

**A TEXT FEATURES**

The **title** often helps readers identify an article's main idea. What kind of information do you think this article will present?

**aquatic** (ə-kwăt'ĭk) *adj.*  
growing or living in the water

**ecosystem**  
(ē'kō-sĭs'təm) *n.* a physical environment, such as an ocean, and the community of things that live in it

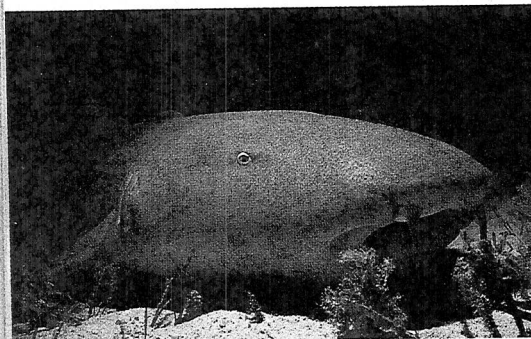
**decimate** (dĕs'ə-măt') *v.*  
to kill or destroy a large part of

# WHAT DO YOU KNOW ABOUT SHARKS?

SHARON GUYNUP

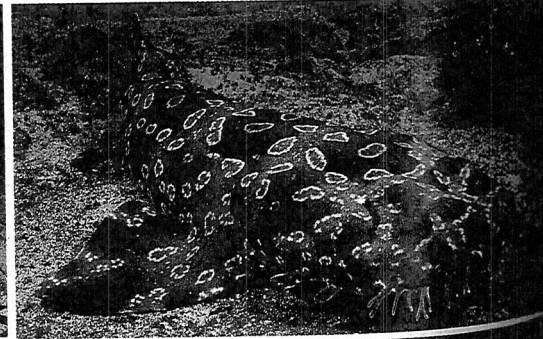
They're ferocious predators. They haunt us in nightmares. But the scariest thing about sharks may be that they're vanishing from the world's oceans. . . .

Why do sharks need protection? Sharks are top predators in the **aquatic** food chain—a web that interconnects all organisms, in which smaller creatures become food for larger predators. Without sharks, the ocean's delicate **ecosystem** would be disrupted. Species that sharks devour, like seals, for example, would overpopulate and in turn **decimate** other species, like salmon. Read the following questions and answers to learn more about the world's most fear-inspiring fish.



## Nurse Shark

Nurse sharks are sluggish bottom dwellers found in the Atlantic Ocean. They're usually not dangerous and are one of the few sharks that breathe by pumping water through their gills while lying motionless. They sometimes suck in prey as well.



## Wobbegong Shark

Wobbegongs are found resting on the sea floor in shallow waters of the Indo-Pacific and the Red Sea. The barbels, or fringe of flesh around their mouths, are feelers that act as camouflage.

## What Are Sharks? **B**

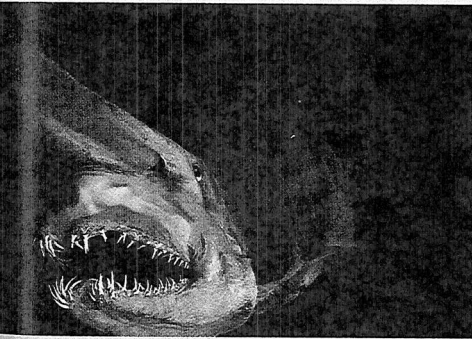
Sharks are fish with skeletons made of rubbery cartilage (tough, flexible tissue) instead of bone. They're cold-blooded (unable to generate their own body heat), breathe through gills (respiratory organs), and have a two-chambered heart. Though most live in warm seas, the Greenland shark thrives in frigid Arctic seas. **C**

## What's the Largest Shark? The Smallest?

Weighing in at 15 tons and stretching up to 14 meters (46 feet) long, the whale shark is the world's largest fish—bigger than a school bus! Nine hundred meters (2,953 feet) below the ocean surface lives the smallest shark: the dwarf shark. An adult measures only 25 centimeters (10 inches) long!

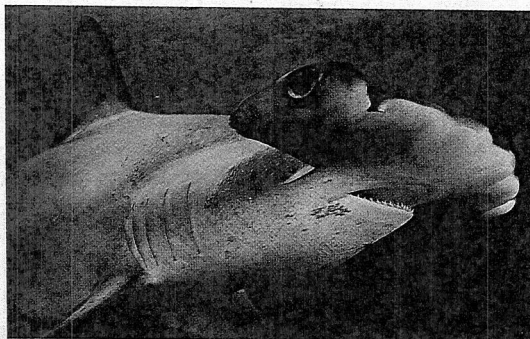
## Are All Sharks Dangerous to People?

Most sharks are harmless. "Out of 375 shark species, only two dozen are in any way really dangerous to us," says Robert Hueter, director of the Center for Shark Research at Mote Marine Laboratory. Still, scientists don't know for sure why sharks sometimes attack humans. One theory: sharks may mistake the sound of swimming humans for that of injured fish—which are easy prey.



### Goblin Shark

Goblin sharks feature needle-like teeth. They're rarely spotted—only 36 specimens have been counted—most found in waters deeper than 1,150 feet. Scientists think they inhabit seas from Europe to Australia.



### Hammerhead Shark

Hammerheads inhabit shorelines and deep seas worldwide. The head, or cephalofoil, provides greater maneuverability—and enlarged nostrils and eyes at the ends of their "hammer" receive more information giving them a hunting advantage. **D**

### **B** OUTLINE

Each orange question is a **subheading** that introduces a new main idea. State each main idea as a phrase and add it to your outline.

### **C** OUTLINE

What are the important details in this paragraph? Add them to your outline.

### **D** TEXT FEATURES

**Sidebars** are set off from the main article—usually on the side or bottom of the page—and provide additional information. You can read sidebars at any time. What information does this sidebar give you?

**E TEXT FEATURES**

Preview the **subheadings** on these pages. Which section will tell you where swimmers are most at risk?

**Which Shark Is the Most Dangerous to Humans? E**

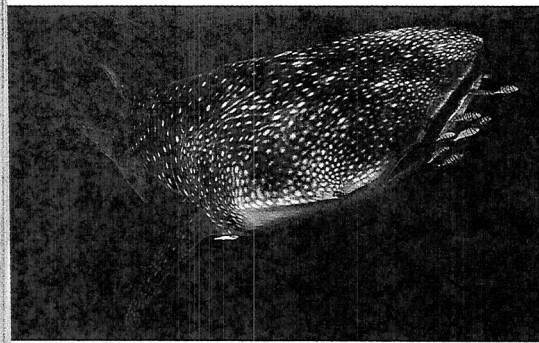
30 “In terms of fatal attacks, it’s a tossup between the great white, the tiger, and the bull shark,” Hueter says. People fear the massive great white the most because of its size—up to 6.4 meters (21 feet) long—and its large razor-like teeth, not to mention the terror stirred up by *Jaws* flicks. But great whites usually inhabit deep seas—not shallow waters where people swim. Worldwide, fewer than 100 human attacks by all shark species are reported each year.

**Where Do Most Shark Attacks Happen?**

Florida leads the world in shark bites, with 22 to 25 reported incidents each year. But, claims Hueter, they’re not repeated  
40 shark attacks—usually a single bite. . . . “Most really bad attacks occur off the coasts of California, Hawaii, Australia, and South Africa,” Hueter says.

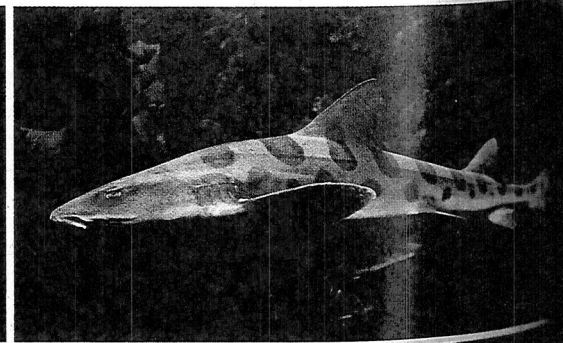
**Just How Powerful Is a Shark’s Bite?**

Scientists built a “shark-bite meter” that measures the jaw strength of one species, the dusky shark. It exerts 18 tons of pressure per square inch on a victim. That’s like being crushed beneath the weight of ten cars!



**Whale Shark**

The largest fish in the sea—whale sharks—are very docile. They feed on plankton, tiny drifting animals. They swim with their enormous mouths open, filtering food from the water with 15,000 tiny teeth.



**Leopard Shark**

Leopard sharks are commonly found near shore, often in large schools along the Pacific coast from Oregon to Mexico. They feed on small fish and crustaceans and are generally harmless.

## What Do Sharks Eat?

Sharks chow down on what they can when they can—usually smaller animals from shrimp and fish to turtles and seabirds. Some, like the bull shark, consume large mammals like sea lions or dolphins; others, like the whale shark, eat only plankton, tiny drifting animals. And tiger sharks devour just about anything—mammal **carcasses**, tin cans, plastic bags, coal, and even license plates have been found inside their stomachs! **F**

## How Do Sharks Find Prey?

Sharks can hear a wide range of sounds but are attracted by bursts of sound—like those made by an injured fish—or occasionally humans romping in water. At close range, sharks also sense vibration with their lateral line, a sensory system that runs from head to tail on each side of a shark's body. Inside the lateral line, which helps a shark maintain balance as well as detect sound, are canals filled with fluid and tiny “hair cells.” Sound causes the liquid to vibrate, alerting the shark to the presence of another creature. This sense allows sharks to hunt even in total darkness.

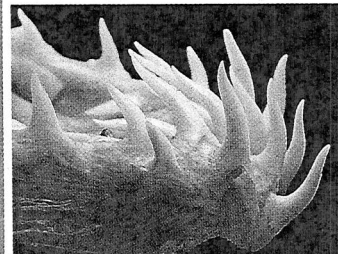
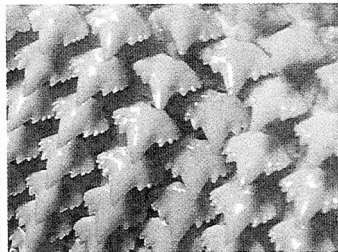
### Brushing and Flossing

Sharks continually lose their teeth, but some species grow new teeth as often as every week to replace worn or lost ones. During their lifetime, some species shed 30,000 teeth. Shark teeth vary according to what's on the menu:

**top:** nurse shark teeth, which chew up shellfish

**middle:** tiger shark teeth, which crunch everything from fish and birds to tin cans and other garbage

**bottom:** mako shark teeth, which grind up squid and big fish like tuna and mackerel **G**



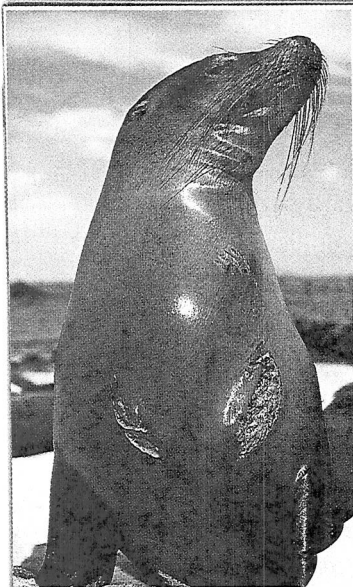
**carcass** (kär'kəs) *n.* the dead body of an animal

### **F** OUTLINE

How many details about what sharks eat have you included in your outline? Remember, you can include as many lettered details as you need.

### **G** TEXT FEATURES

Graphic aids are visuals, such as graphs, photographs, and maps, that provide more information on a topic. What information do you get from looking at these photographs that you don't get from the text?



### **Shark Attack**

This sea lion managed to survive a vicious shark attack. H

**diffuse** (dī-fyōōz') v. to spread out or through

#### **H TEXT FEATURES**

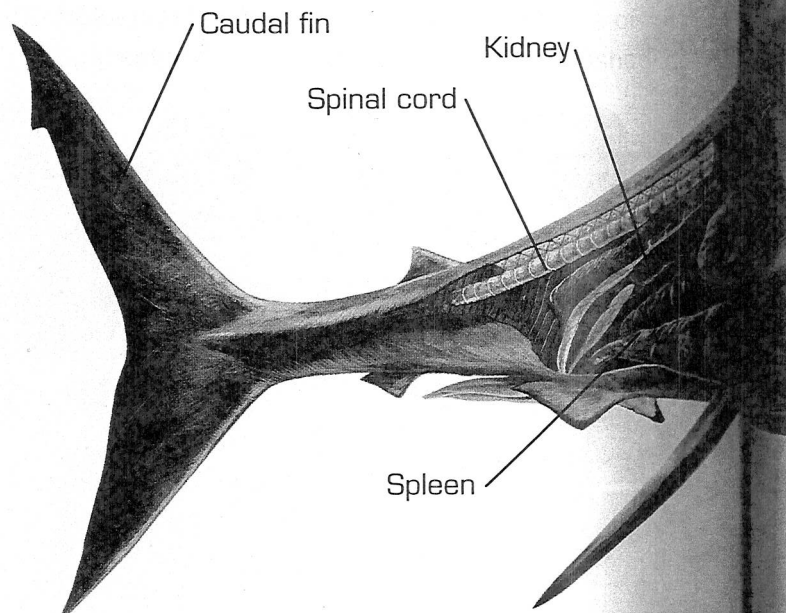
A **caption** is the text that provides information about a graphic aid. How does this caption support your understanding of the photo and reinforce the article?

### **What's a "Feeding Frenzy"?**

Sharks usually travel solo, but if one finds easy prey, an excited, competitive swarm of sharks may join in the feast, biting anything that lies in its path.

### **How Do Sharks Breathe?**

70 A shark usually swims with its mouth open to force oxygen-rich water to pass over a set of gills housed in a cavity behind its head—a process known as ramjet ventilation. Gill flaps called lamellae absorb and help diffuse oxygen into the shark's bloodstream. Lamellae also help sharks expel carbon dioxide, a gaseous waste product of breathing, from the bloodstream.



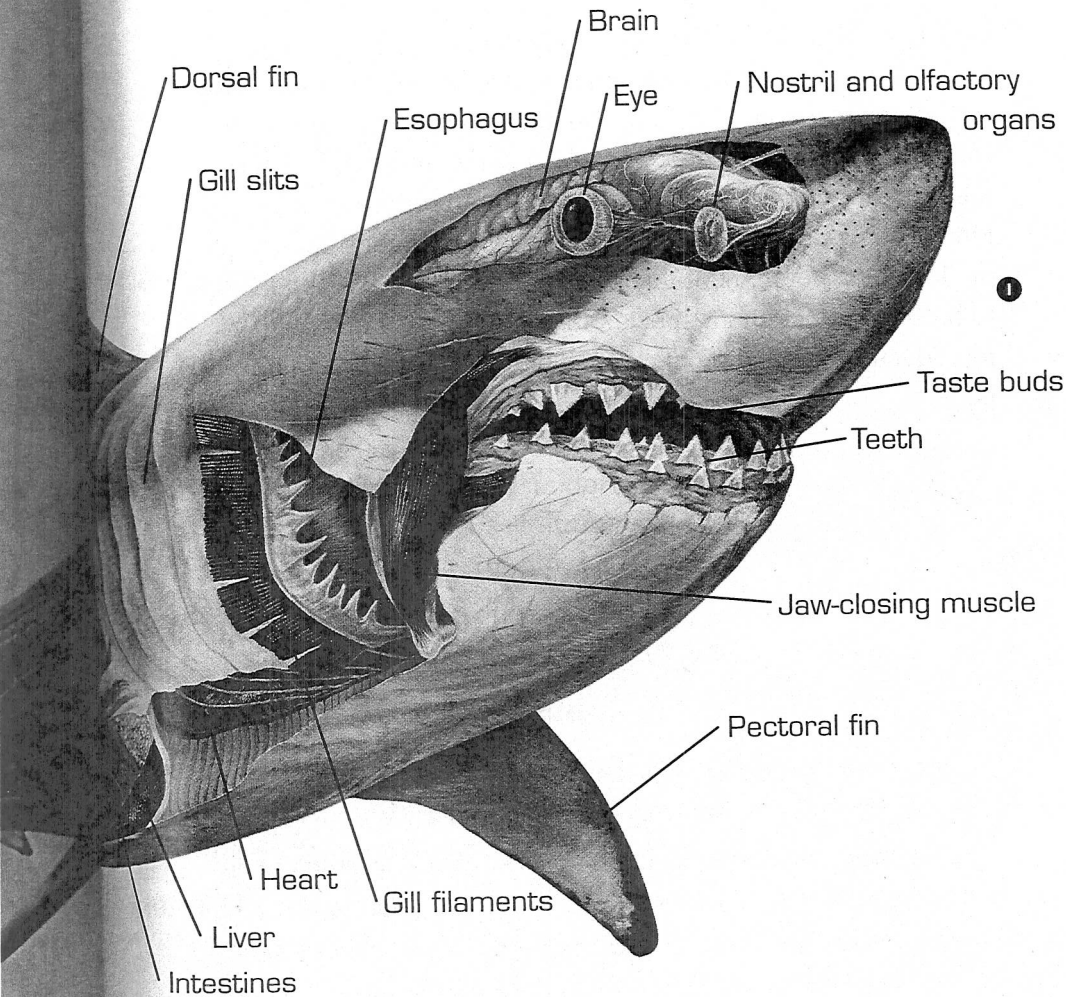
### **Top-Powerful Tail**

Since its upper lobe is larger than the lower one, the great white's thrashing tail movements drive the shark forward and push its head down. This nosedive is countered by the fish's wedge-shaped head and its pectoral fins, which lift the front end.

## Are Sharks Smart?

80 Experiments show that sharks recognize and remember shapes and patterns. Using shark snacks as rewards, scientists have taught lemon sharks to swim through mazes, ring bells, and press targets. "Although we learn new things about sharks every day, there's still a lot we don't know about them," says Hueter.

## Great White Shark



### 1 TEXT FEATURES

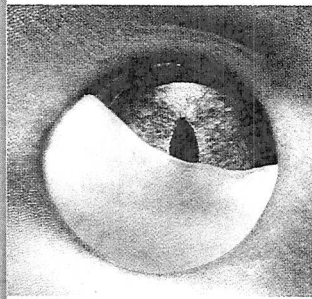
Use the **labels** on the illustration to identify the spinal cord, kidney, and brain.

### Sandpaper Skin

Rough and tough, shark skin is made of hard, platelike scales, like tiny teeth pointing backward.

### Gills

Water flows in the mouth and over blood-rich gill filaments. Some dissolved oxygen passes into the bloodstream before the water flows out through gill slits.

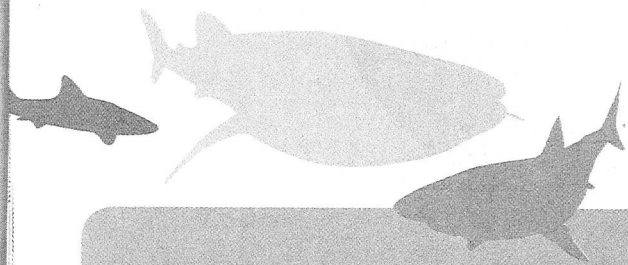


### Shark Eyes

Sharks have good eyesight and can see colors. Their eyes are protected by a nictitating (nĭk'tĭ-tā'tĭng) membrane that moves up and down like an eyelid.

### What Are Sharks' Natural Enemies?

Large sharks sometimes eat smaller sharks, and killer whales also dine on sharks. But the shark's greatest enemy is people. Humans kill sharks for food, use their skins for leather, make medicine from their liver oil, and use shark teeth for jewelry. Many sharks are killed senselessly for sport or get trapped and die in fishing nets. And it takes a long time for shark populations to rebound. Most shark species take ten years to reach reproductive age and produce small litters of less than a dozen pups.



### Bite-Size Facts

- The first sharks appeared in the ancient oceans about 400 million years ago—200 million years before the dinosaurs!
- Sharks are carnivores (meat-eaters). Most gobble their prey whole or rip it into large, shark-size bites.
- Most sharks are found in the ocean but some, like the bull shark, also swim in lakes and rivers. Most shark attacks occur in warm waters—20° to 30°C (68° to 86°F).
- Sharks lack the inflatable swim bladder that allows bony fish to control **buoyancy**. Most sharks must swim endlessly. If they stop, they sink to the bottom and may drown from a lack of water flowing over the gills. ❶

**buoyancy** (boi'ən-sē)  
*n.* the ability to remain afloat in liquid

#### ❶ TEXT FEATURES

The Bite-Size Facts are organized in a **bulleted list**. Why do you think writers use bulleted lists to present information?