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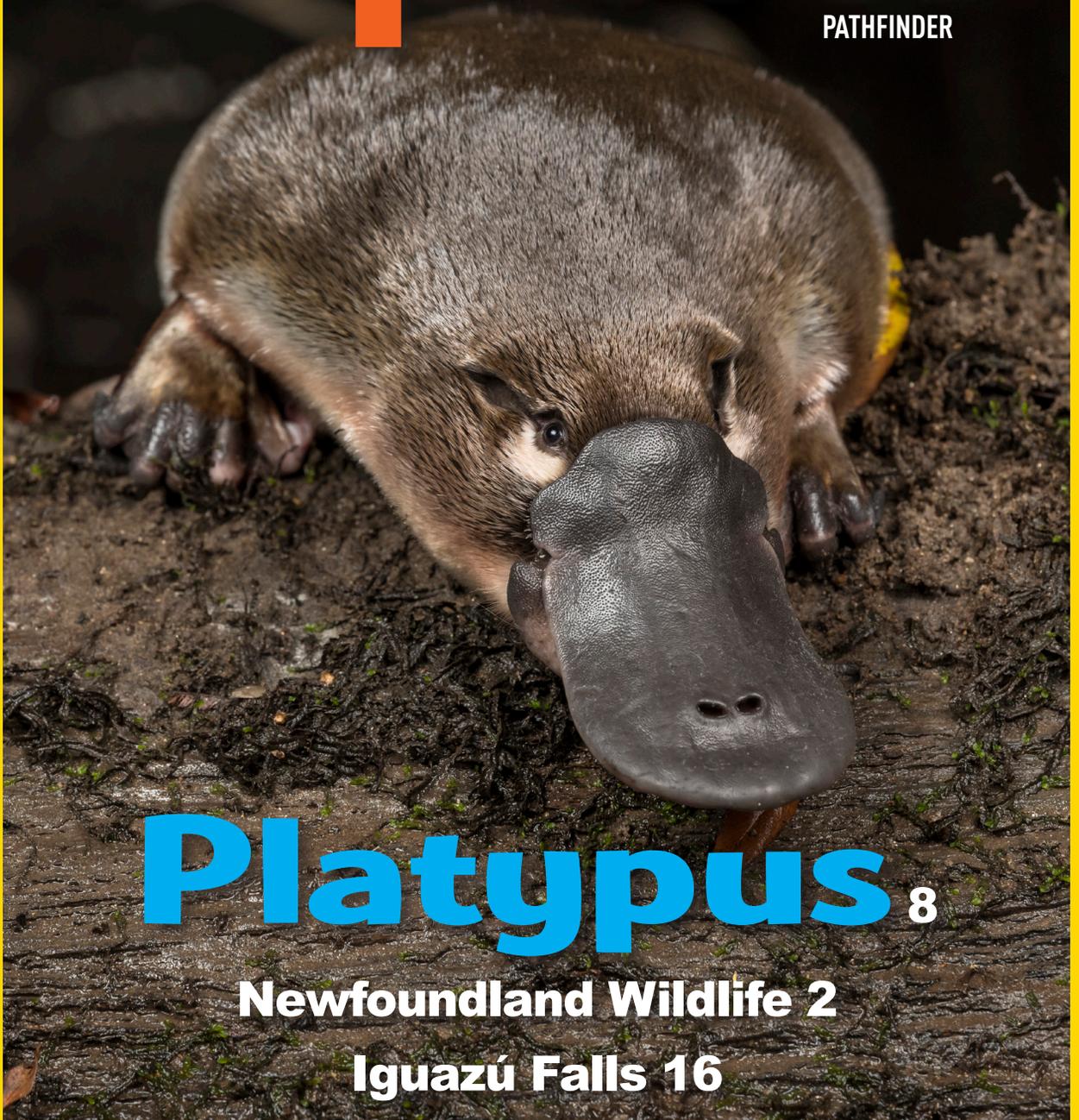


NATIONAL  
GEOGRAPHIC



# Explorer

PATHFINDER



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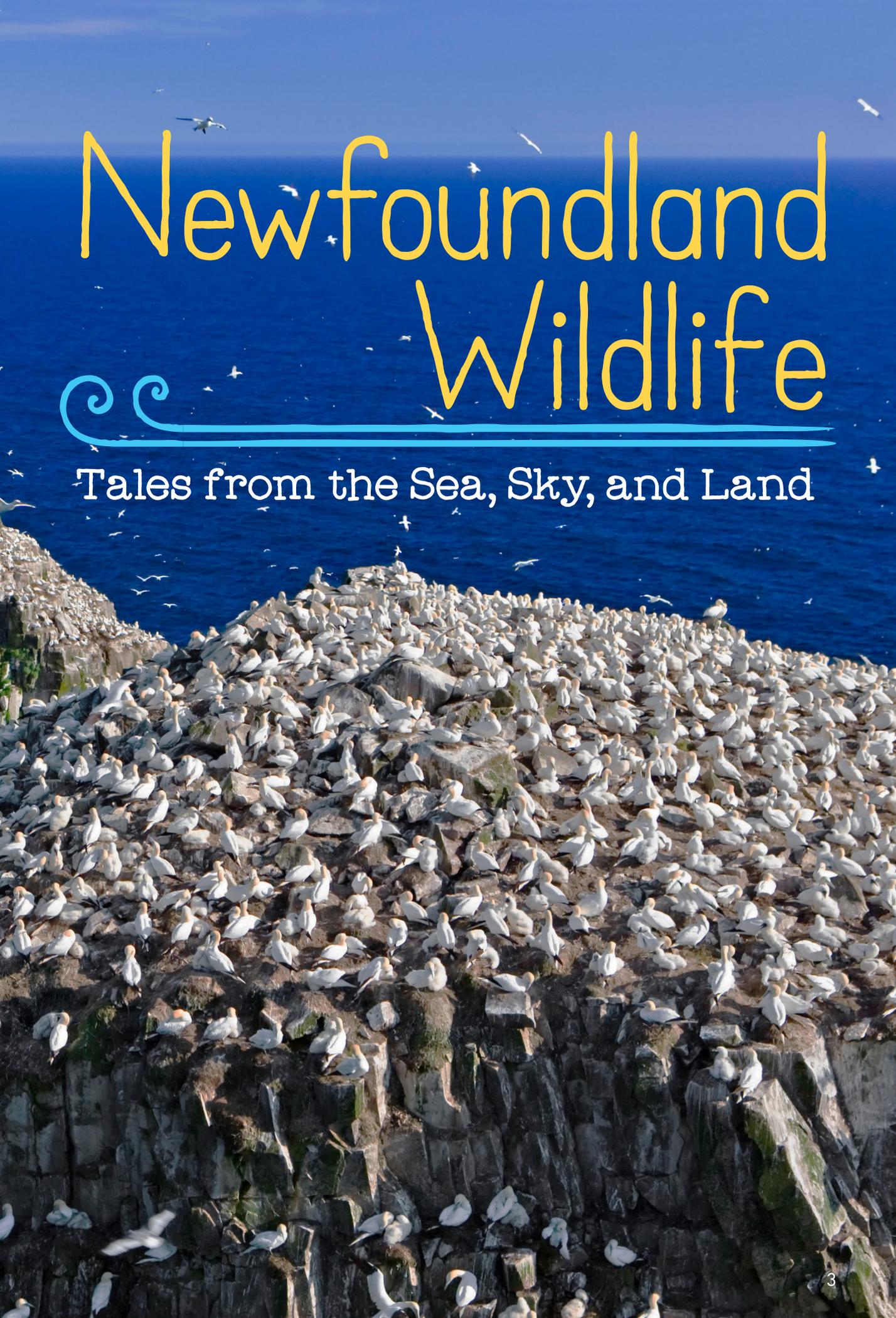
# Wildlife and Wild Places

## LIFE SCIENCE

As you read, think about how animals interact with their environment.



by Justine Ammendolia

A large colony of white seabirds, likely gannets, is perched on a rocky cliff overlooking the ocean. The birds are densely packed on the cliff face, which is covered in dark, jagged rocks. The ocean is a deep blue, and the sky is a clear, bright blue. Several birds are also seen flying in the sky. The text 'Newfoundland Wildlife' is written in a large, yellow, sans-serif font across the top of the image. Below it, the subtitle 'Tales from the Sea, Sky, and Land' is written in a smaller, white, sans-serif font. A decorative blue flourish is positioned to the left of the subtitle.

# Newfoundland Wildlife

Tales from the Sea, Sky, and Land

**Let's get one thing straight:** I know that caribou do not live in the ocean. As a marine biologist, I study ocean animals. I live on an island called Newfoundland in eastern Canada. It's part of the province of Newfoundland and Labrador. My research takes place in the North Atlantic Ocean. Of course, there are no caribou floating in the ocean. But, I can explain why I'm talking about caribou. Here's what happened. I was visiting the historic Port au Choix lighthouse.

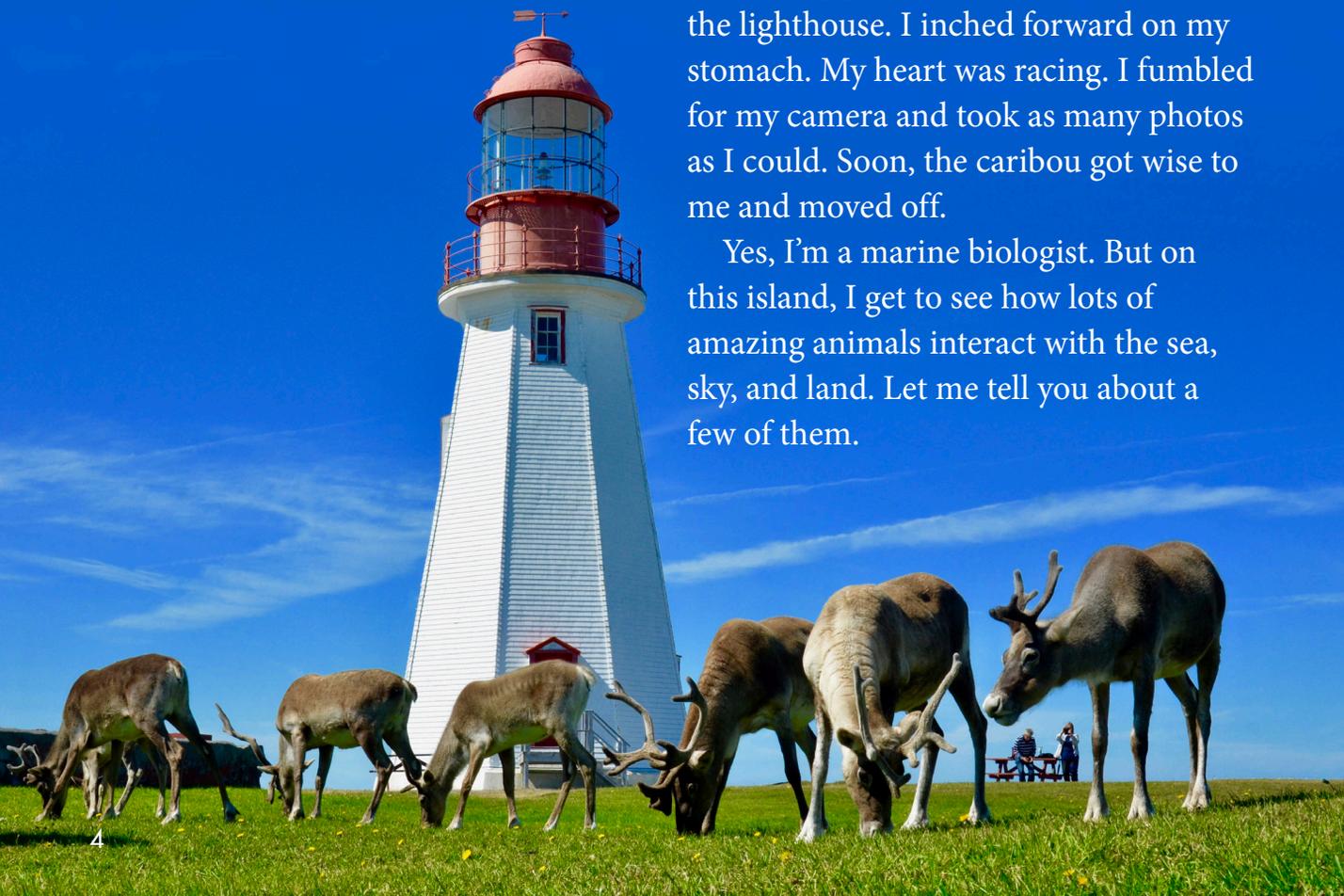
The view of the ocean was incredible. As I walked around the lighthouse, I nearly ran into a small herd of caribou! They were calmly grazing on the lighthouse grounds.

I'm not embarrassed to admit it. I geeked out. Caribou are hard to see in the wild. They avoid people. To see so many of them at once was a big deal.



There was no way I was going to miss this. I dropped to the ground in front of the lighthouse. I inched forward on my stomach. My heart was racing. I fumbled for my camera and took as many photos as I could. Soon, the caribou got wise to me and moved off.

Yes, I'm a marine biologist. But on this island, I get to see how lots of amazing animals interact with the sea, sky, and land. Let me tell you about a few of them.





The waters around Newfoundland are full of anemones and other life.

## The Sea

It's the sea creatures that I know the best. The North Atlantic is very cold, and its waters can get rough. Yet, many animals call these waters home.

Sea anemones live on the seafloor. These **invertebrates** have squishy bodies. They can be as small as a button or big as a teacup. They cement themselves to rocks to stay in place despite the waves. Their long tentacles sting and grab prey that get too close.



The tail of a humpback whale sticks out above the water's surface as the whale dives.

## Sea Snacks

While the anemones hold fast to rocks, tiny, shimmering fish flit about. They are capelin. These fish come to the coasts of Newfoundland by the millions. Here, they put on a show. Thousands of them “jump” onto the rocky beaches to lay their eggs.

Many other species find capelin delicious. Humpback whales are big fans. They travel to Newfoundland on summer vacations. Food is plentiful here. They eat a lot so they gain and store healthy fat (blubber) during their vacation in Newfoundland.

These whales can be hard to spot, though. When they come close to the surface, you can make out the small, hook-like fins on their backs. Or, you can catch sight of the tail of a humpback whale before it dives back into the water.

If humpbacks don't eat all the capelin, the Atlantic cod will. They have big eyes and a long chin “whisker” called a barbel. The barbel helps cod sense food in murky waters. I first learned about cod, not as biologist, but by catching my dinner on a fishing boat!

Puffins are a familiar sight on Gull island.



## The Sky

I'm not always looking down into the water, though. The skies above Newfoundland are filled with seabirds. Seabirds form colonies of thousands of birds. Parents first raise their chicks on land. When the young birds can fly, they all fly together to the ocean.

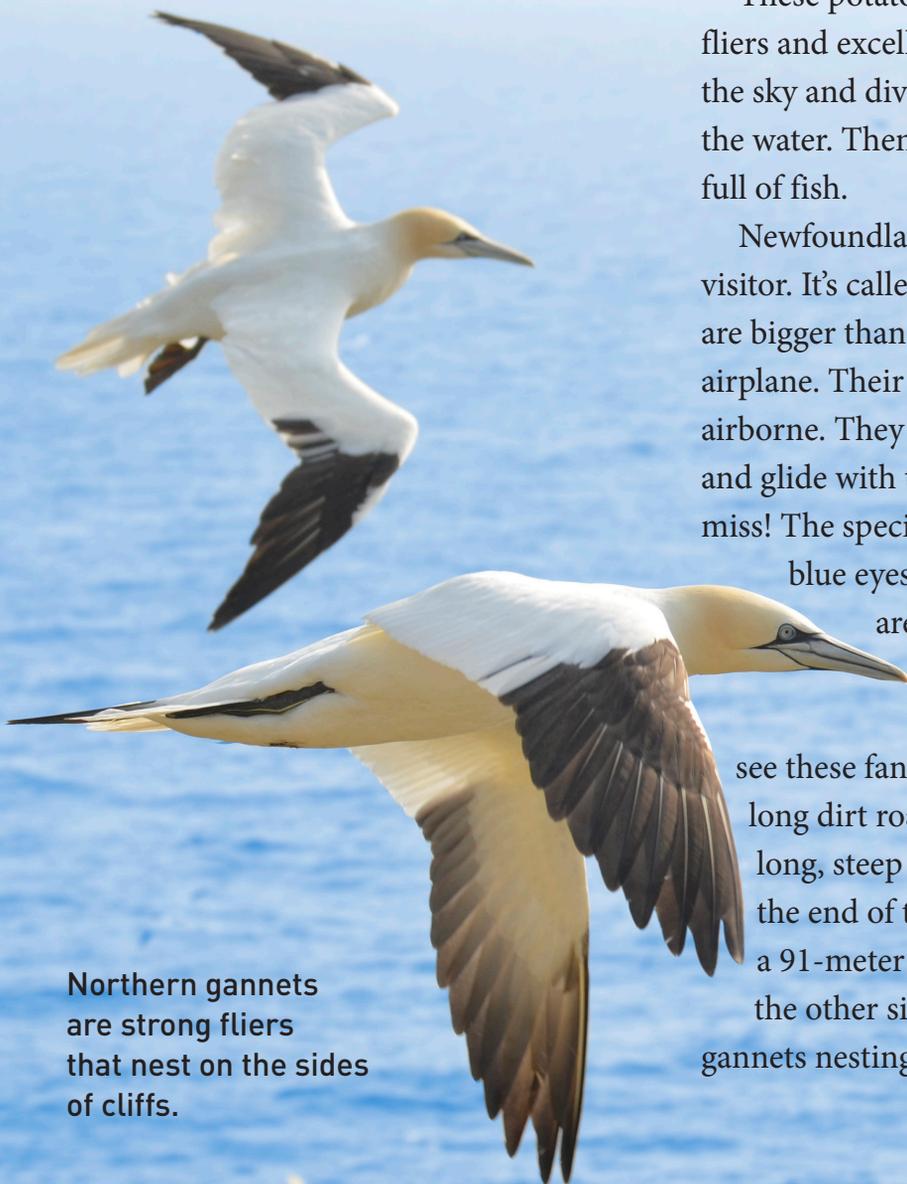
The best-known birds on the island are Atlantic puffins. It's hard not to notice their bright orange-red bills and feet. Puffins use them to dig underground burrows in the grassy areas of Gull Island. There, protected from predators, puffin parents raise a single chick.

These potato-shaped birds are strong fliers and excellent swimmers. They take to the sky and dive downward, straight into the water. Then they resurface with beaks full of fish.

Newfoundland has another winged visitor. It's called the northern gannet. They are bigger than puffins and shaped like an airplane. Their body is designed to stay airborne. They just hold out their wings and glide with the wind. They are hard to miss! The special markings around their blue eyes make them look like they are wearing makeup.

I've traveled to a place called Cape St. Mary's to see these fancy birds. You must travel on long dirt roads. Then you hike down a long, steep trail toward the ocean. At the end of the trail, there's a cliff with a 91-meter (300-foot) drop. Just on the other side, there are thousands of gannets nesting in the open. It's spectacular!

Northern gannets are strong fliers that nest on the sides of cliffs.





Moose often munch on native plants.

## The Land

Newfoundland also has its share of moose. They didn't come from here, however. People introduced these animals to the island more than a hundred years ago.

Moose quickly **adapted** to this environment. Thousands live in the forests and wetlands. They graze on grasses and other plants. As they munch on all the native plants, they change the plant ecosystem. It's something we need to pay attention to.

## The Full Picture

Why is it important for a marine biologist to pay attention to land and sky creatures? Newfoundland has taught me about the connections between sea, sky, and land. I've learned that all of the living things in an **ecosystem** rely on each other. For the birds in the sky to thrive, they need the fish in the ocean. For land animals to prosper, they need plants and other animals to eat.

As a scientist, it's important for me to **observe** all aspects of an ecosystem. You can observe the ecosystem around you, too. By thinking critically about our world, we can start to see how everything fits together.

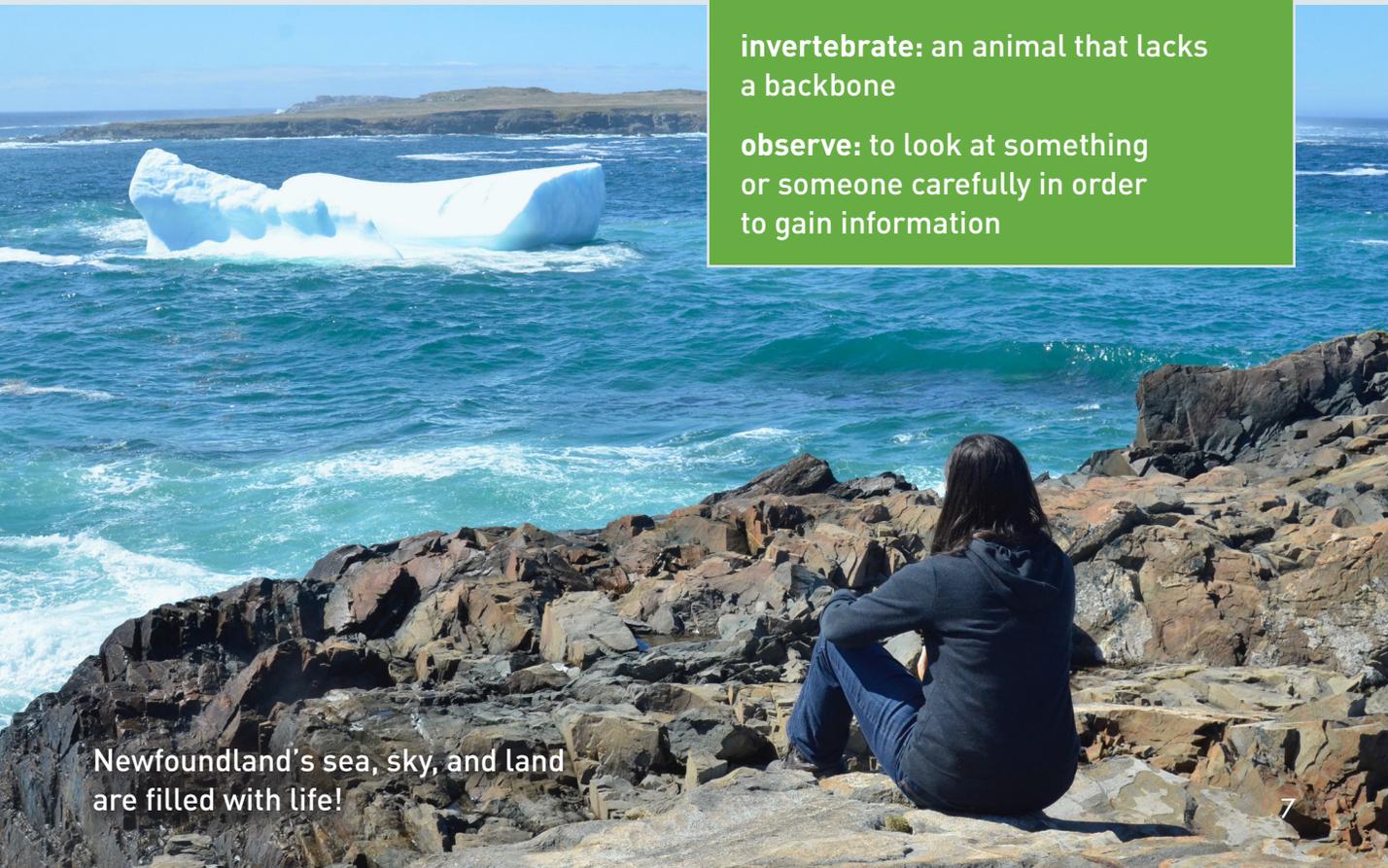
## WORDWISE

**adapt:** to change your behavior so that it is easier to live in a particular place

**ecosystem:** a community of interacting living and nonliving things and their environment

**invertebrate:** an animal that lacks a backbone

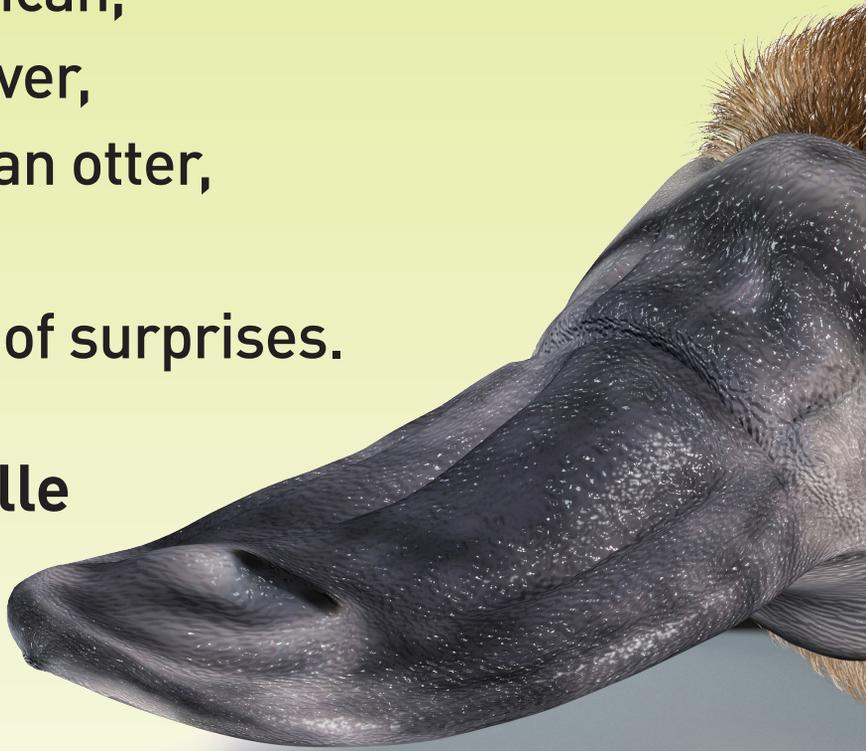
**observe:** to look at something or someone carefully in order to gain information



Newfoundland's sea, sky, and land are filled with life!

With the **bill** of a duck,  
the **bones** of a lizard,  
the **feet** of a pelican,  
the **tail** of a beaver,  
and the **coat** of an otter,  
this egg-laying  
mammal is full of surprises.

**By Lynn Brunelle**



## **Wildlife and Wild Places**

### **LIFE SCIENCE**

As you read, think about  
how the platypus's physical  
characteristics help it survive  
in its environment.

# Mishmas M



h  
ammal

The sun peeks through the leaves on the edge of a river in Australia. A worm wriggles along the murky bottom. It rests under a pile of pebbles. The worm is hidden from predators.

Near the riverbank, a web-footed hunter comes out of its den. It dives into the water, hunting for food.

Waving its duckbill-shaped snout, it picks up a pulse of energy from the worm. It opens its mouth, scooping up the pebbles and the worm. Zipping up to the surface, it grinds the whole thing into mush. Stones dribble out of its mouth. Then the hunter swallows the soft, wormy mush.

This incredible predator is a platypus. It is one of the most unique animals on the planet. Platypuses have features that set them apart from the average **mammal**. It starts from birth.

## Platypus Parenting

It's early morning on the river. A platypus uses her webbed front feet to paddle to the bank. She pulls herself out of the water.

On land, she retracts the webbing in her feet and waddles into her den. She begins to dig soil loose with her claws. Today, she is building a new chamber off the main burrow.

This platypus dives underwater with its eyes closed. It finds a worm to eat.



Snout first, she enters the chamber. She kicks the soil with her back feet to seal herself off. She lays one egg. Then, another. She holds the small eggs between her body and tail to keep them warm.

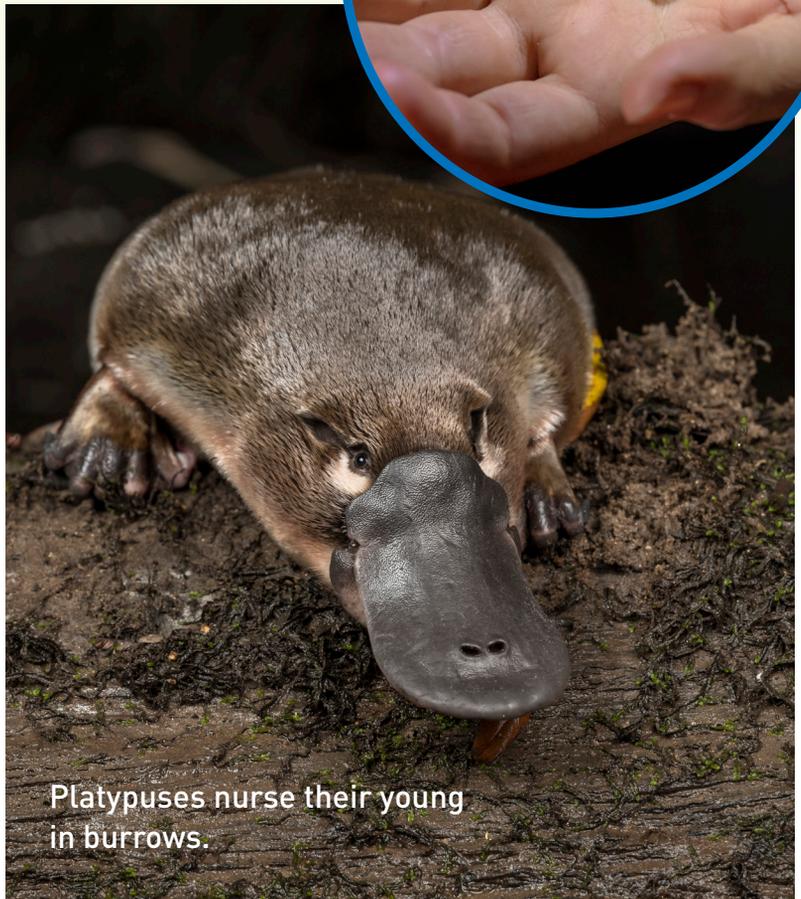
After about two weeks, the eggs hatch. Out of each egg emerges a bean-size, pink platypus. They are hairless, blind, and helpless as they take a journey of inches to their mother's belly. There, they latch onto her fur and wait to be fed.

Like all mammals, platypuses nurse their young. Unlike other mammals, milk leaks from openings between the folds of her belly skin. Babies suck the milk up through her fur. When they can swim and eat by themselves, they are ready for life on their own.

## ANIMAL HOAX?

The first platypus was sent to England in 1799. Most scientists thought it was fake. They thought someone had sewn together bits of animals to play a joke. How could a mammal have a beak, webbed feet, and lay eggs? How could a bird have fur and nurse babies? Because the platypus was so different, no one could believe it was real.

Platypus eggs are the size of marbles.



Platypuses nurse their young in burrows.

## All in the Family

Platypuses are found only in Australia. They are a part of a group of egg-laying mammals called **monotremes**.

Millions of years ago, there were a few species of reptile-like mammals. They had characteristics of today's reptiles, birds, and mammals.

They had fur and nursed their babies like mammals. Their faces had bird beaks. Their skeletons were shaped like lizard skeletons. And like lizards and birds, they laid eggs. These species divided into three groups. Mammals. Birds. Reptiles. Over time, most egg-laying mammals died off. Today, only two remain: the platypus and the echidna.

## Duck Face

What's the first thing you notice about the platypus? It has the face of a duck. Yet, its bill is unlike any bird beak out there. It is flexible and spongy and has a smooth, suede-like skin. The bill is a super sensory organ, too, with nerve cells to sense pressure, movement, and electricity. It helps the platypus feel its way around the underwater world.

The bill has sensory receptors known as push rods. They are activated by pressure or touch. They are so sensitive that they can detect tiny movements in the water, as when insect larvae move just a few inches away.

## Platypuses are found only in Australia.



The sensitive bill on the platypus looks like a duck's bill.



The platypus bill has two more types of nerve receptors. They can detect tiny electrical signals made by the muscles in the bodies of their prey. So, even if a larva or shrimp are hiding, they don't stand a chance.

## Toothless Work-Around

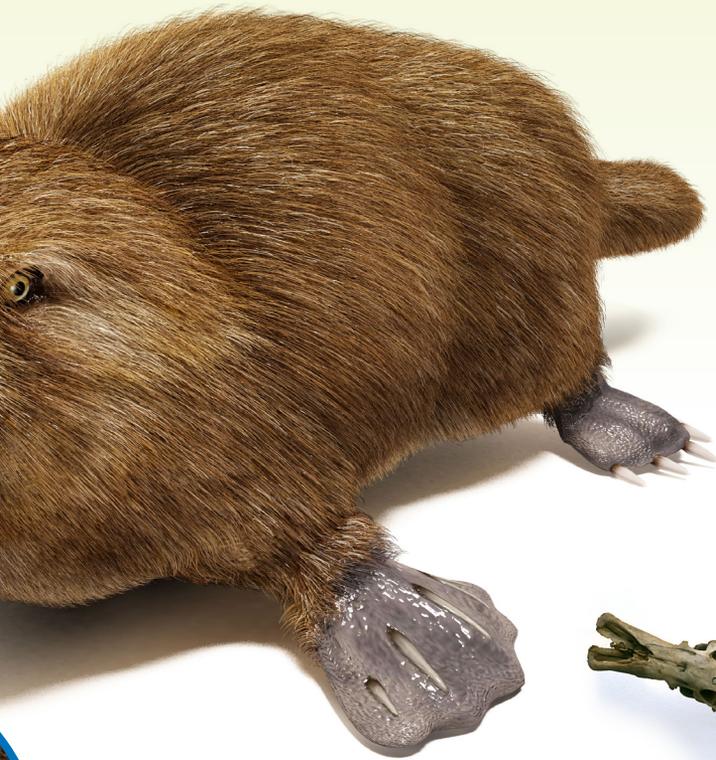
A platypus has no teeth. Yet, that doesn't stop it from crunching up its food. It scoops up its meal along with pebbles and gravel. The gravel helps crush the food. Then it swallows the food and spits out the stones.

Stomachs are acidic pouches that help animals digest their food. Because platypuses do not have a stomach, their throat connects to their intestines.

## Waterproof and Warm

Being waterproof and warm is vital for the platypus to survive. Even in cold winter, the platypus goes diving for food. It has a hairy adaptation for swimming in cold water. It is covered in thick, two-layered fur. This keeps body heat in and water out.

Fine hairs make up a woolly undercoat. On top of this is a second layer of longer hairs. Air is trapped between the layers. This keeps the animal warm and dry.



Webbed toes help form a paddle. This propels the platypus through the water.



The platypus's tail helps it swim. It also stores fat.



The platypus's skeleton is similar to a lizard's.

The platypus may feel most at home in the water.



The platypus's adaptable feet help it both on land and in water.

## In the Swim

Shaped like a furry football, the platypus is a skilled swimmer. Its shape helps it dive deep and slice through the water quickly.

A platypus is powered by rapid paddling, using its front webbed feet. The back feet and tail are used for steering and braking. The combination allows the platypus to move gracefully.

## Transformer Toes

The front feet of a platypus are built for both water and land. In the water, extra skin between the toes stretches out to create a broad paddle.

On land, the webbing is retracted. The sharp toes stretch beyond the skin. This allows for claws that dig into the dirt.



front foot

The back feet are not convertible like the front ones, but they are remarkable. Their webbing allows the platypus to steer and brake in the water. On land, platypuses use their back claws for grooming.

Male platypuses have an extra surprise in their back feet. Hollow heel spikes are loaded with venom! Platypuses use the poison when fighting. Though not deadly, the venom can cause pain and swelling.

## Tale of a Tail

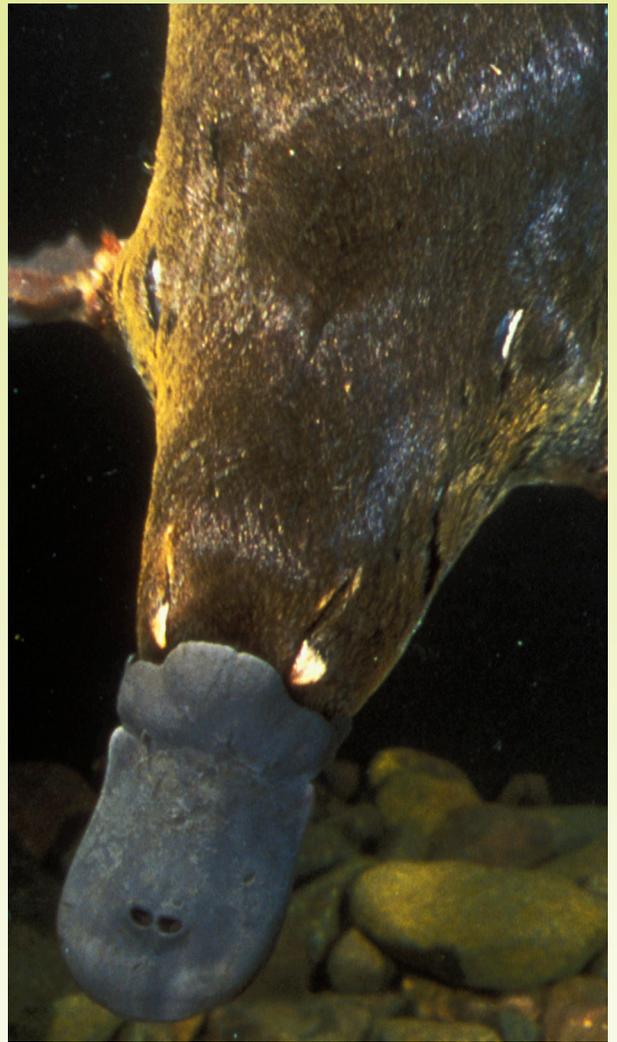
Though it looks like a beaver tail, a platypus tail is not used for paddling or communication. The flat tail is really a body fat storage tank. It can hold almost half of the animal's body fat.

## Now See This

A platypus's eyes are loaded with extra color receptors. Yet, it does not use its eyes for hunting. These receptors are needed at the water's surface or on land to better spot predators.

When it dives deep, the platypus closes its eyes tightly. The fur on its eyelids is much lighter than the brown fur covering the rest of its body. This makes it look like its eyes glow in the dark!

Platypus adaptations have been shaped over millions of years. Though these traits may seem like an odd combination to us, this mishmash mammal is a survival success story.



Lighter fur on its eyelids make this platypus's eyes seem to glow when closed underwater.

## WORDWISE

**mammal:** an animal that breathes air, has a backbone, and grows hair; female mammals have glands that can produce milk

**monotreme:** a mammal that lays eggs and also feeds its babies with milk

Male platypuses have hollow spikes on their back heels. They are filled with venom. The males fight each other over females and territory.





# The Wonder of

## Natural World

### PLATE TECTONICS

As you read, think about how the falls were created by lava from volcanic eruptions.

# the Falls



Travel to South America to experience one of the natural wonders of the world.

By Libby Romero



After walking through the hot and humid rainforest, I had finally reached the last, long footbridge. Ahead of me lay the Devil's Throat. I could hear its steady roar. The closer I got, the louder it became.

I inched forward to the edge of the footbridge. Peering over the balcony, I caught sight of this massive waterfall. Mist from the water rose into the air. I was soaking wet within minutes.

Before me, the mighty Iguazú River plunged over a rocky, U-shaped cliff. Down into a deep and narrow canyon it fell. It was breathtaking.

## Great Water

Iguazú Falls got its name from the Guaraní people. Its name means “great water.” The water the river carries over the falls is astounding.

On average, the Iguazú River flows at a rapid rate. When it rains from November to March, it can carry more than seven times that much!

Iguazú Falls is one of the largest waterfall systems in the world. It spans the border of Argentina and Brazil. During the rainy season, up to 275 different waterfalls can form.

About two-thirds of the falls are on the Argentinian side of the river. I crossed the border into Brazil. I raced up the churning river in a speedboat. The boat slowed at the foot of several waterfalls to give me a closer view.

It's hard to appreciate the spectacular falls until you have seen them for yourself. Upon visiting the falls, a first lady of the United States, Eleanor Roosevelt, said, “Poor Niagara.” Niagara Falls, between the U.S. and Canada, is half as tall and half as wide.



## Legend of the Falls

There is a legend that tells how the Iguazú Falls came to be. In the Guaraní tale, the serpent god M'Boi lived in the Iguazú River. M'Boi was an angry god. Each year, the people made a sacrifice to quiet him. They threw a young woman into the water.

One year, the tribe chose Naipi. Naipi was about to marry a warrior named Tarobá. The night before the sacrifice, she and Tarobá tried to escape in a canoe. But, M'Boi saw them.

Tarobá paddled hard, but the serpent god was mighty. He split the earth, creating a rocky gorge, Devil's Throat. Naipi was thrown to one side of the gorge and Tarobá to the other. M'Boi changed Naipi into a rock. As Tarobá tried to help her, M'Boi pulled his hands into the earth. His fingers turned into roots. His body became a palm tree. And so Naipi and Tarobá only can meet over a rainbow to show their love for one another.



## Eruption and Erosion

Science tells us a different story of the Iguazú Falls. About 130 million years ago, the **supercontinent** Gondwana broke apart. South America separated from Africa. This triggered one of the largest volcanic events in history.

At the time, the area was a giant desert. Lava poured from volcanoes, covering the desert. As it cooled and hardened, it built up layers of basalt rock.

Earth's plates kept moving. The layers were lifted into a high plateau. **Faults**, or cracks, appeared in them. Water running down the faults eroded, or wore away, the land. The Paraná riverbed formed. Later, the Iguazú River appeared, feeding into it.

The falls formed at the site where these two rivers meet. Today, they are farther upstream. **Erosion** gets the credit. As water fell into the river from the plateau, it **weathered** away rock on the bottom. The upper layers crumbled.

Today, the layers of the falls look like a giant staircase. Erosion continues. The canyon gets about 3 millimeters (0.1 inches) longer each year.



The Iguazú River empties into the Paraná River. This is where the borders of Brazil, Argentina, and Paraguay meet. The area is known as the Triple Frontier.



Beware of the coatis! They can easily bite your hand when they try to grab your food.



black capuchin monkey



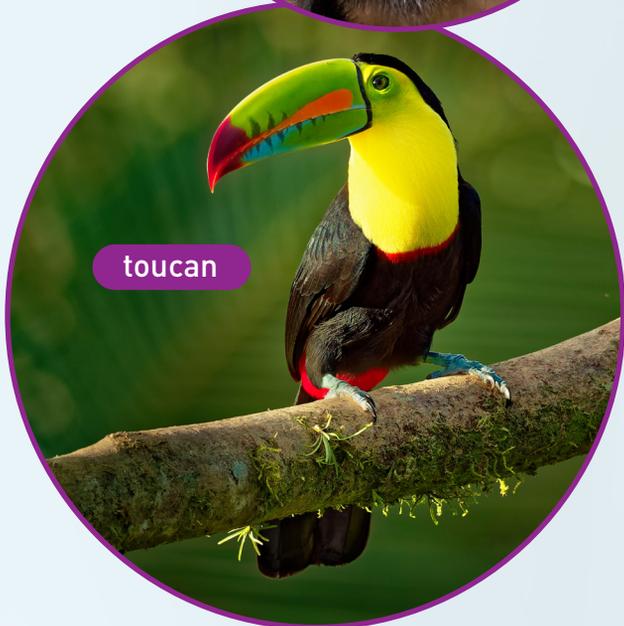
## Into the Rainforest

The water is just part of the beauty that surrounds Iguazú Falls. They exist in the subtropical Atlantic Forest. It is one of the most biodiverse ecosystems in South America. It is home to more than 2,000 plant species, plus mammals, birds, reptiles, and amphibians. Many of the plants and animals that live here aren't found anywhere else in the world.

As I walked through the rainforest, I saw tall palm trees and even taller rosewoods. Papaya fruit hung from small trees under huge leaves.

Blue morpho butterflies fluttered through the air. I also caught a glimpse of a toucan in flight and monkeys in the trees. I got a good view of a young caiman. Raccoon-like coatis seemed to be everywhere! I kept an eye out for jaguars. They live here, too.

toucan



## People and the Falls

People have lived in this area for more than 10,000 years. First, the Kaingang. Then, the Guaraní. In 1541, Spanish explorer Álvaro Núñez Cabeza de Vaca was the first European to see the falls.

Religious missionaries arrived in 1609. But, the Spanish forced them to leave in 1767. It wasn't until the early 1880s that Western interest surfaced again.

Following a scientific expedition to the area, the first tourist trip was organized in 1901. The first national park, Iguazú National Park, opened in 1934. Five years later, its sister park opened in Brazil. Both are UNESCO World Heritage sites. And Iguazú Falls is one of the “New Seven Wonders of Nature.”

In Argentina, people speak Spanish. So, the falls are called the Iguazú Falls. In Brazil, they speak Portuguese. So, they call them the Iguaçu Falls.

## Trouble in Paradise

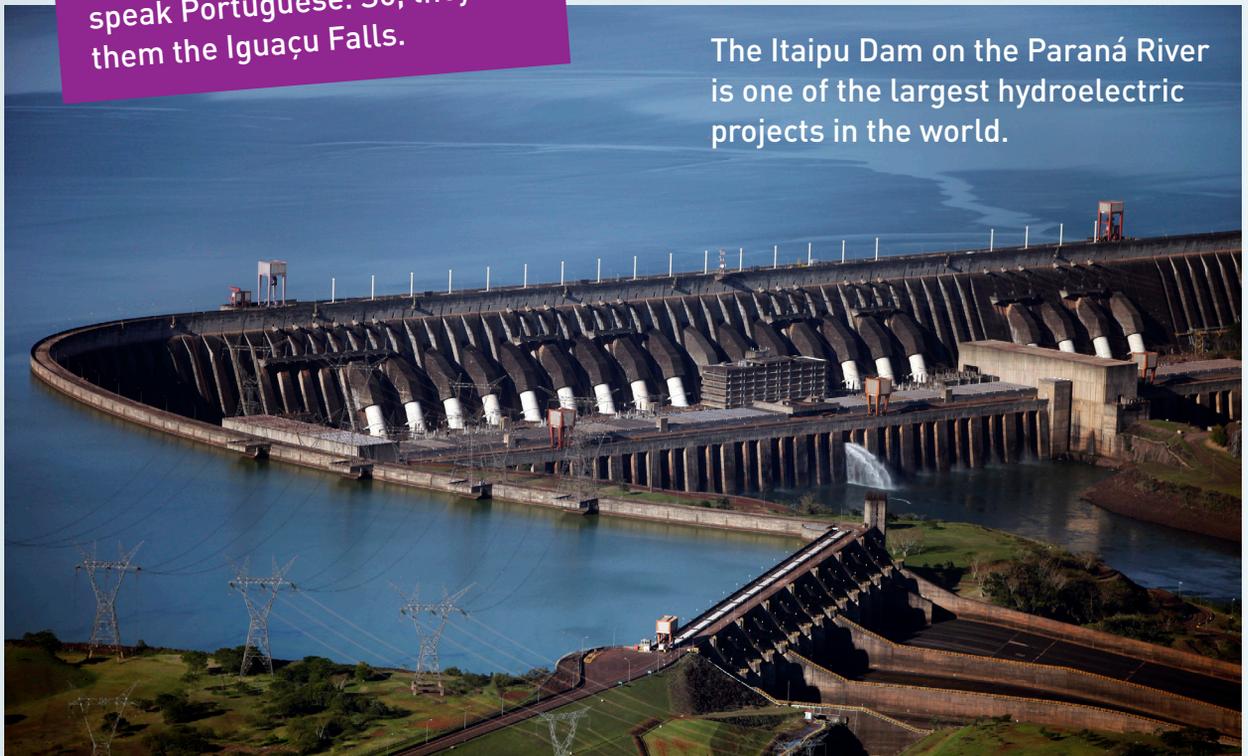
People want to protect the Iguazú region. Yet, people are its biggest problem. Poachers come into the parks illegally to take trees and animals. People accidentally injure or kill animals while driving through the parks.

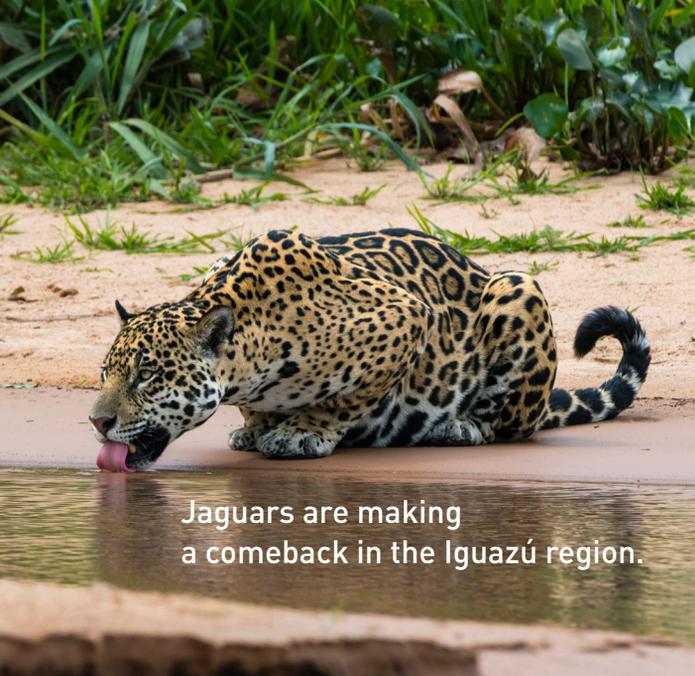
Outside the parks, logging and clearing land for farms are two of the biggest problems. When trees disappear, plants and animals lose their homes. Some species go extinct. Water sources like Iguazú Falls are affected, too.

People also built hydroelectric dams in the area. The dams help supply electricity to the area. But they also affect the water level in the rivers.

More than 1.5 million tourists visit the falls each year. The region depends on the tourists to survive. If the falls run dry or plants and animals disappear, people may no longer come.

The Itaipu Dam on the Paraná River is one of the largest hydroelectric projects in the world.





Jaguars are making a comeback in the Iguazú region.



This view from above shows part of the spectacular falls.

## Working Together

One challenge in preserving the Iguazú Falls region is its location. The falls are near the borders of three countries. Each has its own ideas on how to manage the land. Argentina and Brazil, for example, established national parks in the 1930s. Paraguay never did.

These countries disagree about dams. Yet, they have come together to create a plan on how to manage the land. This includes more patrols, species monitoring, education, and research.

Recently, jaguars became a sign that the plan is working. In the early 2000s, jaguars had nearly disappeared from this region. The countries increased patrols. They planted camera traps to deter poachers. Farmers who used to kill jaguars that preyed on their livestock started planting corn instead. As a result of these actions, the number of jaguars has doubled.

People's efforts to make the parks better are working. The beautiful falls and other Iguazú splendors are worth seeing. And they are worth fighting for.

## WORDWISE

**erosion:** when rocks and sediments are picked up and moved to another place by ice, water, wind, or gravity

**fault:** a crack in Earth's crust

**supercontinent:** one of several large landmasses thought to have divided in the geological past to form the present continents

**weather:** when rocks are broken down by mechanical or chemical processes

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Cover: a platypus

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