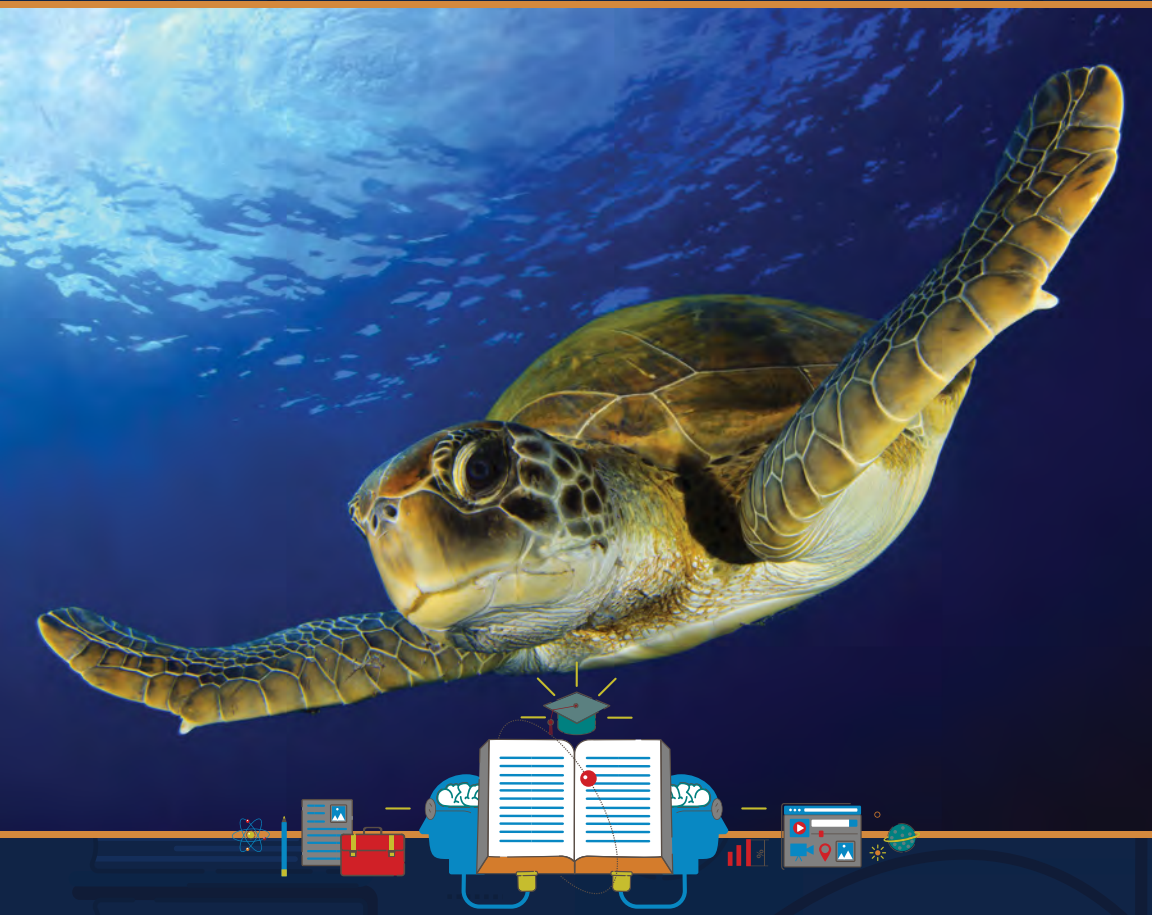
SEA TURTLE WORLD

A SCIENCE 3D ADVENTURE

GRADE 5



By MIKE HEITHAUS Ph.D

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KEY WORDS

Look for these words and try to figure out their meaning.

ABOTIC

AQUIFER

BIOTIC

COMMENSALISM

EXTINCTION

GROUNDWATER

HABITAT

HYDROSPHERE

MUTUALISM

NUTRIENTS

PARASITISM

PREDATOR

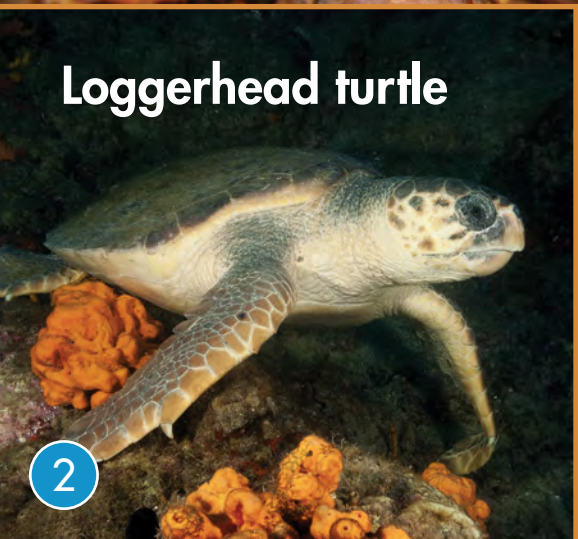
SYMBIOSIS

TABLE OF CONTENTS

TURTLES OF THE WORLD

Turtles are amazing reptiles! Like other reptiles they are cold-blooded and covered in scales. They also lay eggs with a tough covering. When you think of turtles, what is the first thing that comes to mind? Unlike other reptiles, they have a shell! Usually the shell is hard. Sometimes it is soft. Some turtles, called tortoises, are adapted to live on land. But, most of the 350 turtle species live almost all of their lives in or around water! Have you ever seen a turtle sunning itself on a log at a lake or pond?

Eastern box turtle



Loggerhead turtle

Softshell turtle

Turtles come in many sizes. The smallest turtle is the speckled tortoise. It is about 10 centimeters long (less than 4 inches) and weighs about 150 grams (one third of a pound). Compare that to the Galapagos tortoise, which grows to 400 kilograms (900 pounds). That is a lot of weight to carry around on land! The legs and skeleton of Galapagos tortoises are built to carry the weight, but they move very slowly!


Speckled tortoise

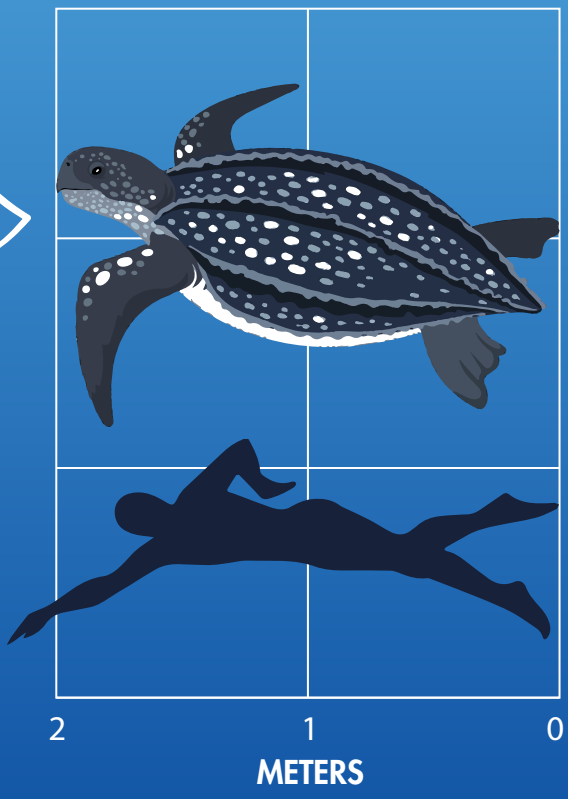

Galapagos tortoise

Most turtles that live in the world's freshwaters are small with small legs and webbing between their toes to help them paddle. They are pretty slow and clumsy on land. Some freshwater turtles can grow very big! Alligator snapping turtles can weigh 68 kilograms (250 pounds) or more!

Leatherback turtle

Turtles in the ocean grow larger than most turtles in freshwater. The leatherback turtle is the world's largest turtle. It grows to 700 kilograms, or 1,500 pounds. It would take more than 4,000 spectacled tortoises to weigh as much as a single leatherback turtle!

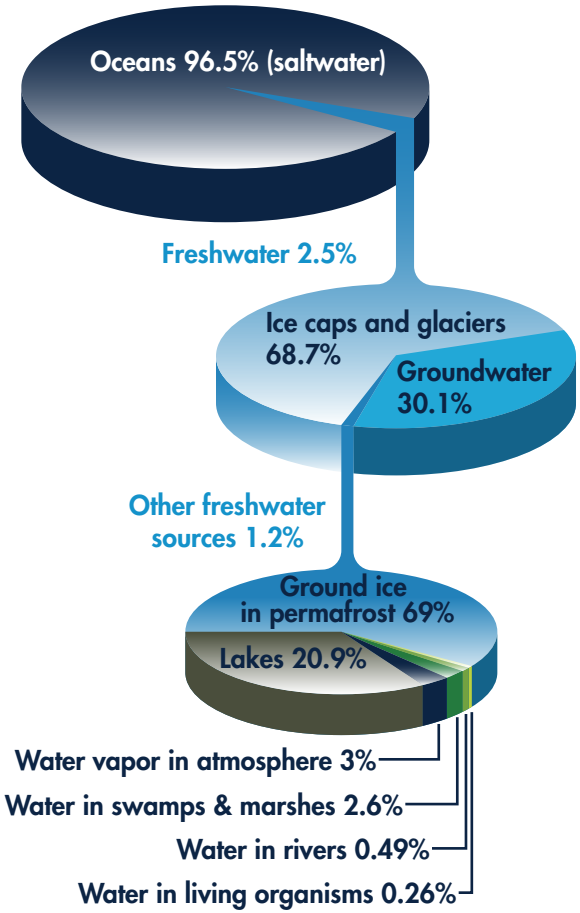
Size: 2.2 m (7 ft), 700 kg (1,500 lbs)

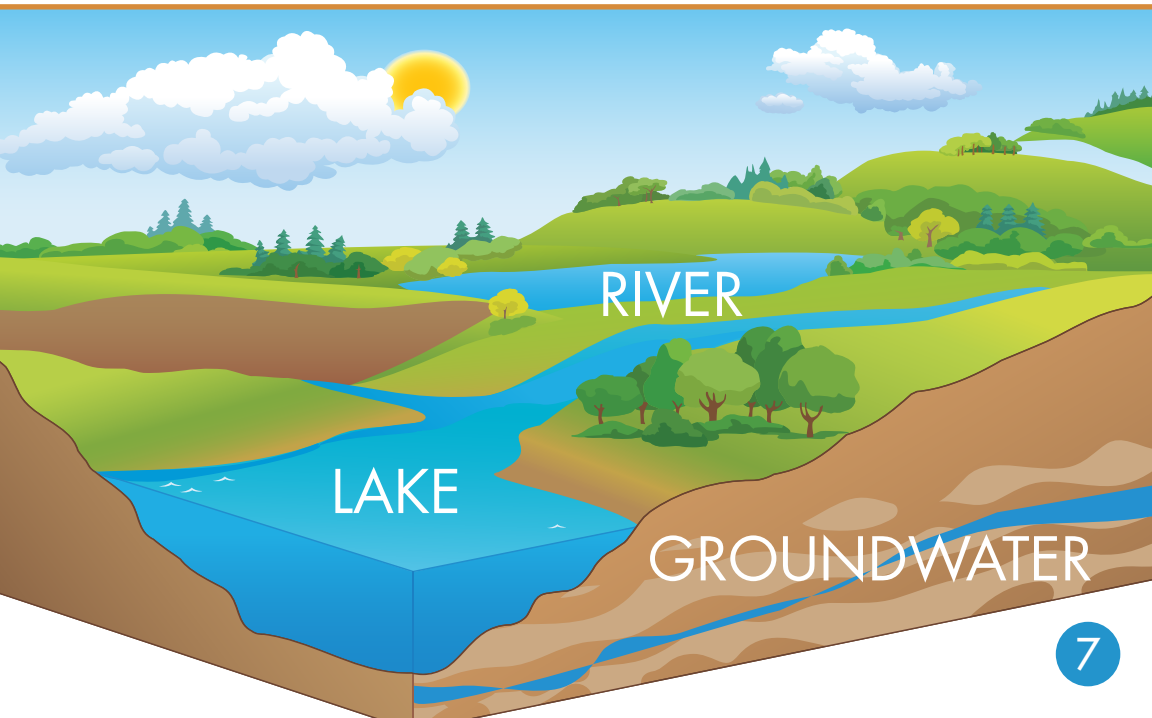


Body sizes of a human and a leatherback turtle!

WATER, WATER EVERYWHERE

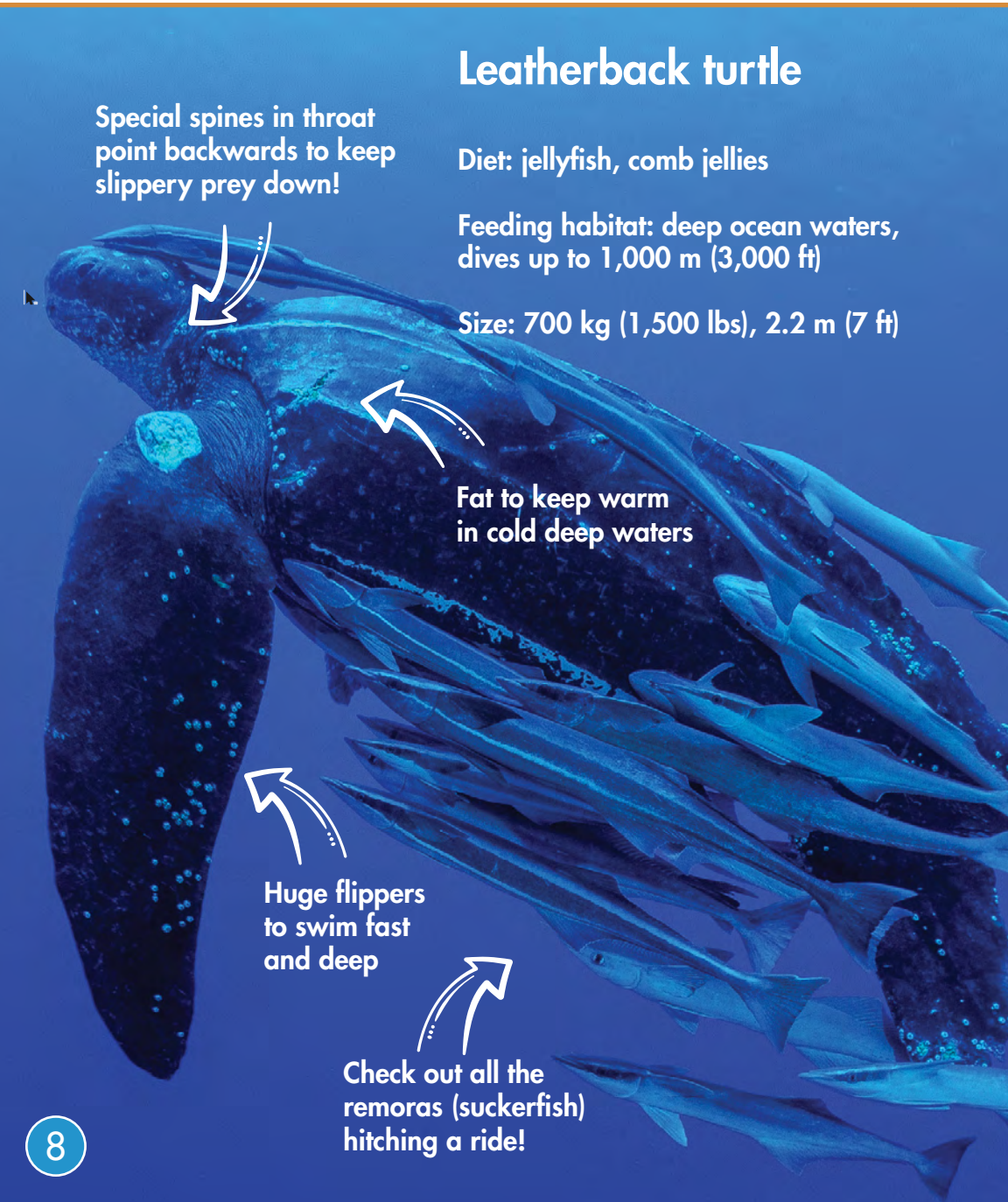
All the water on Earth is part of the **hydrosphere**, but not all water is the same. What kinds of water can you think of? Freshwater, saltwater, ice, and water vapor (water that is in the atmosphere) are all part of the hydrosphere. Not all of the water is on the surface of the Earth. Freshwater that moves underground can be very important for supporting ecosystems and people. This **groundwater** moves through porous rock. It can form large pools underground called **aquifers**, which are an important source of water for people.



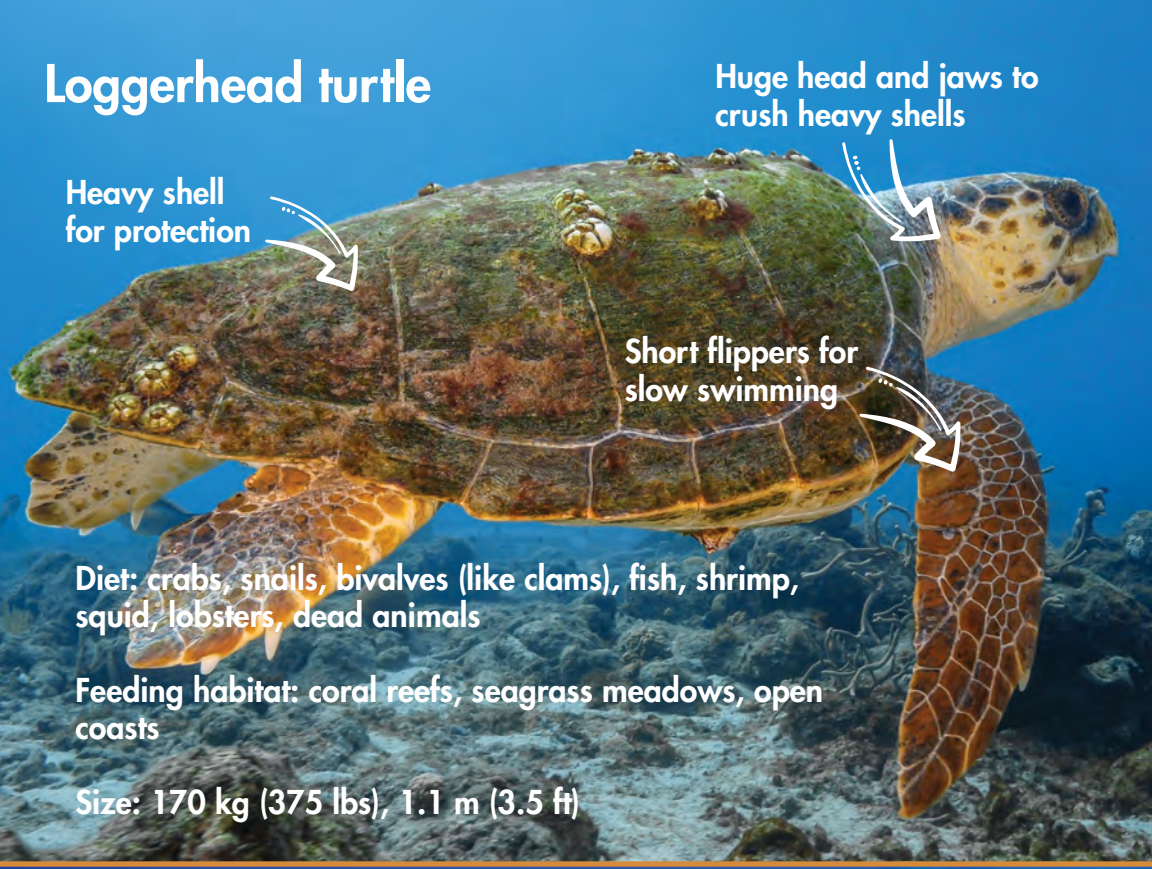


WORLD OF SEA TURTLES

Sea turtles are a special group of turtles. The first sea turtles lived 150 million years ago! Let's explore the seven species of sea turtles that are alive today and their **habitats**!



Loggerhead turtle



Diet: crabs, snails, bivalves (like clams), fish, shrimp, squid, lobsters, dead animals

Feeding habitat: coral reefs, seagrass meadows, open coasts

Size: 170 kg (375 lbs), 1.1 m (3.5 ft)

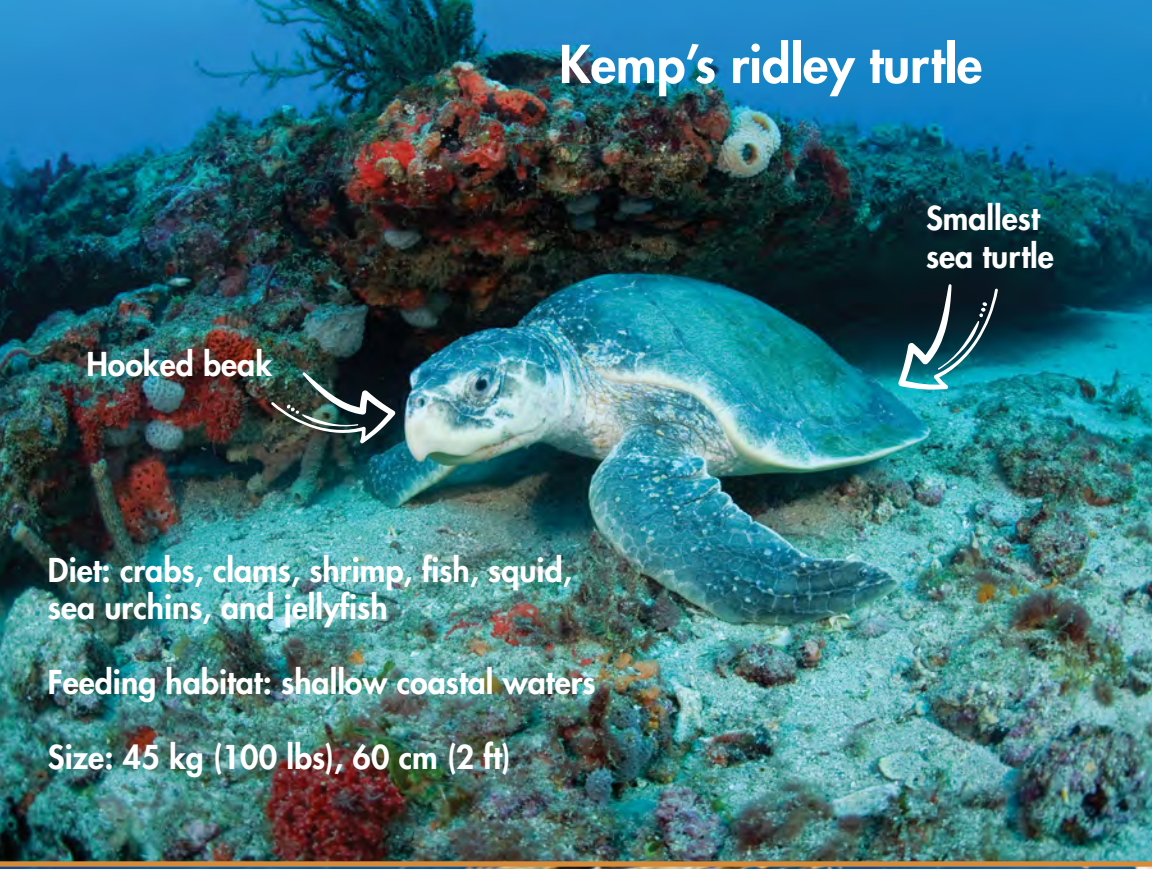
Hawksbill turtle

Diet: sponges, corals, squid, anemones, bubbles corals, other invertebrates

Feeding habitat: coral reefs

Size: 68 kg (150 lbs), 90 cm (2.9 ft)

Kemp's ridley turtle



Diet: crabs, clams, shrimp, fish, squid, sea urchins, and jellyfish

Feeding habitat: shallow coastal waters

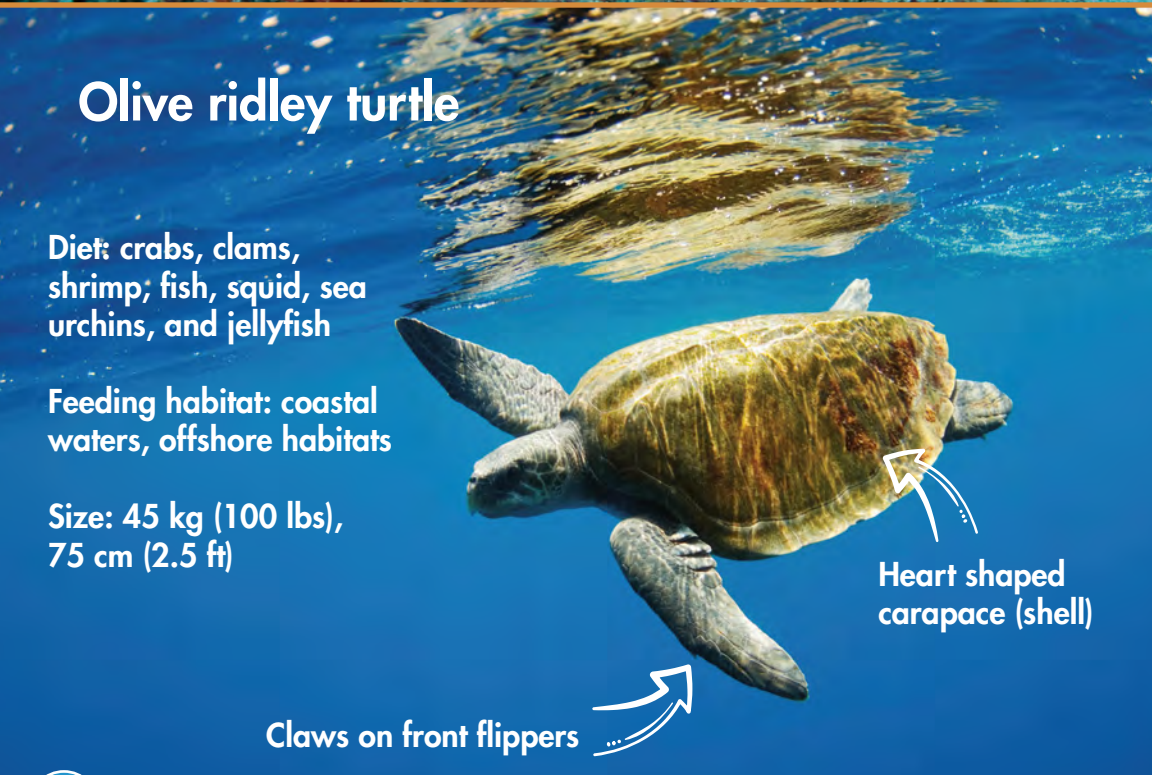
Size: 45 kg (100 lbs), 60 cm (2 ft)

Olive ridley turtle

Diet: crabs, clams, shrimp, fish, squid, sea urchins, and jellyfish

Feeding habitat: coastal waters, offshore habitats

Size: 45 kg (100 lbs), 75 cm (2.5 ft)



Green turtle

Diet: seagrass, algae, jellyfish, comb jellies, occasionally sponges

Feeding habitat: seagrass meadows, rocky areas with algae

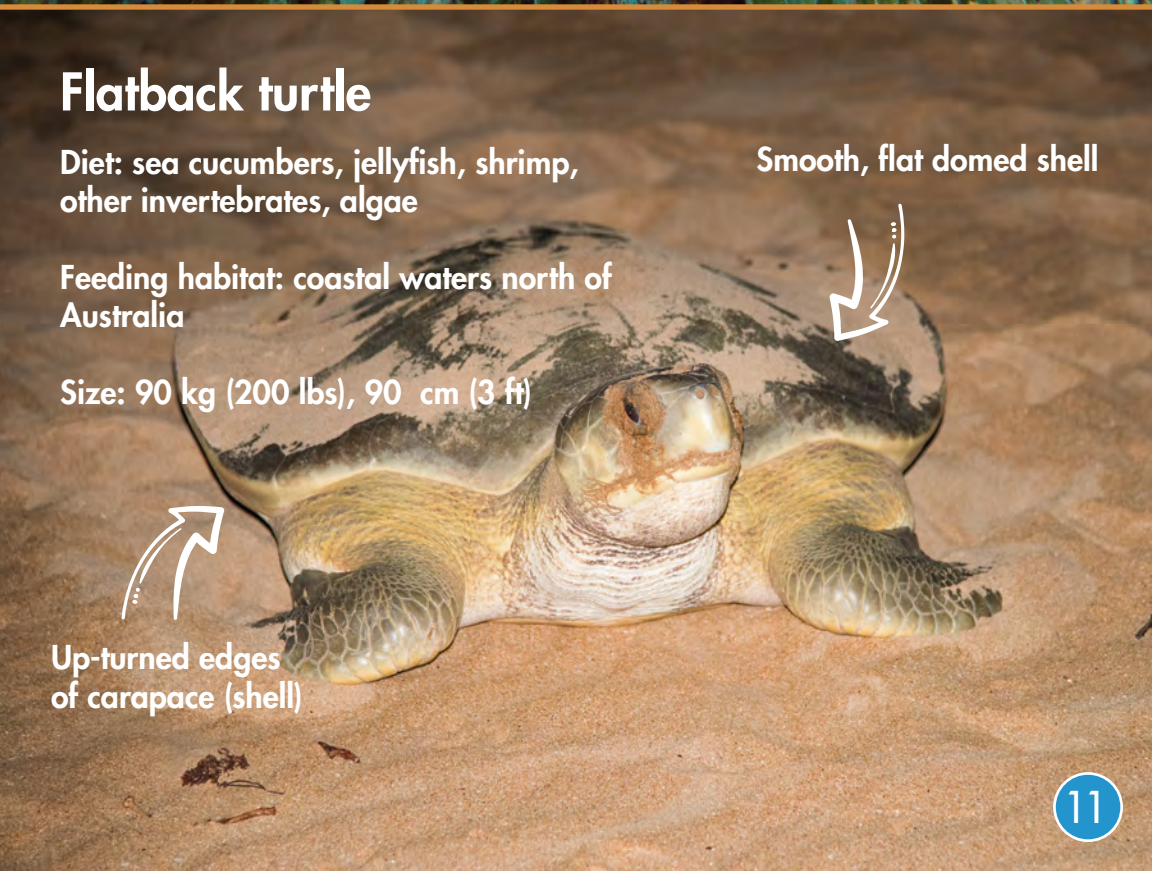
Size: 190 kg (420 lbs), 120 cm (3.7 ft)

Flatback turtle

Diet: sea cucumbers, jellyfish, shrimp, other invertebrates, algae

Feeding habitat: coastal waters north of Australia

Size: 90 kg (200 lbs), 90 cm (3 ft)



FROM BEACH TO THE BLUE

Sea turtles start their lives buried in the sand on a beach. The eggs hatch about two months after they are laid. All the eggs in a nest hatch together, and all the turtles start digging their way towards the surface. It can be exhausting work digging through almost a meter (3 feet) of sand. Sometimes it takes a couple days just to reach the surface of the sand!

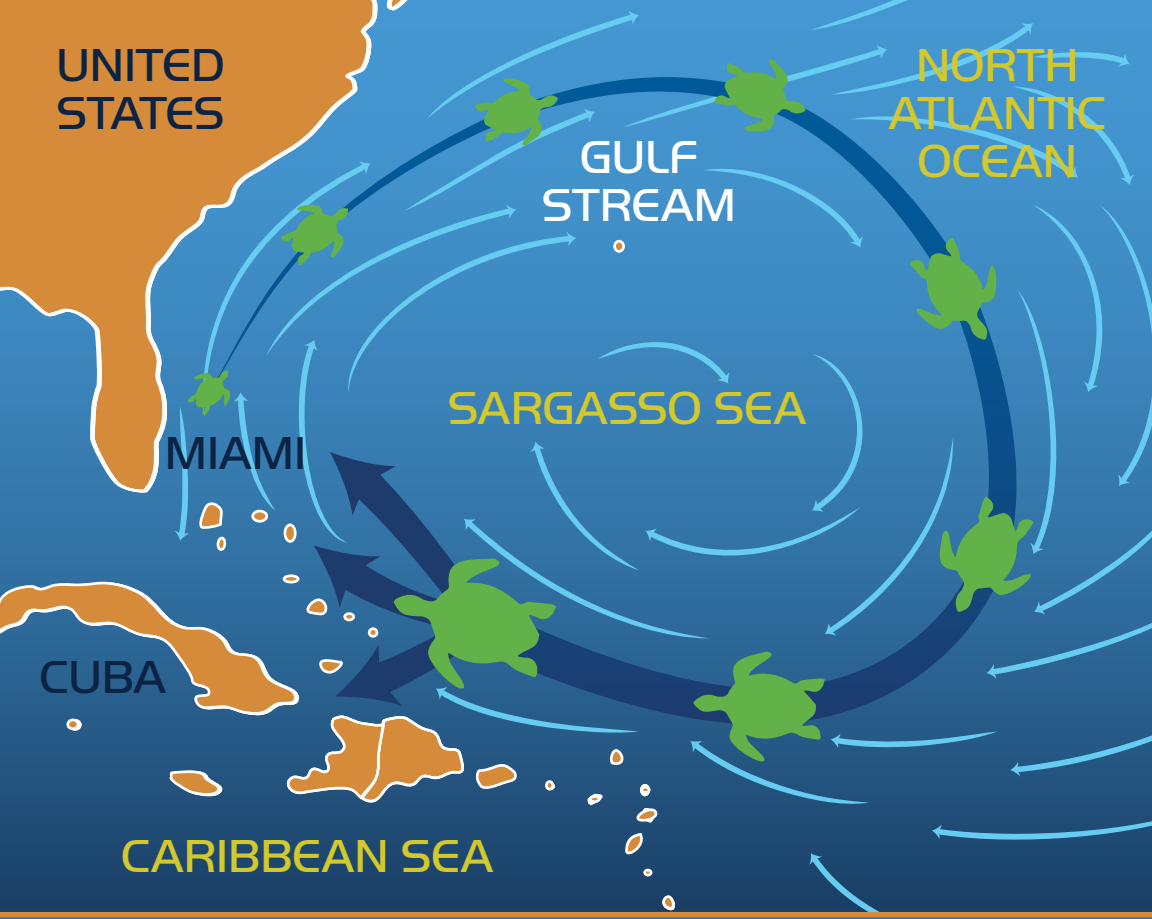
Life is very dangerous for a small sea turtle. Many of the hatchlings won't make it to the water. Crabs, racoons, birds, skunks, dogs, and other animals try to eat them! However, there is safety in numbers. To stay safer, the dozens of baby turtles from a single nest emerge together. Usually, many nearby nests hatch at the same time. The dozens or even hundreds of turtles scampering down the beach at the same time can confuse **predators**.

Another way baby turtles try to stay safe is to hatch at night. The darkness helps hide them from predators with weaker night vision. The danger doesn't end once they hit the waves. As soon as they are in the water, fish try to eat them! They swim as fast as they can away from shore to escape the area with the most fish.

For many decades scientists didn't know where most baby turtles went after they left the beach. Baby flatback turtles have been found close to shore. But the babies of other types of turtles seemed to disappear! Where did they go? Because scientists didn't know, they called the first years of sea turtles' lives the "Lost Years." Slowly, scientists used observations at sea, reports from people traveling across the oceans, and new technologies to figure out what happens during these lost years.

Sea turtles are more at home in the water than on land. But, they use their lungs to get oxygen. That means they have to come to the surface to breathe air. Some sea turtles can hold their breath for up to seven hours!

It turns out that the baby turtles that survive the danger zone of the beach and waters near the shore start looking for patches of floating algae. These patches provide a great home for the growing turtles. They can hide from predators like big fish and sharks. They also can find nearby meals. They eat things like snails, small crabs and fish, shrimp, jellyfish, and even algae. The baby turtles float on their rafts for up to several years! In that time, they may ride the currents around an entire ocean!



Baby turtles ride the currents starting near the beaches where they hatched. They keep riding until they are big enough to avoid most predators and they are close to a place with enough food for them near the shore.

It may take a couple years, but eventually the baby turtles, now about the size of a dinner plate, float close to the shore again. They swim away from their floating home. Only about 1 out of every 1,000 turtles will make it to adulthood.
They find a new home near the shore. Green turtles look for seagrass pastures. They stop eating small fish and shrimp and start eating algae and seagrass. Hawksbill turtles find homes on coral reefs. Loggerhead turtles are happy near seagrass meadows or coral reefs. Big leatherback turtles don't swim to the coast. They stay in the deep water where they can find their favorite food – jellyfish.

SEA TURTLE ECOSYSTEMS

Sea turtles finish growing to adulthood in "foraging habitats." These habitats get their name because these are areas where the turtles spend a lot of their time looking for food and eating. Sea turtles don't just eat in their foraging habitats. They also interact with other turtles and other species. Organisms have different types of relationships. For instance, some turtles get cleaned by small fish. The fish get a meal, and the turtle gets a good cleaning! This mutually beneficial relationship is called **mutualism**. Other turtles clean themselves by rubbing against sponges. This helps scrape algae off their shells, but the sponge doesn't benefit from the interaction.

Symbiosis occurs when two species live in close association.

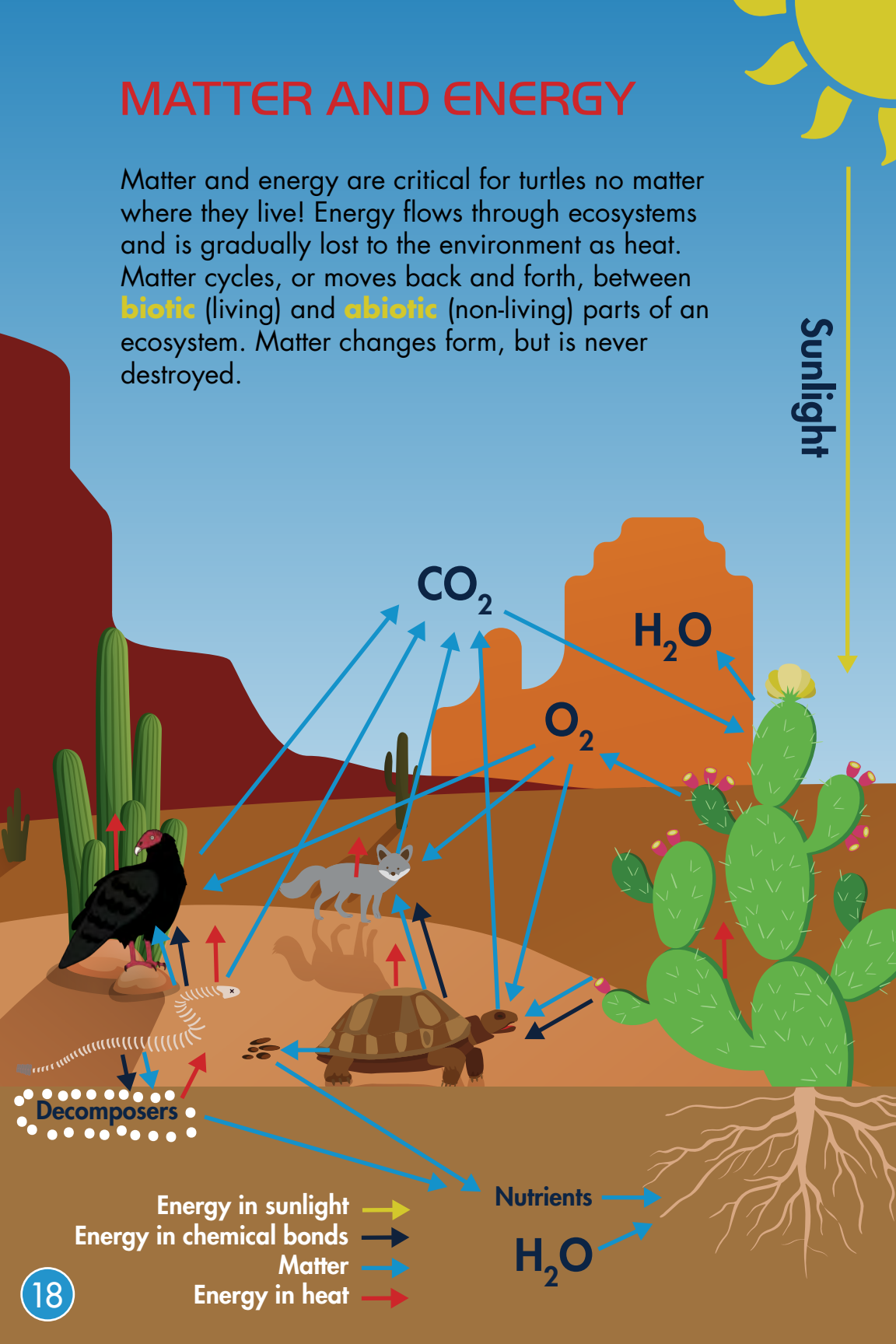
Fish clean a green turtle. The fish get a meal and the turtle stays healthy. Both benefit from the interaction. This type of symbiosis is called mutualism.

Turtles have parasites, like worms, that live inside them. In **parasitism**, parasites get a home and a meal, but they hurt the host they live in or on. The barnacles on a turtle's back don't help or hurt the turtle, but they get a place to live, and a free ride to food. This relationship is called a **commensalism**. Symbioses can be mutualism, parasitism, or commensalism. What other interactions can you think of in oceans?

The loggerhead turtle is a predator of conch.

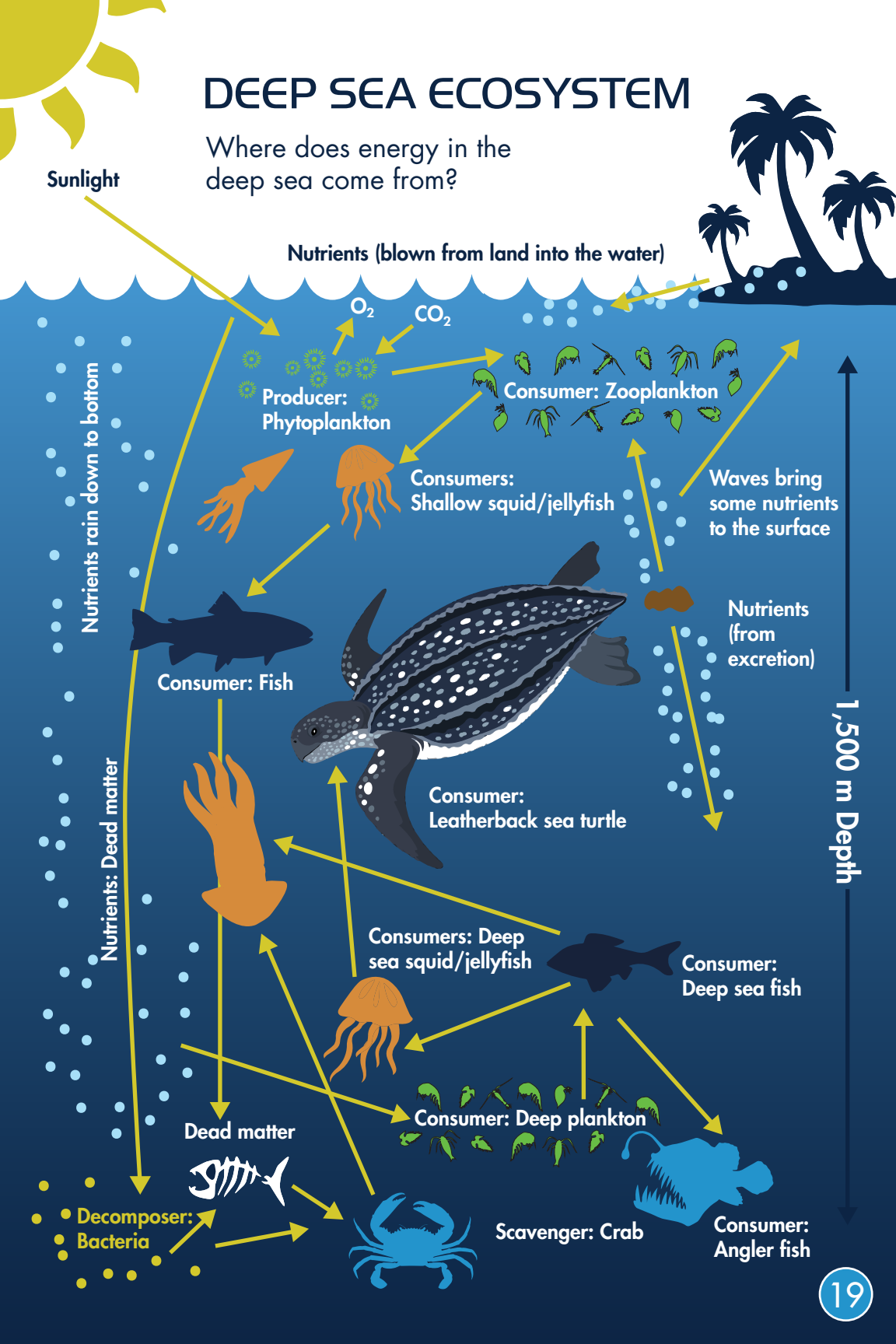
MATTER AND ENERGY

Matter and energy are critical for turtles no matter where they live! Energy flows through ecosystems and is gradually lost to the environment as heat. Matter cycles, or moves back and forth, between **biotic** (living) and **abiotic** (non-living) parts of an ecosystem. Matter changes form, but is never destroyed.



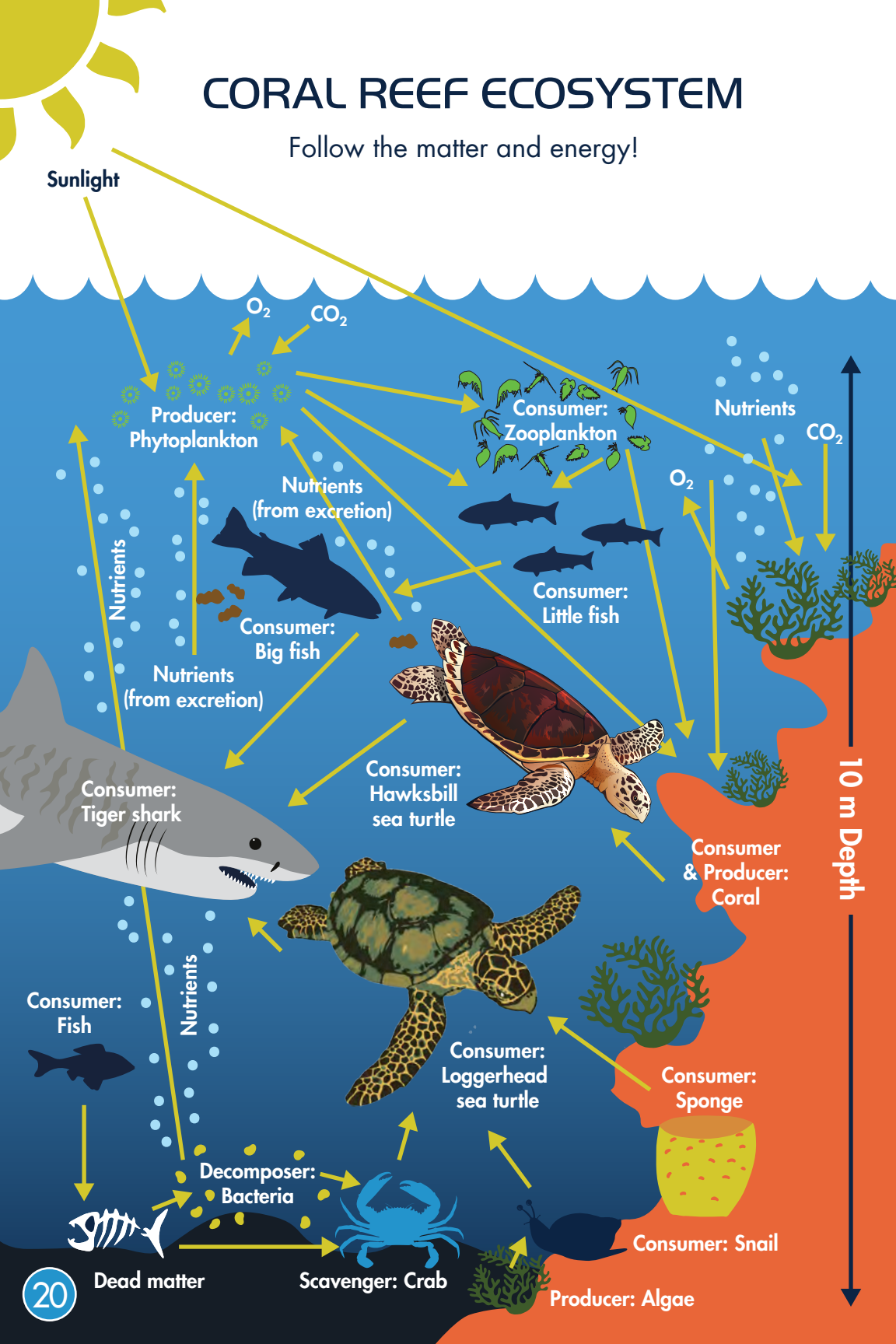
DEEP SEA ECOSYSTEM

Where does energy in the deep sea come from?

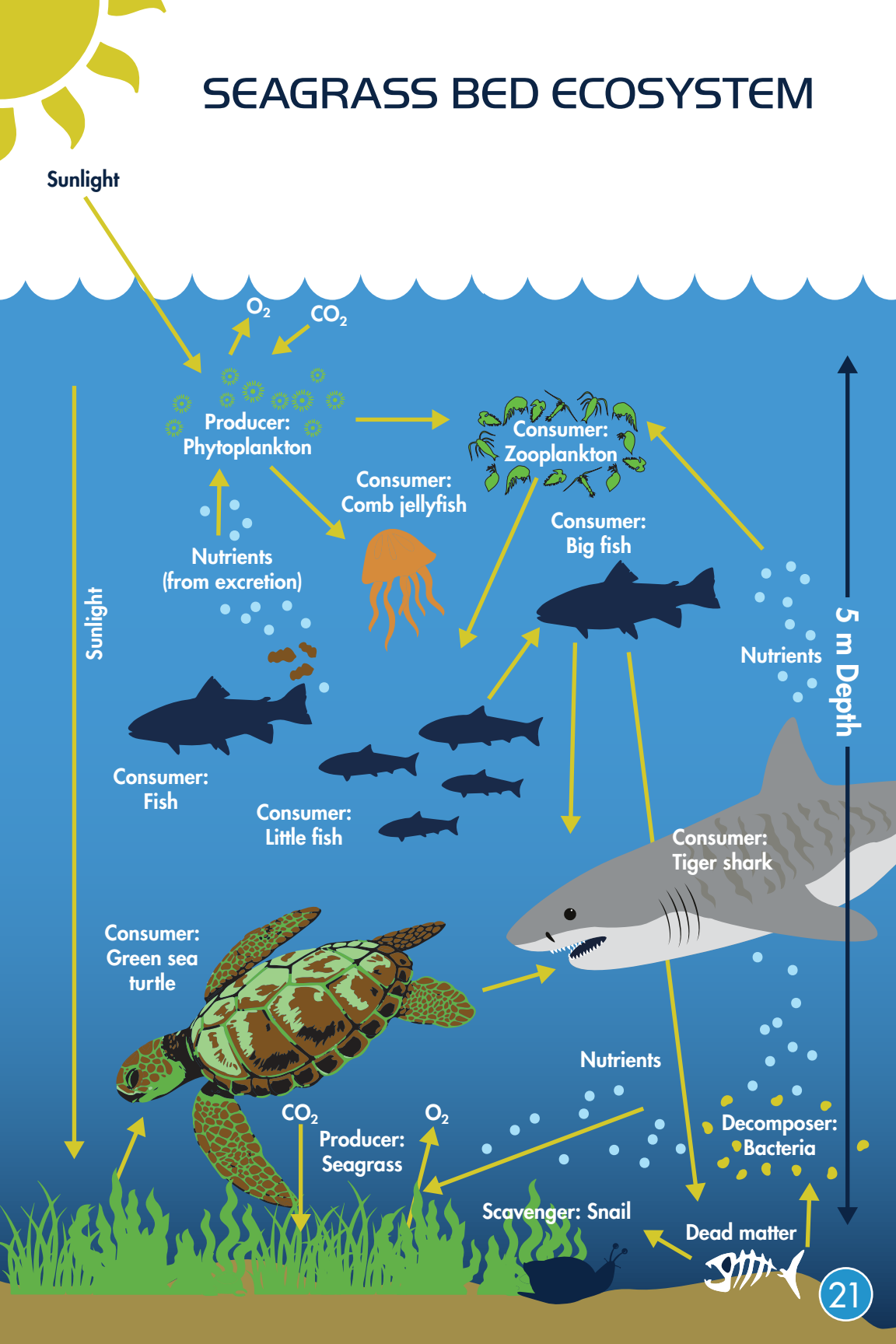


CORAL REEF ECOSYSTEM

Follow the matter and energy!



SEAGRASS BED ECOSYSTEM



NUTRIENTS MATTER!

Seagrass is the main source of food for green turtles in many places. Seagrass is a flowering plant that lives underwater. It can form huge pastures. Seagrasses grow by extending stems under the sediment. Their leaves sprout up through the mud or sand.

Seagrasses are very important for many reasons. They can remove pollution from the water. They are also food for green turtles, fish, and small invertebrates that serve as food for fish and other animals. Seagrass are also beneficial because they provide safety for small fish, shrimp, and crabs. When these animals get bigger, they are important food for other animals and for people. To survive, seagrasses need plenty of light and **nutrients** to build their bodies. They get the nutrients from the bottom where they grow.

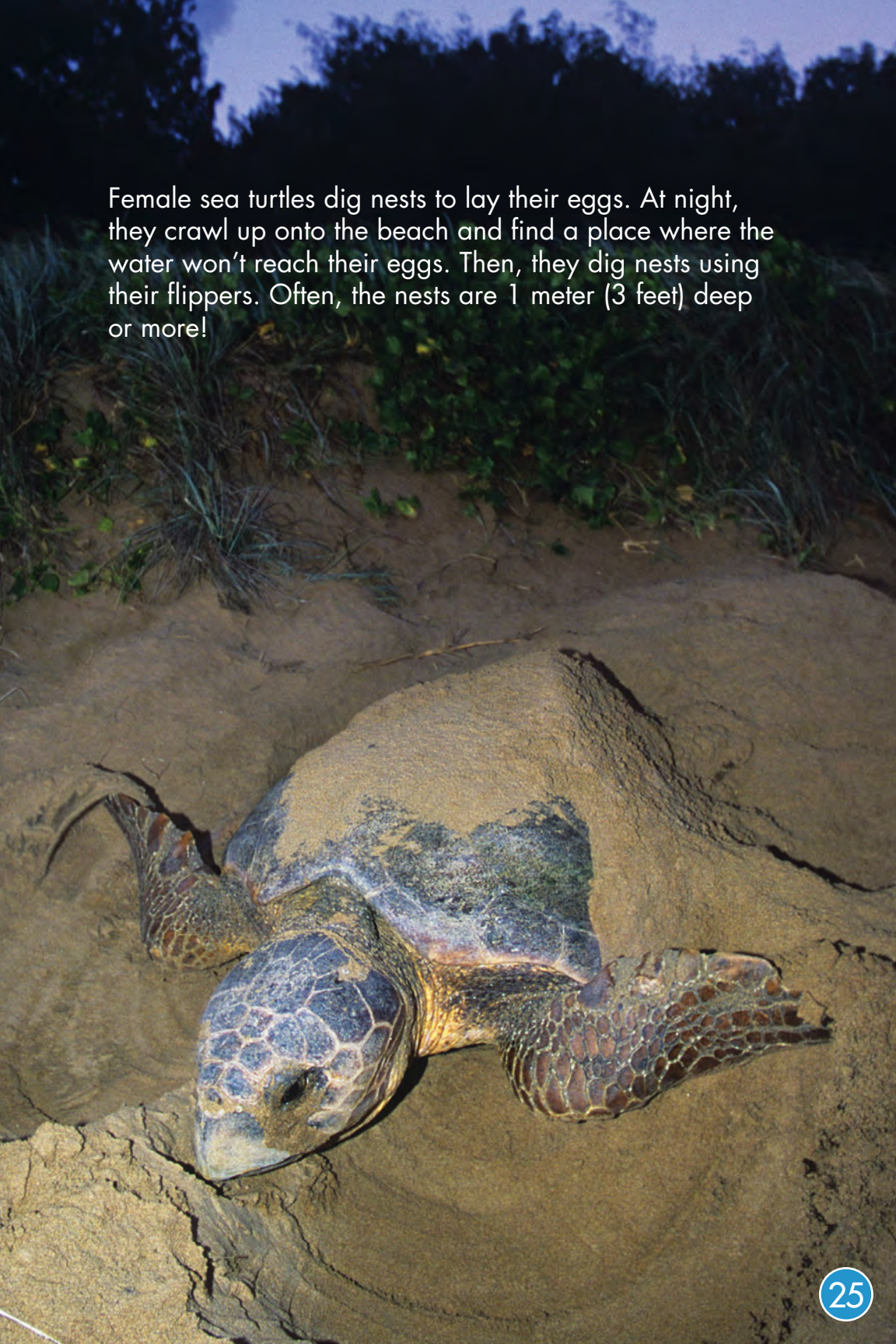
However, too much nutrients can have negative effects. Fertilizer from lawns and farms can run into the water. This causes too much algae to grow on the top of the water. This is called an algae bloom. The top of a lake can look like it is covered in green goop! In oceans, algae can block the sun for seagrass and animals below. When algae and seagrass dies, decomposers can remove all the oxygen from the water. Algae can also pile up on beaches or red tides can bloom. The tiny organisms that form red tides release toxins that can kill fish and make it difficult for people to breathe! Scientists around the world are trying to figure out how to prevent too many nutrients from flowing into bodies of water.

Too many nutrients flowing into the water can lead to "algae blooms." The algae blooms can remove all the oxygen from the water and kill many organisms. Algae blooms are a problem in rivers, ponds, lakes, and oceans in many parts of the world.

RETURN TO THE BEACH

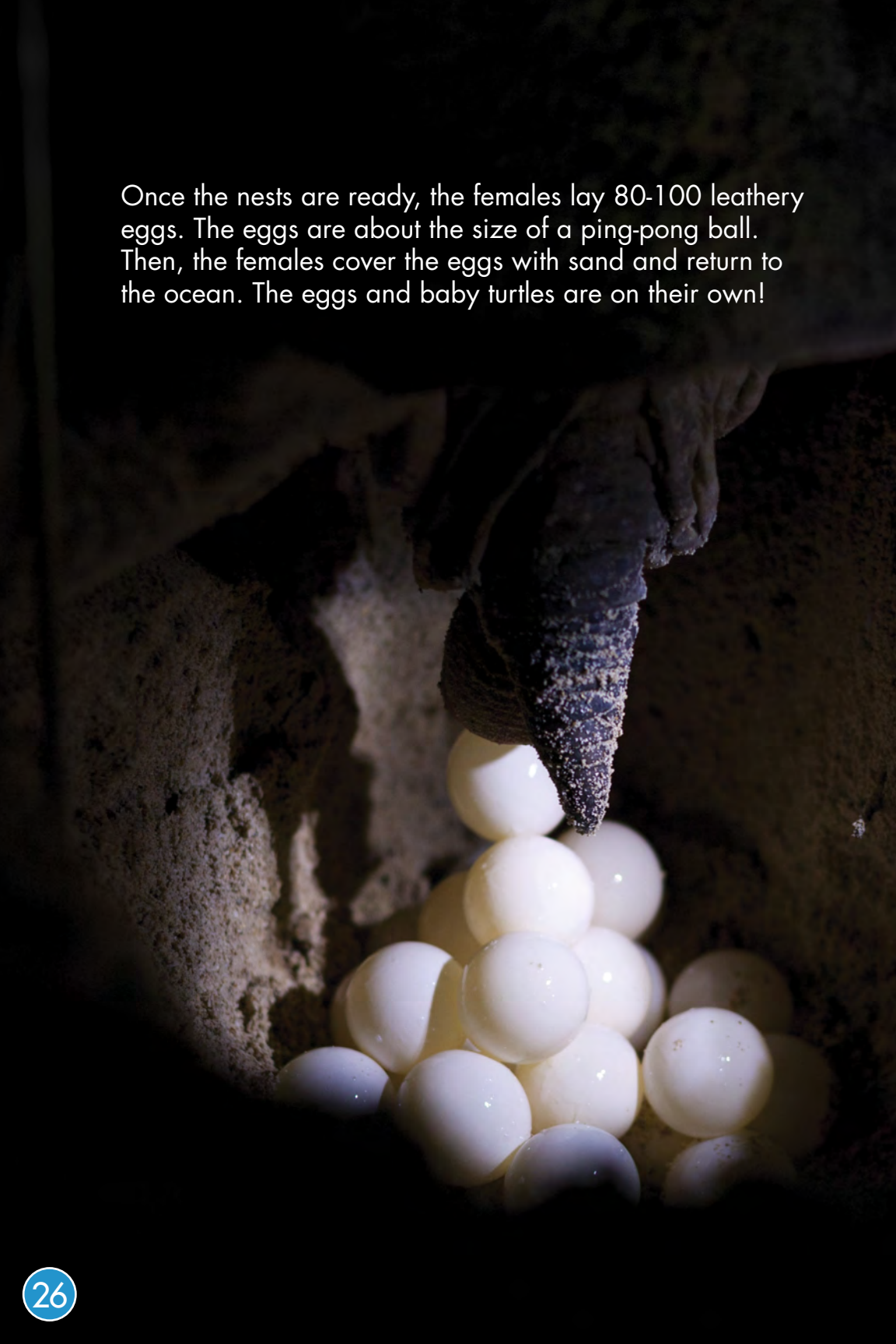
Adult female sea turtles return to the beaches where they hatched to lay their own eggs. But, most species don't make the trip from foraging area to nesting beaches every year. They take one or more years off between their migrations to lay eggs. They do this because it takes a lot of energy to swim to the nesting beach and to crawl up on the beach to lay eggs. Some migrations between feeding areas and nesting beaches aren't very far, but most are hundreds or thousands of kilometers! Imagine swimming that far every year! Male sea turtles will also travel to the waters near the nesting beaches to mate.

Female turtles nest several times when they travel to nesting beaches. They rest in the shallow waters near the beach in between their crawls onto shore.



Female sea turtles dig nests to lay their eggs. At night, they crawl up onto the beach and find a place where the water won't reach their eggs. Then, they dig nests using their flippers. Often, the nests are 1 meter (3 feet) deep or more!

Once the nests are ready, the females lay 80-100 leathery eggs. The eggs are about the size of a ping-pong ball. Then, the females cover the eggs with sand and return to the ocean. The eggs and baby turtles are on their own!



Sprint!

Baby turtles need to get to the water fast to avoid predators.

SEA TURTLE TROUBLES

Human actions have put six of the seven sea turtle species at risk of **extinction**. Scientists don't know enough about the flatback turtle to know if it is also in danger of extinction.

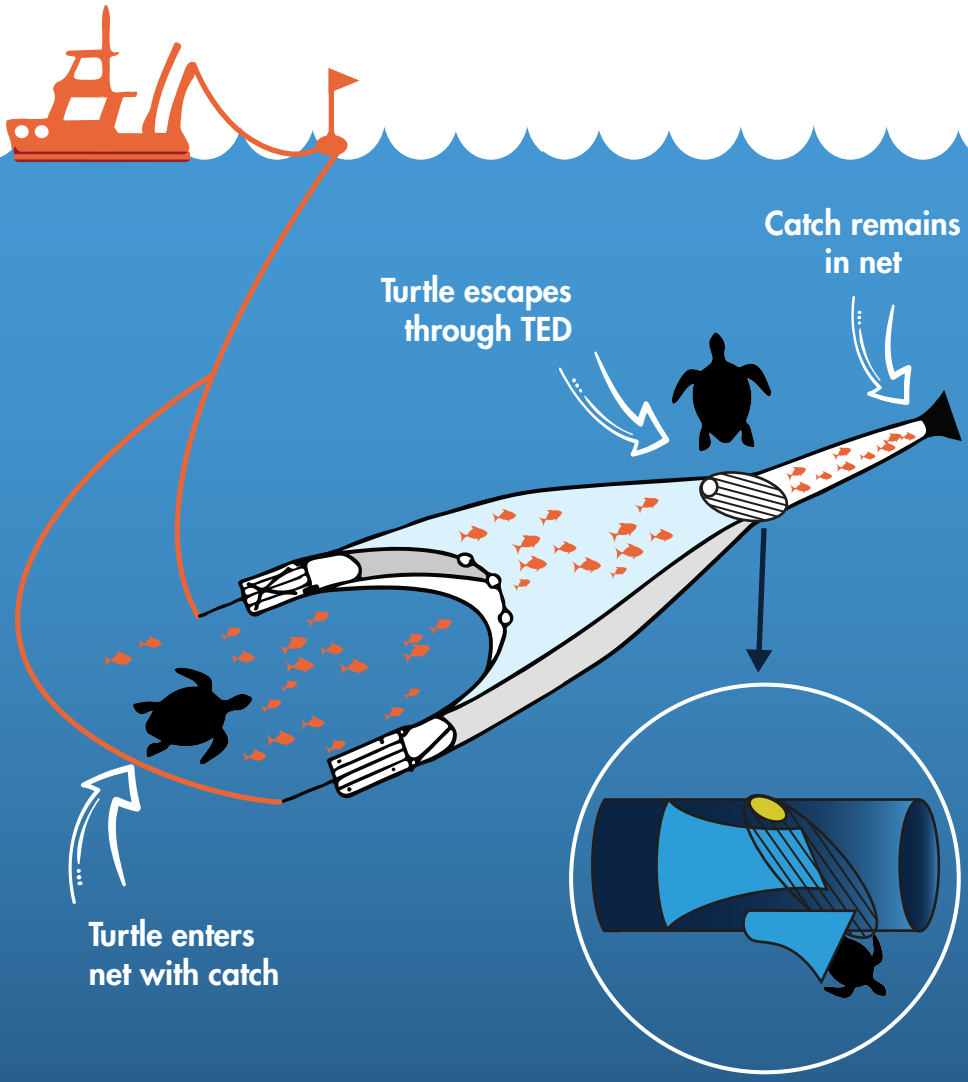
In some areas, turtle populations were nearly wiped out because people hunted the adults for food. They dug up the eggs too. Sea turtle eggs are now protected in most of these places. And people also don't catch as many turtles to eat.

People are helping protect sea turtle nests and baby sea turtles by marking nests and turning off lights.

Plastics are a major threat to sea turtles. They eat plastic bags, floating plastic debris and balloons because they mistake them for food, like jellyfish.

When people build buildings and roads near beaches, many places where turtles nest are destroyed. The females have nowhere to lay their eggs. And where beaches are not destroyed, people can accidentally destroy nests by walking or driving over them. Another problem for turtles is too much light at night. Lights from houses and buildings can confuse newly hatched baby turtles. Instead of crawling towards the moon reflecting on the ocean, they crawl towards buildings or a road. Luckily, people are now protecting turtle nesting areas. They mark the nest areas so people don't accidentally hurt them. People that live and work near turtles turn off their lights or use special lights when turtles are hatching. Scientists and volunteers go out at night to collect baby turtles that go the wrong way and take them to the ocean. All the hard work to protect turtles is working. In many places, the number of turtles nesting and hatching is increasing!

TURTLE EXCLUDER DEVICE (TED)



Turtles also face threats from people in the ocean. In the past, fishermen were accidentally catching too many sea turtles in nets and on lines. But technologies that help turtles escape from nets have helped save many turtles! Another big threat to turtles in the ocean is plastic and balloons. Turtles mistake them for food and eat them. This can kill turtles! Be sure to recycle or properly dispose of plastics and don't release balloons outside!

STUDYING SEA TURTLES

Scientists around the world study sea turtles on nesting beaches and at their foraging habitats. On beaches, scientists count the number of nests, eggs, and baby turtles that hatch. They take measurements of the female turtles that come ashore, and put tags in their flippers so they can identify them. They can put special tags on the backs of adult turtles that communicate with satellites. These tags can track where the turtles go when they leave the beach!

Studying turtles at their foraging habitats is more difficult. But, it is the only way to learn about male turtles and juvenile turtles. Scientists have learned how to safely catch turtles. When a turtle is on a boat, they can weigh and measure it. When they catch the same turtle again they can measure how much it grew. They can put special tags on the turtles that record how deep and how long they dive, how fast they move, and even how many bites of food they take! Some new tags have video cameras and other sensors to record what turtles eat and how they interact with other turtles and other species. These cameras can show scientists what habitats turtles like and what areas they avoid.

These are some of the methods you will use when you join the green turtle research team in The Bahamas!

GLOSSARY

ABIOTIC
related to or resulting from non-living things

AQUIFER
a large underground lake of water

BIOTIC
related to or resulting from living things

COMMENSALISM
a relationship in which one species benefits and the other is not affected

EXTINCTION
when a species disappears forever

GROUNDWATER
water that is found underground

HABITAT
the place an animal or plant lives

HYDROSPHERE
all of the water on Earth, including on its surface, in the air, and underground

MUTUALISM
an interaction in which both species benefit

NUTRIENTS
substances that provide nourishment essential for growth and life

PARASITISM
an interaction in which an organism lives in or on another organism and harms the host organism it lives in or on

PREDATOR
an animal that catches and eats other animals

SYMBIOSIS
an interaction between two organisms that live close together

PHOTO CREDITS

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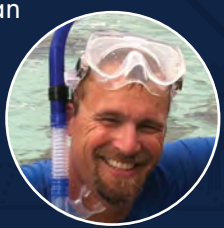
SCIENCE·3D

Thanks for exploring with us! Our science adventures take us around the world to uncover secrets of the most amazing animals and places. Our mission and passion is to share these scientific discoveries with you. There are so many cool things to see out there, even in your own backyard, so get outside and explore!

MIKE HEITHAUS PH.D.



Dr. Mike Heithaus is a scientist, explorer, author, educator, and television host. He is a professor of biology and Dean of the College of Arts, Sciences & Education at Florida International University. Mike and his students study sharks, whales, sea turtles, and other large marine animals around the world. They also work with people to help protect these species. Mike loves sharing his work with others. He has written text books and helped create programs for students in elementary, middle, and high school. He has been on television programs including on PBS, National Geographic, and Discovery Channel's Shark Week.

PATRICK GREENE

As a wildlife filmmaker, Patrick has always had a passion for animals. He started to draw pictures of sharks and whales when he was just five years old. Later, he went to college to become a marine biologist and learned a lot about science. Then he got a job in television and learned how to make videos, too. Since then, he's gone all over the world studying and filming wild animals. He's made shows for National Geographic, PBS and ABC, and even won an Emmy Award. He loves making videos to teach students about science and about the many creatures that share our world.

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