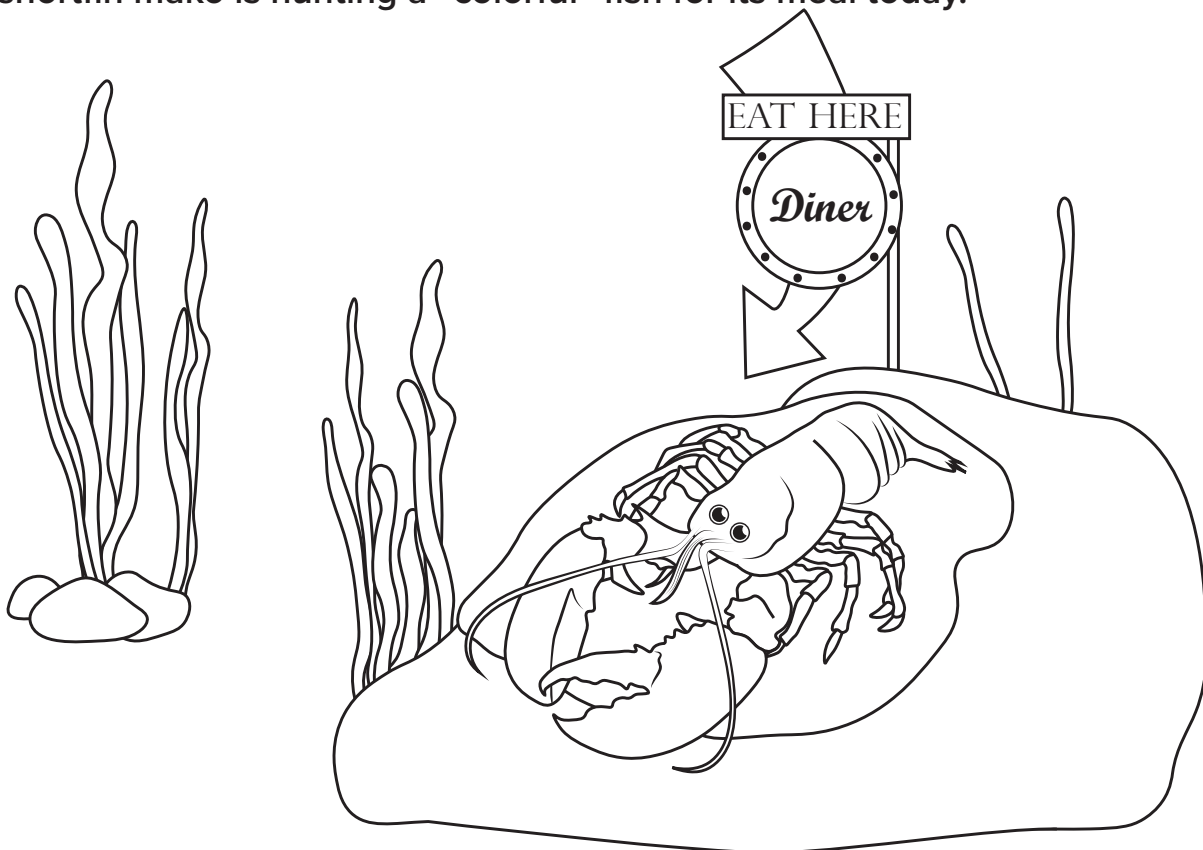
Five species of shark are hunting for food along the Massachusetts coastline. Each shark captures a different food item to eat.

Can you match the shark to its prey?

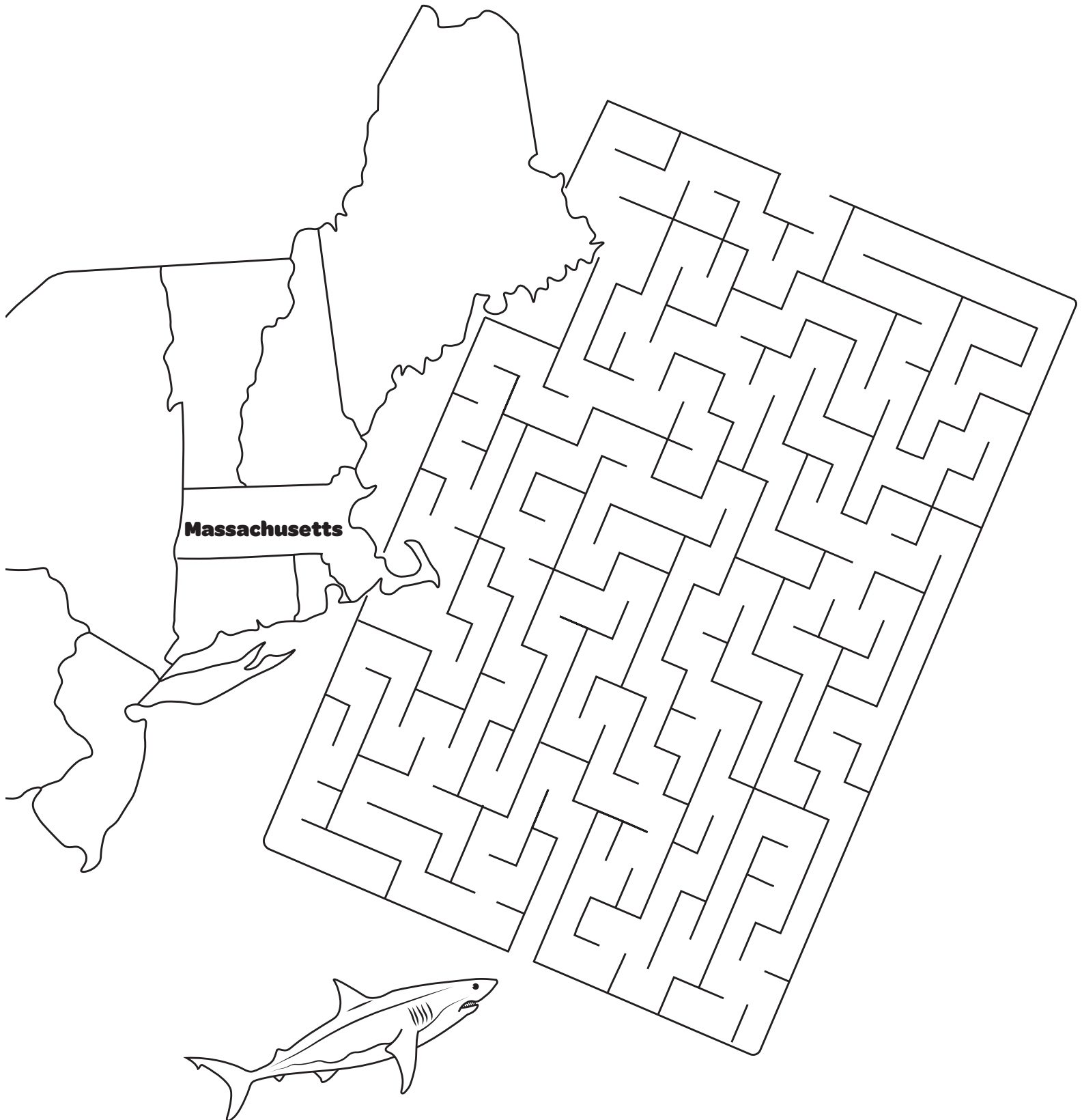
	Squid	Lobster	Seal	Bluefish	Herring
White Shark					
Blue Shark					
Smooth Dogfish					
Shortfin Mako					
Porbeagle					

As you read through the clues, put an “O” in the box of a match you know to be true, and an “X” in the box of a match you know to be false. HINT: when you put an “O” in a box, the boxes above and below, and to the left and right of it, will be an “X”.

1. No shark is eating food that starts with the same letter as its name.
2. The smooth dogfish uses its plate-like teeth to crush the hard shelled animal it is eating today.
3. The blue shark is eating an invertebrate today.
4. The white shark is eating a mammal today.
5. The shortfin mako is hunting a “colorful” fish for its meal today.



# HELP THE WHITE SHARK SWIM ALONG THE COASTLINE!



**Can you fill in the other states on the map?** (Maine, Vermont, New Hampshire, New York, Rhode Island, Connecticut, New Jersey, Pennsylvania)

# CHONDRICHTHYES\*

## CROSSWORD!

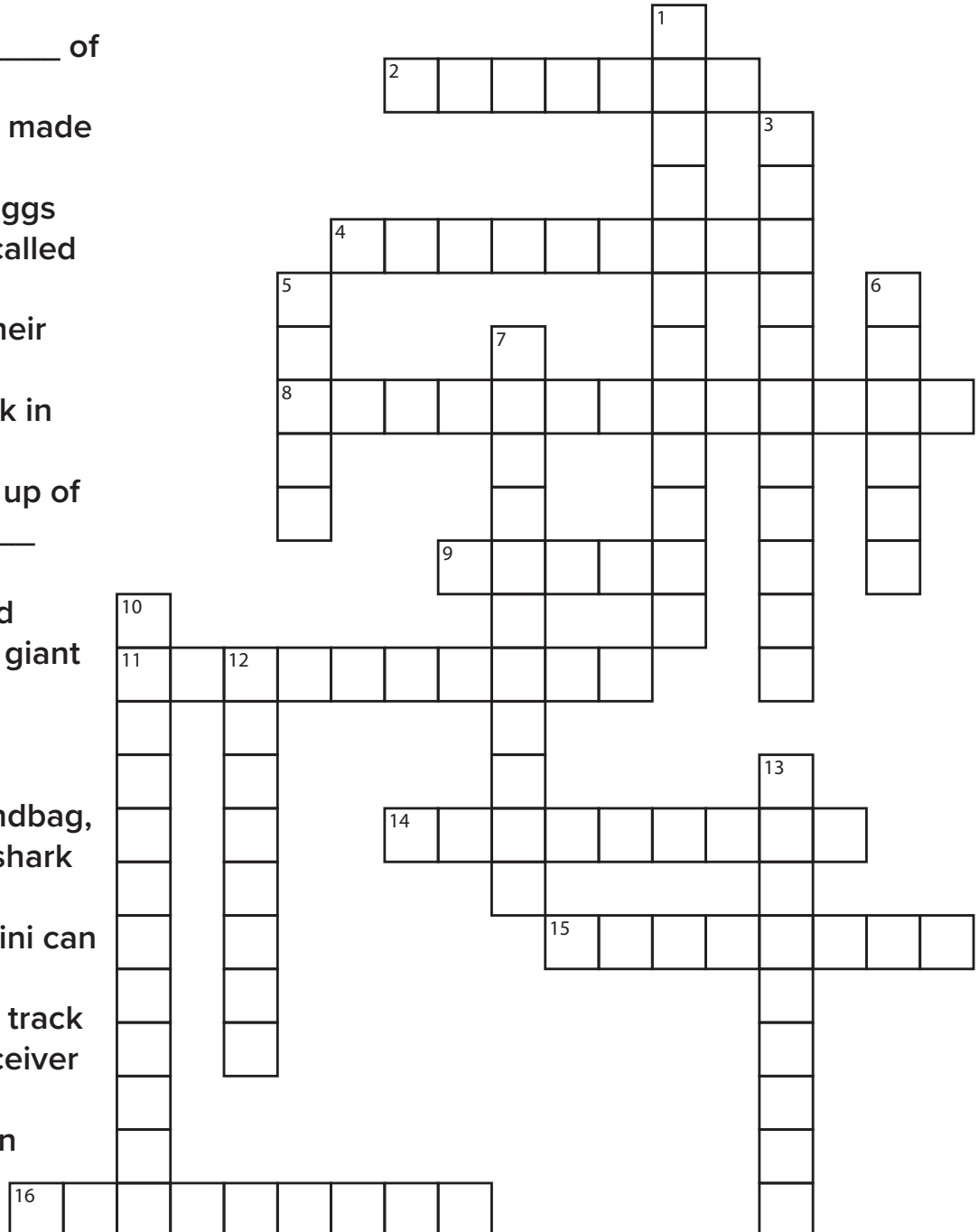
For extra help, look for the **BOLD** words throughout this book!

### ACROSS

2. There are around 500 \_\_\_\_\_ of sharks
4. What a shark skeleton is made of
8. Sharks that hatch their eggs inside of their body are called \_\_\_\_\_
9. What sharks use to get their oxygen from the water
11. The largest modern shark in the world
14. What shark skin is made up of
15. The white shark has \_\_\_\_\_ teeth for cutting
16. Sharks have been around longer than these extinct giant reptiles

### DOWN

1. A mythical creatures' handbag, or what you might call a shark egg
3. What ampullae of Lorenzini can sense in the water
5. Scientists tag sharks and track their movements with receiver \_\_\_\_\_
6. Another name for a tail fin
7. Some sharks have this kind of eyelid to protect their eyes
10. The smallest shark in the world
12. The Ocean that borders Massachusetts
13. The largest shark to have ever lived

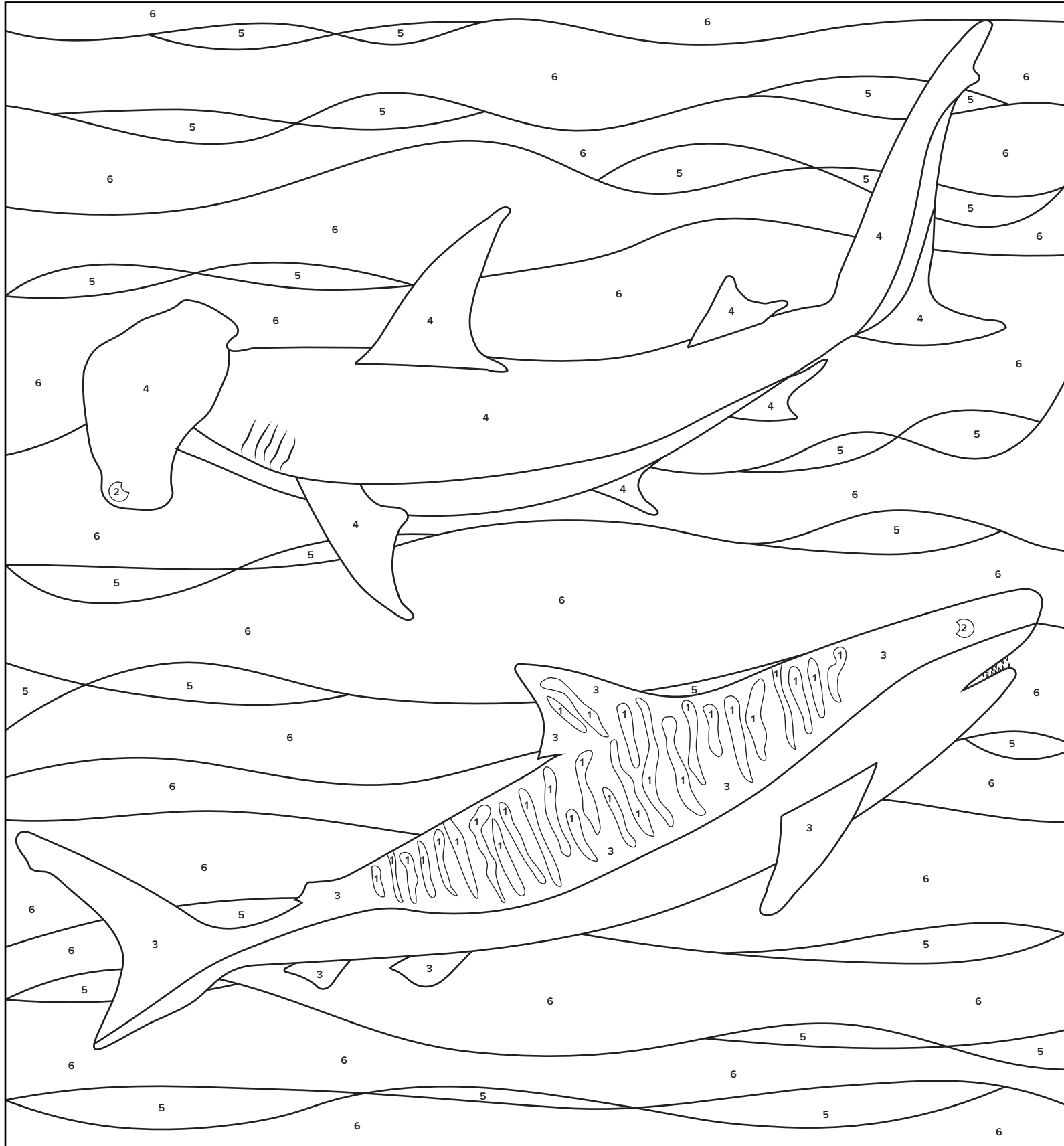


**\* Chondrichthyes (khan-drick-thee-z) are fish that have cartilage skeletons, including sharks, skates, and rays!**



# HIDDEN SHARKS!

Using the key below, fill in each numbered spot with the color to reveal two species of sharks!

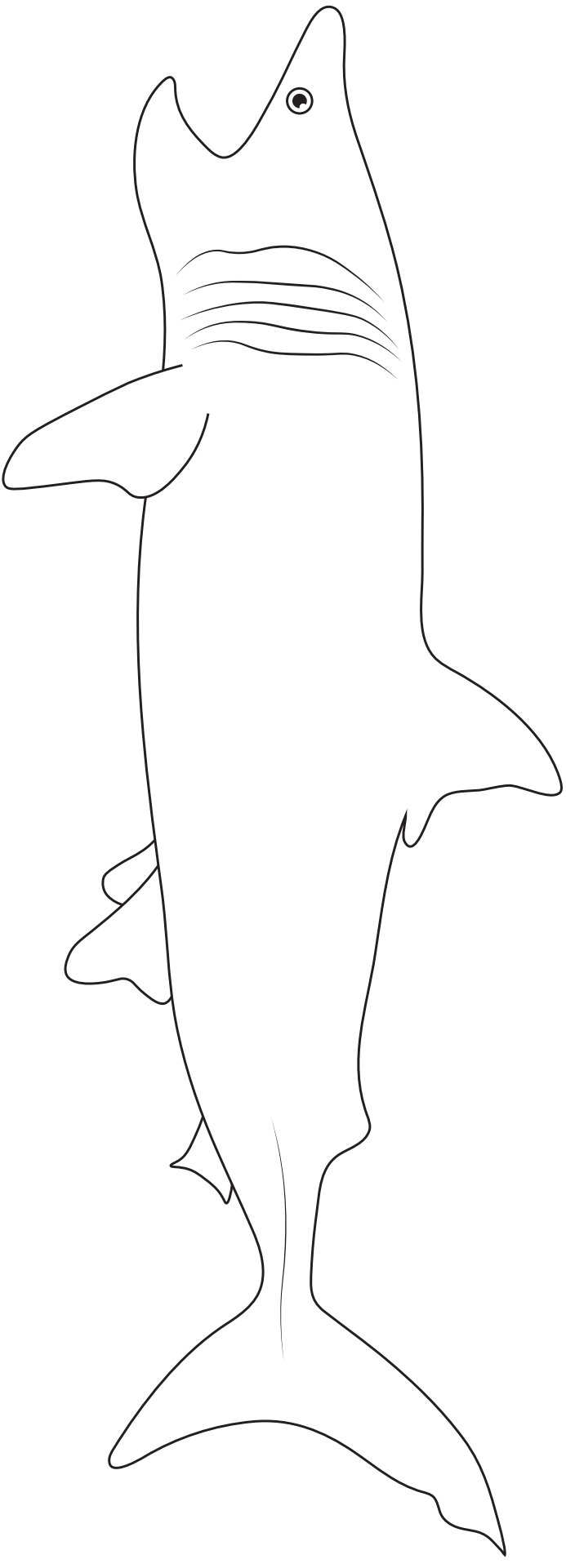


1=TAN 2=BLACK 3=GRAY 4=LIGHT BROWN 5=DARK BLUE 6=LIGHT BLUE NO NUMBER=WHITE

Can you name the two sharks in the picture? \_\_\_\_\_

# BASKING SHARK

*Cetorhinus maximus*



**World Range / habitat:** Tropical, temperate and arctic waters worldwide; commonly found at the surface of coastal waters during the summer to feed, migrating into deeper waters during winter

**Eastern United States Range:** Canadian border to Florida, throughout the Gulf of Mexico, as well as offshore waters in the Sargasso Sea and the Caribbean.

**Size:** Up to 35 feet (making it the second largest fish after the whale shark!) and weighing in at 12,000 pounds!

**Color:** Light brown to dark gray or black on top; the same color to almost white on the belly

**Diet:** Filter-feed on zooplankton (microscopic animals that drift in the water)

**Reproduction:** Ovoviviparous (unknown how many pups to a cycle!)

**Fun Fact:** Basking sharks can filter 1800 tons of water through its gills in just one hour!

# BLUE SHARK

*Prionace glauca*



**World Range / habitat:** Temperate and tropical pelagic, with a preference for deep, cool waters; will dive deep in tropical zones to find water in the 50–70 degree range

**Eastern United States Range:** Canadian border to Florida, throughout the Gulf of Mexico

**Size:** Up to 12 feet; max weight of 450 pounds

**Color:** Dark, vivid blue on top, bright blue on the sides with a pale, almost white belly

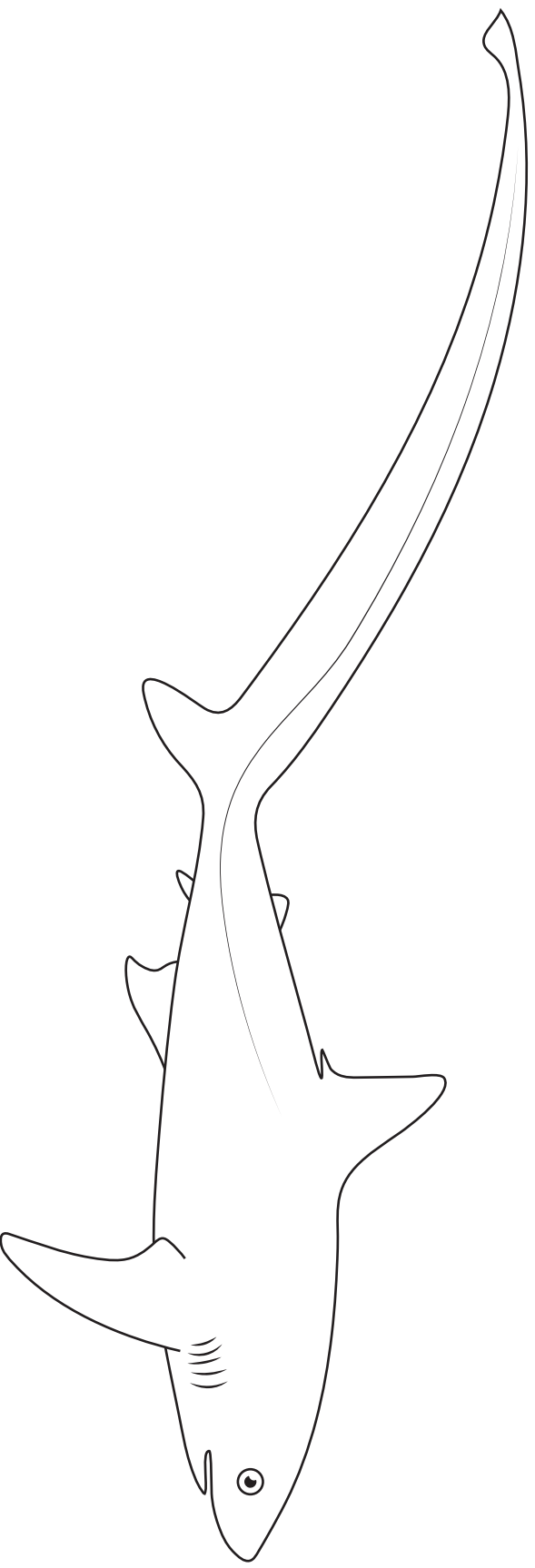
**Diet:** Smaller bony fish like herring and sardines, invertebrates like squid and octopus. They have also been seen feeding on turtles, seals, and even birds!

**Reproduction:** Viviparous

**Fun Fact:** Blue sharks can have anywhere from 5–135 shark pups in a litter!

# COMMON THRESHER SHARK

*Alopias vulpinus*



**World Range / habitat:** Worldwide tropical and cold-temperate coastal waters and the open ocean

**Eastern United States Range:** Canadian border to the gulf of Mexico

**Size:** 16 feet (half of their length is their tail!) and 450+ pounds

**Color:** Dark brown to gray on top, white belly; darker coloring on the backside of the pectoral fins

**Diet:** Schooling bony fish like mackerel, herring, and bluefish, as well as squid

**Reproduction:** Ovoviviparous (2–5 pups)

**Fun Fact:** The long tail fin is used to hit and stun their prey!

# DUSKY SHARK

*Carcharhinus obscurus*



**World Range / habitat:** Highly migratory (swimming as far as 2,000 miles!), the dusky shark can be found world-wide in tropical and temperate oceans, swimming as deep as 1,300 feet to surf zones and shallow coastal waters

**Eastern United States Range:** Canadian border to Florida and into the Gulf of Mexico; mostly found in New England Waters on Georges Bank

**Size:** 10 feet and 350 - 400 pounds

**Color:** Blue-gray or bronze-brown on top with a white belly; most have a dark stripe along their side

**Diet:** Preferring to hunt near the bottom, they search out crabs, sea stars, squids, and bony fish, like bluefish, herring, and tuna

**Reproduction:** Viviparous (3–14 pups)

**Fun Fact:** Dusky sharks have TWO kinds of teeth; upper teeth in the shape of triangles for slicing, and straight pointed teeth on the bottom for holding prey!

# PORBEAGLE SHARK

*Lamna nasus*



**World Range / habitat:** Found in cold and temperate marine waters of the North Atlantic and Southern Hemisphere from nutrient-rich banks to outer continental shelves

**Eastern United States Range:** Canadian border to New Jersey

**Size:** 12 feet and up to 500 pounds

**Color:** Dark blue to blue-gray with a white belly. The dorsal fin has a white patch on the backside, close to the body

**Diet:** Bony fishes like herring and mackerel in the spring, sand lance and flounder in the fall, and squid year round

**Reproduction:** Ovoviviparous (1–5 pups)

**Fun Fact:** These sharks have been seen engaging in “playful” behavior with floating objects, much like a puppy with a ball!

# SAND TIGER SHARK

*Carcharias taurus*



**World Range / habitat:** Worldwide subtropical and temperate waters; from sandy shorelines to the continental shelf

**Eastern United States Range:** Gulf of Maine to Florida, throughout the Gulf of Mexico

**Size:** 10 feet and up to 350 pounds

**Color:** Light brown to gray on top with rust-colored spots and a light gray to white belly

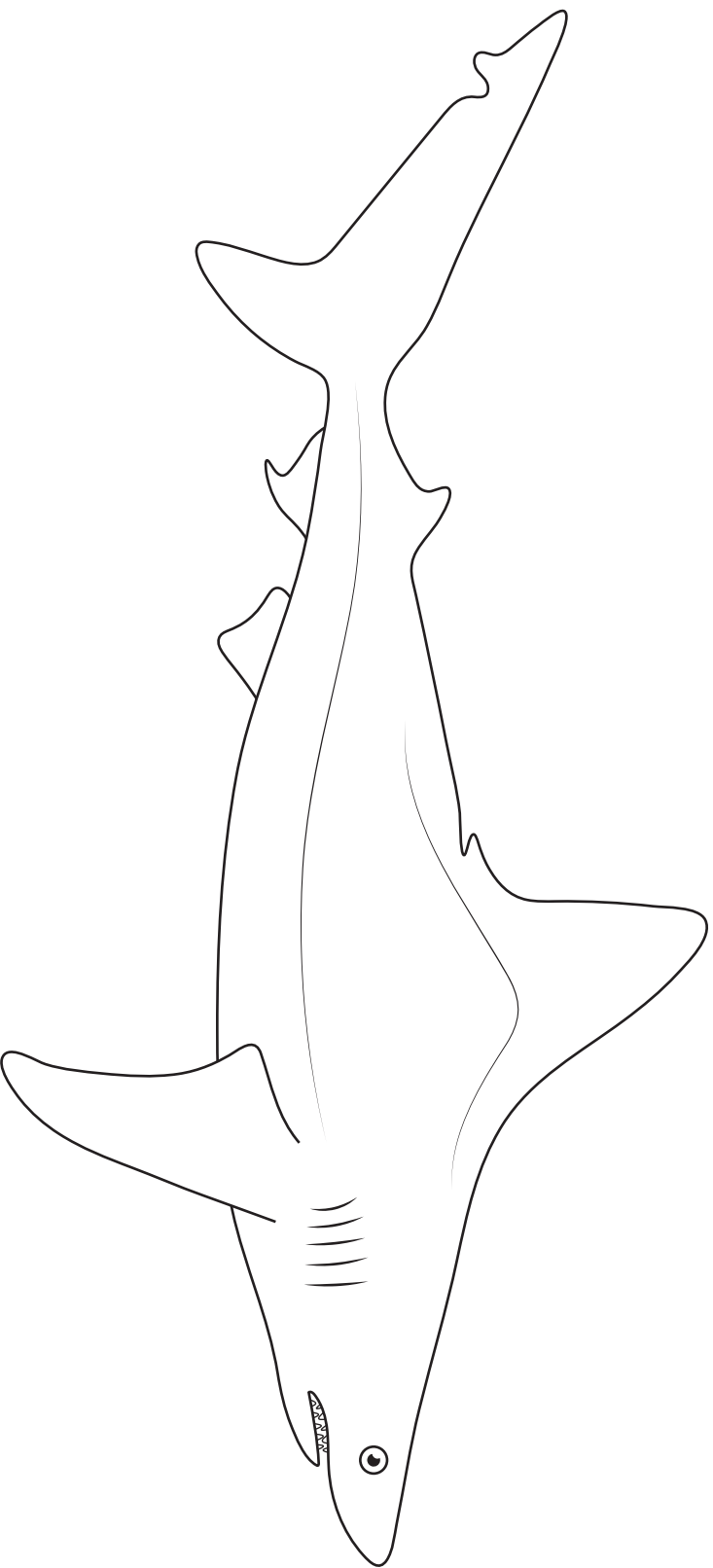
**Diet:** Preferring to hunt near the bottom, they search out rays, other sharks, and bony fish like herring and flatfish

**Reproduction:** Ovoviviparous (1–2 pups because during pregnancy the largest pup(s) eat the others!)

**Fun Fact:** Sand Tigers are the only shark that can come to the surface and gulp air to help them float in the water!

# SANDBAR SHARK

*Carcharchinus plumbeus*



**World Range / habitat:** found in temperate and tropical coastal waters and intertidal zones, with a swim preference for the bottom

**Eastern United States Range:** Canadian border to Florida, throughout the Gulf of Mexico

**Size:** Up to 6 feet and 200 pounds

**Color:** Blue-brown to grey on top with a white belly

**Diet:** Small fish, mollusks, and crustaceans

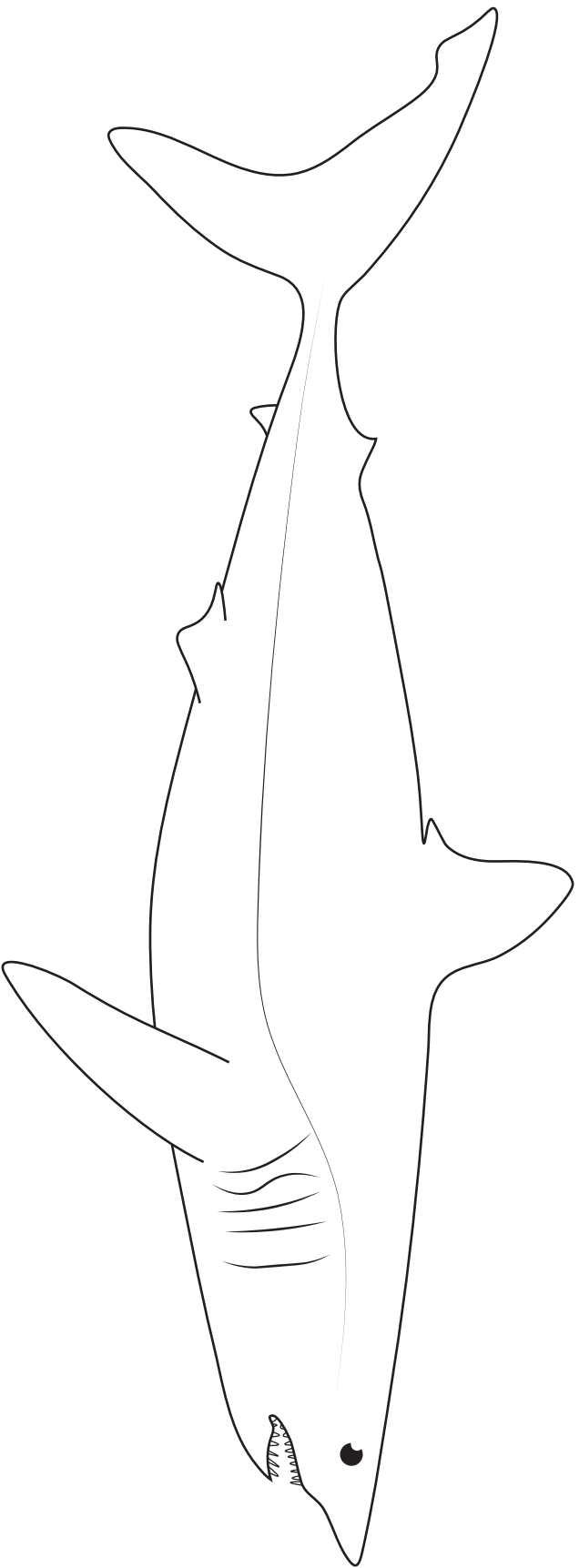
**Reproduction:** Viviparous (1–14 pups)

**Fun Fact:** A sandbar shark will grow and lose around 35,000 teeth over the course of its life!



# SHORTFIN MAKO SHARK

*Isurus oxyrinchus*



**World Range / habitat:** Offshore temperate and tropical waters, with a preference for the cooler waters of the open ocean

**Eastern United States Range:** Gulf of Maine to Florida, throughout the Gulf of Mexico

**Size:** Up to 12 feet and 1300 pounds

**Color:** Dark to light metallic blue on top with a white belly

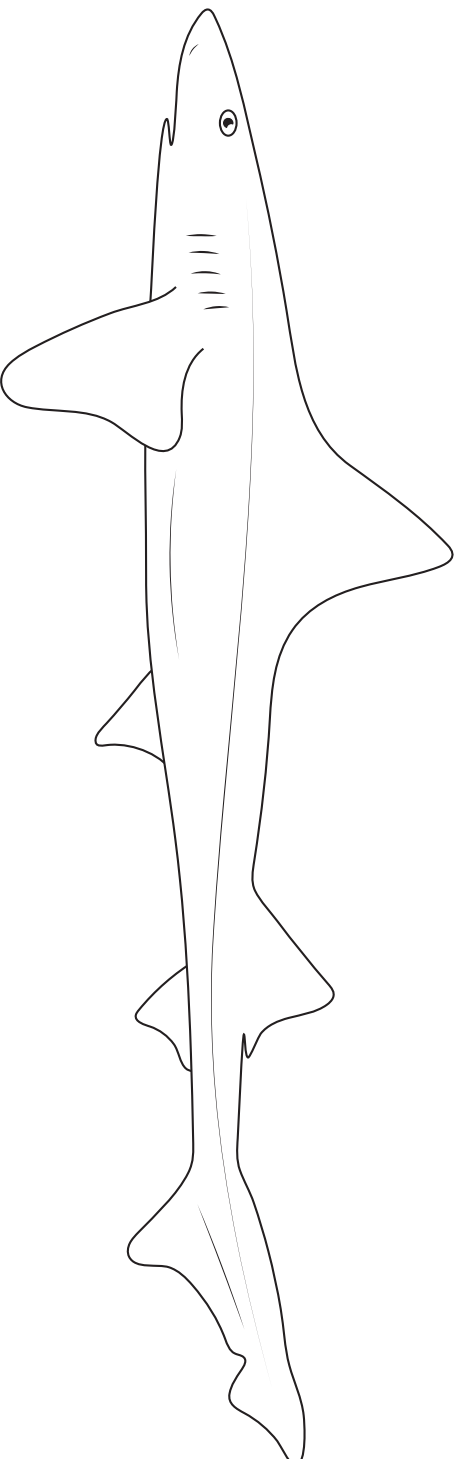
**Diet:** Bluefish, swordfish, tuna, sailfish and squid

**Reproduction:** Ovoviviparous (4–18 pups)

**Fun Fact:** The shortfin mako is the fastest shark species, reaching speeds of 25 mph, with short swim bursts up to 46 mph! These sharks have also been seen jumping as high as 30 feet out of the water!

# SMOOTH DOGFISH

*Mustelus canis*



**World Range / habitat:** Cold and temperate marine waters of the North Atlantic and Southern Hemisphere, from nutrient-rich banks to outer continental shelves

**Eastern United States Range:** Massachusetts to Florida, throughout the gulf of Mexico

**Size:** Up to 5 feet and 20 pounds

**Color:** Grey to brown on top, yellow-gray to white on the belly

**Diet:** Lobster, crab, fish, and mollusks

**Reproduction:** Viviparous (4–20 pups)

**Fun Fact:** Instead of sharp pointed teeth, dogfish have rows of flat, grinding teeth that are used for crushing its food!

# SMOOTH HAMMERHEAD SHARK

*Sphyrna zygaena*



**World Range / habitat:** Found in temperate marine waters of the North Atlantic and Southern Hemisphere with a preference for coastal, shallow waters.

**Eastern United States Range:** Canadian border to Florida and Gulf of Mexico

**Size:** Up to 16 feet and 800 pounds

**Color:** Dark brown-green to grey on top with a white belly

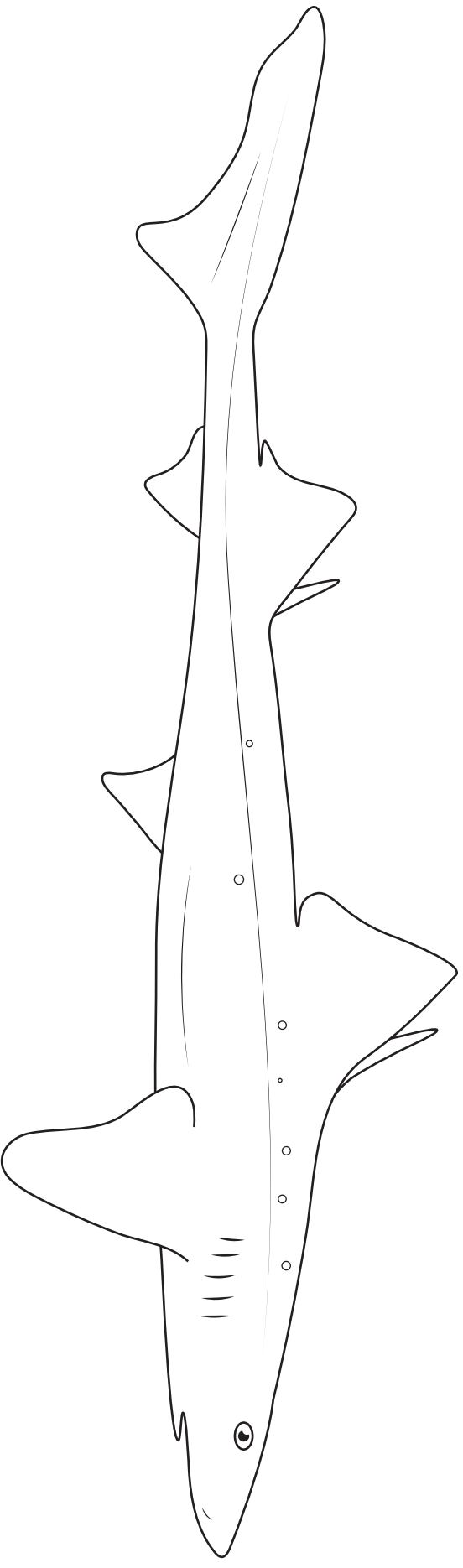
**Diet:** Bony fish, smaller sharks, rays and skates

**Reproduction:** Viviparous (20–50 pups)

**Fun Fact:** The smooth hammerhead is known to sometimes swim in freshwater estuaries and rivers!

# SPINY DOGFISH

*Squalus acanthias*



**World Range / habitat:** Temperate and arctic waters, from shallow coastal waters to the deep ocean

**Eastern United States Range:** Canadian border to Florida

**Size:** Up to 4 feet and 20 pounds

**Color:** Dark gray on top with a white belly, often with white spotting on the sides.

**Diet:** Squid, fishes (even wolffish!), crabs, and invertebrates

**Reproduction:** Oviviviparous (2–11 pups)

**Fun Fact:** They got the name “dogfish” from fishermen who observed them chasing smaller fish in large doglike packs!

# TIGER SHARK

*Galeocerdo cuvier*



**World Range / habitat:** Temperate and tropical waters, commonly found more coastal areas, near estuaries and seagrass beds

**Eastern United States Range:** Massachusetts to Florida, throughout the gulf of Mexico

**Size:** Up to 14 feet and 1,400 pounds

**Color:** Light brown to blue-green with a dark, splotchy pattern on top with a white or yellow belly. Young tiger sharks have distinct stripes that fade as they grow.

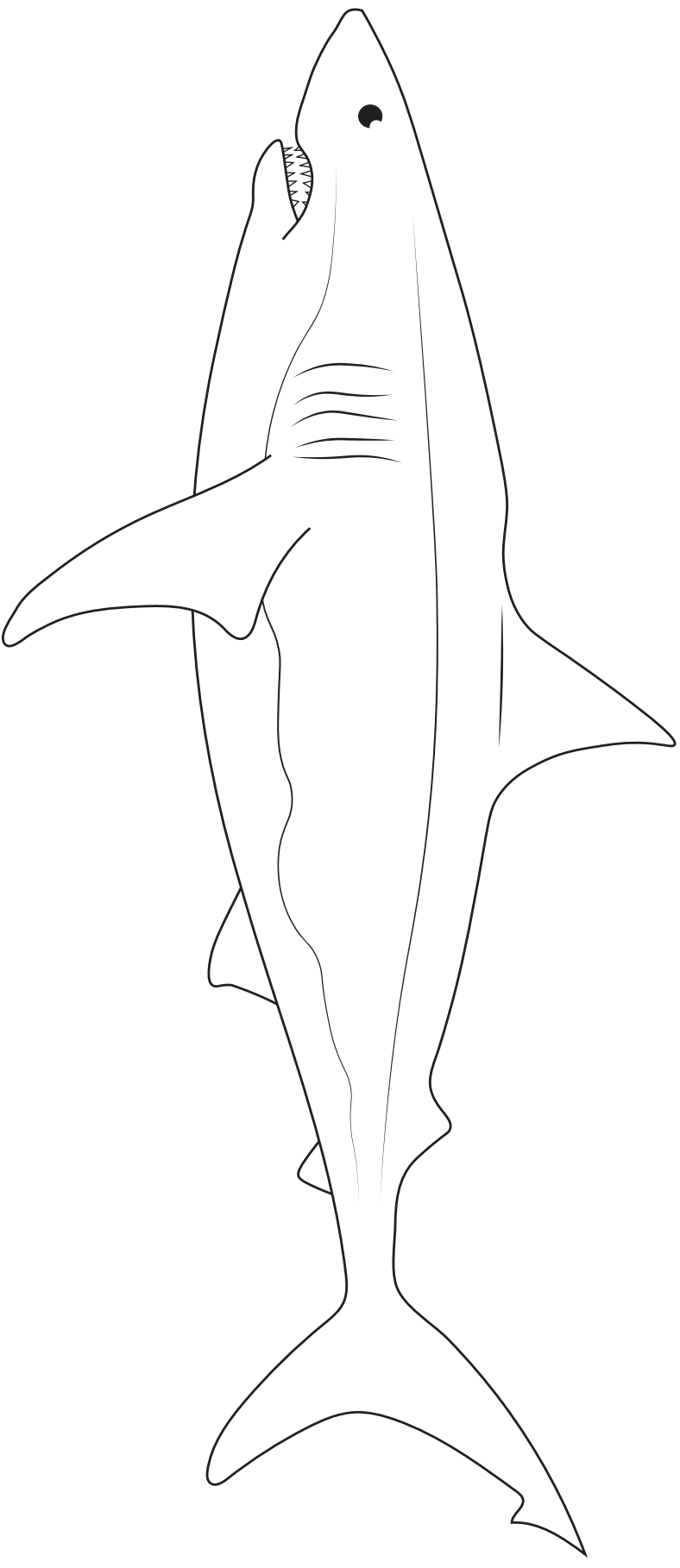
**Diet:** Sea turtles, rays, other sharks, birds, dolphins, squid, and bony fish

**Reproduction:** Ovoviviparous (10–30 pups...but up to 80 have been reported!)

**Fun Fact:** Tiger sharks have a huge appetite and will eat just about anything they find! They have been found with license plates, trash bags, tires and even cameras...just another good reason to keep our oceans clean!

# WHITE SHARK

*Carcharodon carcharias*



**World Range / habitat:** Cold, temperate, and tropical waters throughout the world, both coastal and pelagic waters

**Eastern United States Range:** Canadian border to Florida, throughout the gulf of Mexico

**Size:** Up to 20 feet and 4,000 pounds

**Color:** Medium to dark gray on top with a white belly. Each shark has a distinct pattern (like a fingerprint) on their side where the white and gray meet.

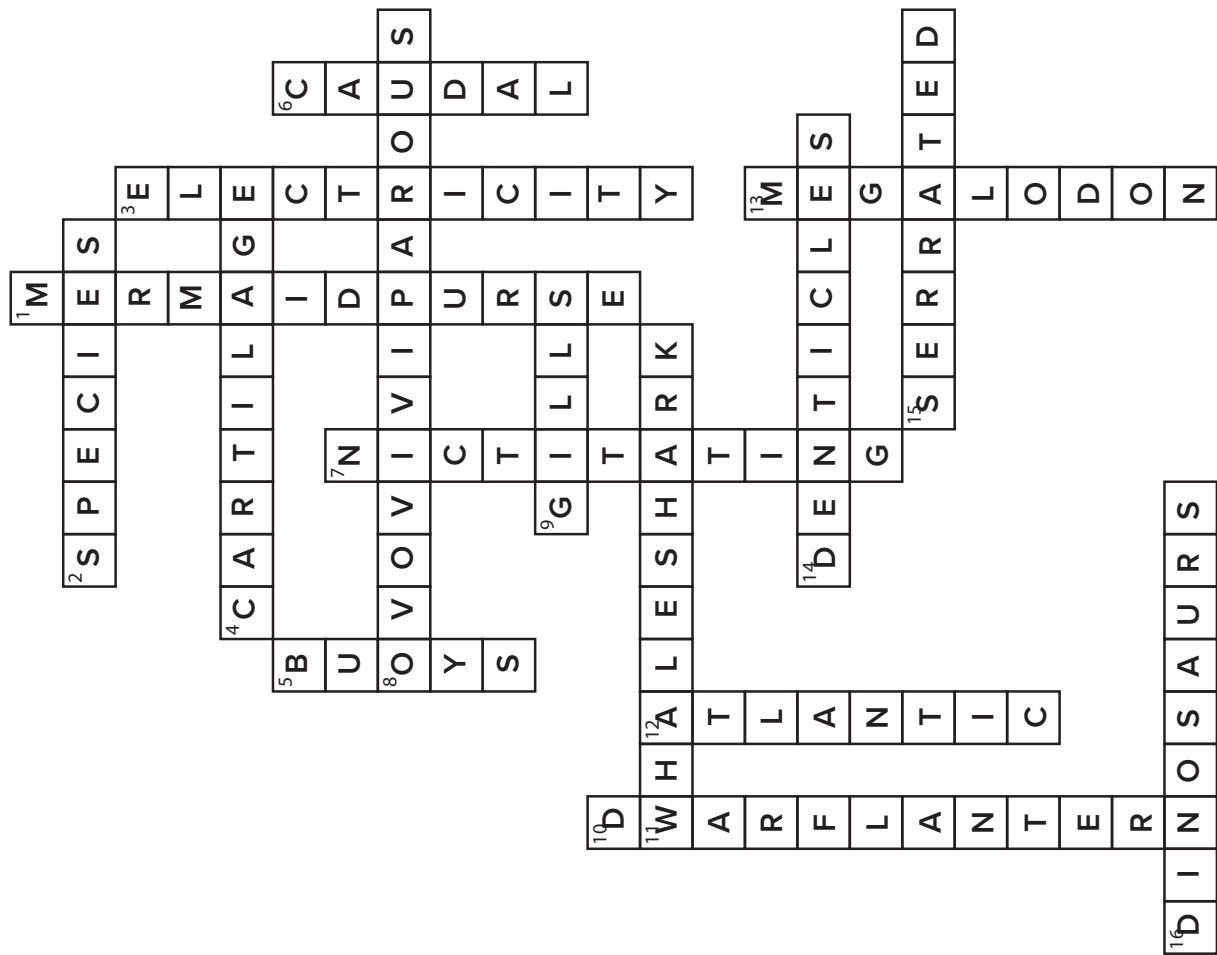
**Diet:** Marine mammals, other sharks, and large fish like tuna

**Reproduction:** Ovoviparous (2–12 pups)

**Fun Fact:** White sharks can live to 70+ years!

# answers:

	Squid	Lobster	Seal	Bluefish	Herring
White Shark	x	x	o	x	x
Blue Shark	o	x	x	x	x
Smooth Dogfish	x	o	x	x	x
Shortfin Mako	x	x	x	o	x
Porbeagle	x	x	x	x	o



For more information, visit our website!

<https://www.mass.gov/marinefisheries>

Massachusetts Division of Marine Fisheries  
251 Causeway Street, Suite 400  
Boston, Massachusetts 02114

