



Illustrations BY Taina Litwak



# A SLIPPERY MYSTERY

Meet the **AMERICAN EEL**—  
one of Minnesota's rarest fishes.

BY Christine Petersen

WHEN YOU THINK of Minnesota, you probably don't picture the ocean. After all, our state sits at the center of the continent, and the closest seashore is far away. But there is a creature that connects these two distant and very different environments. It's one of our state's rarest fishes: the American eel.

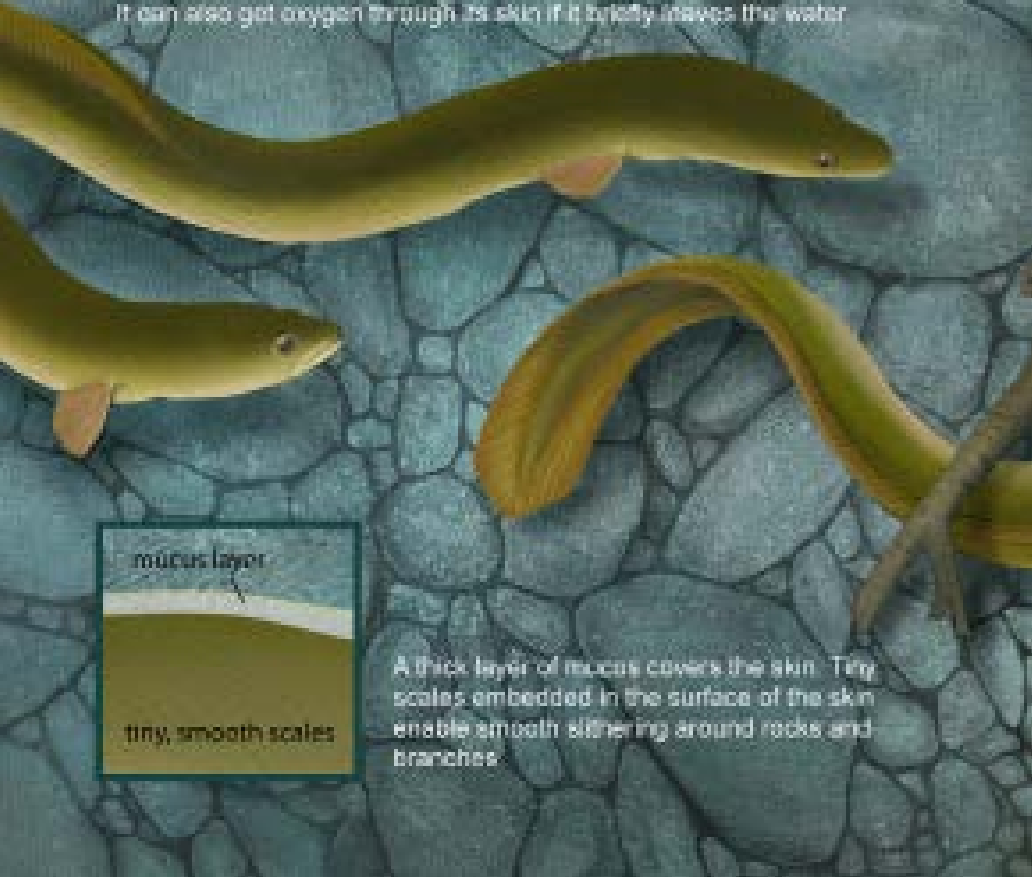
Few of us will ever catch a glimpse of a wild eel in Minnesota, but seeing it in photos, you might wonder if it's a real animal or a mythological mashup. Long and ribbon-shaped,

the eel looks like a strange cross between a fish and a snake.

The eel's way of life adds to its mystery. Baby American eels are found only in the ocean. But adult eels sometimes show up far inland, including in Minnesota, where they live for many years before returning to the sea.

Why and how do eels travel so far? And what do they do in the years between life journeys? These are puzzles that biologists are still working to solve.

An eel, like all fish, has gills that absorb oxygen from water. It can also get oxygen through its skin if it briefly leaves the water.



A thick layer of mucus covers the skin. Tiny scales embedded in the surface of the skin enable smooth slithering around rocks and branches.

## EEL SUPERPOWERS

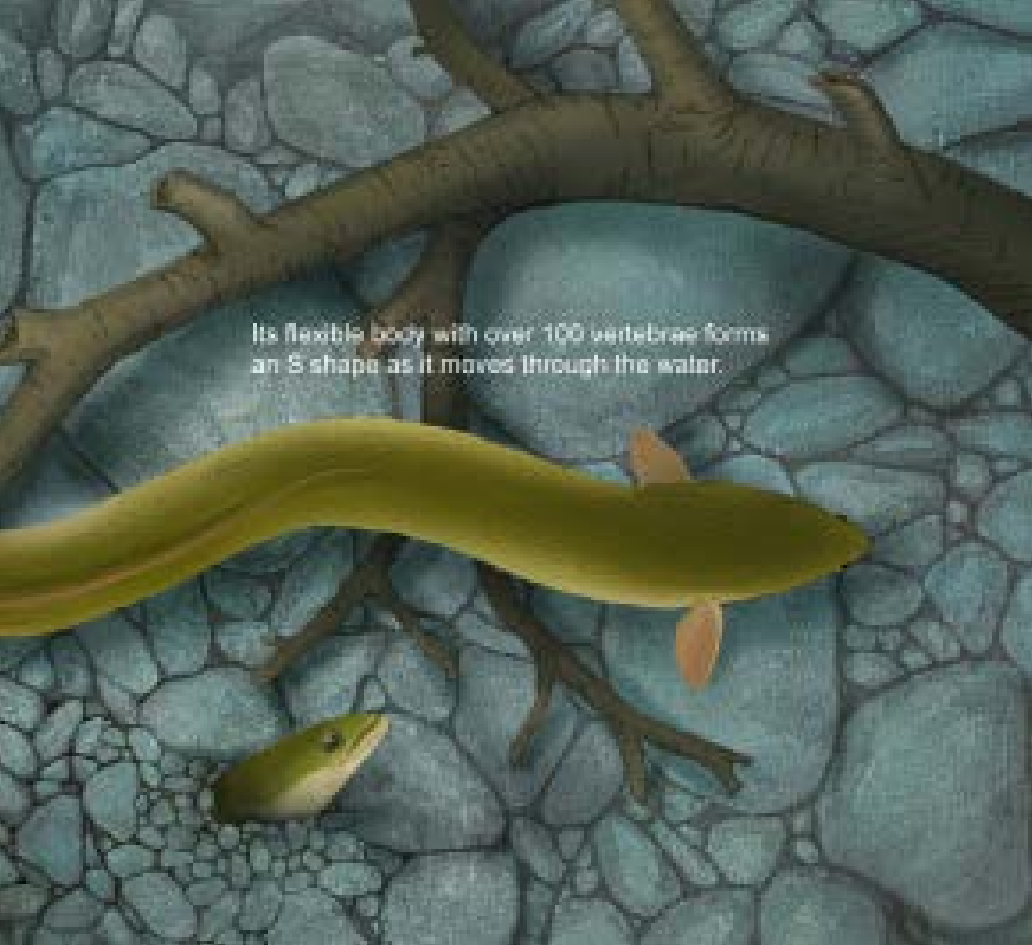
Like all fish, eels have special adaptations that help them live their best aquatic lives.

To breathe, an eel swallows water that flows over feathery *gills* in its throat. These organs absorb oxygen from the water.

An eel's *fins* help it swim. The fins on its chest and belly are quite small. All the others are joined as a single, soft fin that stretches along the eel's back, around its paddle-shaped tail, and down to its belly.

To swim, an eel swings its head from side to side. Each small movement travels along the body as an S-shaped curve, pushing against the water and moving the animal forward. Eels also have the unusual ability to swim backward.

The American eel is covered in *scales* so small that its skin seems polished. This smooth texture allows the eel to flow easily through water or fit into small gaps be-



Its flexible body with over 100 vertebrae forms an S shape as it moves through the water.

tween rocks and rubble near the shoreline.

Slender and slinky, the eel can weave among the branches of fallen trees in the water or slip into the sand and gravel of a river bottom. Eels hide in these hard-to-reach places during the daytime. By night, they come out to feed but may retreat to escape enemies.

Eels have more *mucus* on their skin than other fish. The extra slime may keep

an eel moist when it uses another uncommon ability: absorbing air through the skin. This lets eels come onto land for short periods, even though they don't have air-breathing lungs. If an eel's underwater route is blocked, it just slithers out of the water to find another way through mud or damp vegetation. If it becomes stuck in a drying pool, the eel can burrow into mud and rest until rains refill the water.



Eels all hatch from eggs far out in the central Atlantic Ocean in the Sargasso Sea. The tiny, leaf-shaped larvae live there for many months.

As their bodies thicken and get larger and stronger they are called elvers. Only female eels migrate up rivers, including the Mississippi River.



4 to 6 inches

As they grow, the larvae change shape and become better swimmers. They migrate toward the coast on the ocean currents. At this point they are called glass eels.



1/2 inch to 4 inches

## SHAPE-SHIFTERS

Though there are about 800 eel species worldwide, the one we're focusing on here is the only freshwater eel in North America. But the American eel doesn't live its whole life in freshwater. Instead, it moves between the salty ocean, freshwater rivers and lakes, and inlets where fresh and salt-water mix. Not many fish can do that!

**Where do eels come from?** American eels are secretive and difficult to study in the wild. Baby eels, called *larvae*, look nothing like adults. At hatching, they're barely a quarter-inch long, flat-bodied with a pointed head and tail, and as clear as water. For centuries, this fooled naturalists into thinking adult eels and their

larvae were separate species.

Finding breeding sites and eel eggs posed another challenge to scientists. In the early 1900s, a young Danish naturalist named Johannes Schmidt decided to solve this problem. He knew larvae live in the ocean, so he sailed far and wide. Although he never found a single egg, Schmidt did notice an important trend. As he traveled south and west across the Atlantic Ocean, eel larvae became smaller and smaller. The smallest of all were in the Sargasso Sea, located in the middle of the Atlantic Ocean.

**Seaweed nursery.** The Sargasso Sea is as extraordinary as the eels that are born there. Most seas have at least one land boundary. Not so here. Instead, the Sargasso Sea is bordered by several strong, riverlike *currents* that move seawater over long distances.

The Sargasso Sea gets its name from a certain kind of seaweed that floats freely on the water's surface. Long strands dangle into the water, providing food and shelter for all kinds of animals—from shrimp, seabirds, turtles, and whales to baby eels.

But why do American eels breed only in the Sargasso Sea? That's a question scientists are still trying to answer.

## OFF THEY GO

Equally mysterious is the epic journey made by eel babies. Soon after hatching, tiny American eel larvae depart the Sargasso Sea. They slip into one of its currents, beginning an amazing *migration* away from their birthplace. Larvae spend the daylight hours deep underwater, where it is dark and safe. They rise closer to the surface at night to feed on bits of natural ocean debris.

American eel larvae might wind up almost anywhere on the west side of the Atlantic Ocean. Some float toward the chilly waters around Greenland, far north of the Sargasso Sea. Others are carried southward, into tropical waters around Caribbean islands or Venezuela, in South America. Still other larvae wind up in the Gulf of Mexico. These may reach the coast of Louisiana, where the massive Mississippi River meets the sea.

**Changes.** After about a year, a young American eel's journey takes it from the open ocean toward land. In that time, the little fish has become slender and wormlike, and it has grown to a couple of inches in length. Big eyes mark its head, and the pale line of a spine shows through the clear body.

At this point, the young eel can live in freshwater or saltwater. It might stick near the coast, moving seasonally between streams and the ocean as it grows and grows and grows. Or it might find a river and head upstream. The inland travelers are always females. That's another unexplained mystery of eel biology.



In Minnesota, eels have been recorded in the Mississippi, Minnesota, St. Croix, and Crow rivers, as well as the Duluth-Superior Harbor and the rivers of the Lake Superior drainage.



Glochidia in the water latch onto the eel's gills, where they develop into baby mussels. It's a safe place to grow.

Tiny larvae, called glochidia, are expelled by female mussels.

## UPSTREAM

In the early 1800s, biologists didn't believe eels could swim up the powerful Mississippi River. But they were wrong! Young eels not only swim against strong river currents and spring floodwaters—they can even wriggle and climb over barriers in the water.

**Free ride.** As it swims upstream, an eel might accidentally pick up some freshwater mussel larvae. Freshwater mussels are shelled animals that live on riverbeds.

Mussel larvae can't swim upstream, so

they grab a free ride on the gills of an eel or other fish. These larvae develop into young mussels that drop off and settle to the bottom to grow, leaving the eel unharmed. At least seven Minnesota mussel species attach to the gills of eels.

In our rivers, mussels perform important services: They filter river water, making it cleaner, and provide food for a variety of animals.

Through this connection, eels help to make our environment healthier.





The female eels are a greenish-gold color, can grow up to 4 feet long and live in our rivers for up to 20 years.

The eel carries the baby mussels to new areas, where they drop off, settle on river bottoms, and grow into adults.



As eels migrate upriver, mussels hitch a ride. These shelled animals help keep our waterways clean.



Eels eat small fish, aquatic insects, and crayfish and can even leave the water for a short time in search of snails or frogs.



**Home in Minnesota.** A few of the eels that migrate up the Mississippi River will eventually reach Minnesota. From there, they might continue into the nearby St. Croix or Minnesota rivers. Once in a while, eels even swim into Lake Superior through shipping canals from Canada.

Here in Minnesota, female eels may live 20 years or more and reach a length of almost 4 feet. That's about twice as long as male eels that live near the ocean. During this long growing phase

of an eel's life, it prefers the quiet water of pools and channels, or shallow water near riverbanks.

Though a female eel looks dangerous, with her toothy mouth and greenish-gold skin, she is harmless to people. But smaller river creatures should beware! The eel uses her super sense of smell to hunt many kinds of prey, including smaller fish, aquatic insects, and crayfish. She might even leave the water in search of snails or frogs.



## BACK TO THE SEA

No one knows what triggers an eel to prepare for mating. It doesn't seem to happen at a particular age. But at some point, each eel begins to change again in preparation for its last stage of life.

**A final journey.** Female eels from Minnesota and other inland locations begin their migration in summer. As they go, their bodies change dramatically for a return to saltwater. The body turns silvery-gray for camouflage in the ocean. Early on, the eel gobbles prey to store up fat, an important source of energy. Eventually it stops eating completely. Its fins grow larger and the tail flattens, helping the eel swim faster toward the scent of salty water at the coast.

Female eels that have lived alone most of their lives now join other females and males moving east toward the open ocean. Like all mature American eels from around the Atlantic, they are headed to the Sargasso Sea.

**Dangers everywhere.** Eels are at risk in all stages of their life cycle.

Natural predators, from herons and river otters to sharks and swordfish, enjoy a meal of eel. People sometimes do, too. Many of the waters where eels live are also affected by pollution.

But migration is an especially dangerous time for female eels. They may become stuck behind dams or be killed by *turbines*—fanlike structures inside some dams, which spin in the water to produce electricity. Biologists and engineers are exploring options such as pipes and channels that allow eels to move safely over or around dams. These solutions might help eels while allowing people to produce the energy we need.

**The next generation.** Two or three months of nonstop swimming brings the eels back to their birthplace. Here, each female releases up to 20 million eggs! The parent eels then die and their bodies sink to the seafloor or feed other animals in the Sargasso Sea. Soon a new generation of American eels will hatch, ready to begin their own amazing journeys—perhaps all the way to Minnesota. 📍

**TEACHERS RESOURCES.** Find a Teachers Guide and other resources for this and other Young Naturalists stories at [mndnr.gov/young\\_naturalists](http://mndnr.gov/young_naturalists).

MINNESOTA CONSERVATION VOLUNTEER



Eels face many hazards on their return migration to the Sargasso Sea. Pollution and dams take a toll.



Far out in the Atlantic, the females release their eggs and a new generation of eels hatches in the warm Sargasso.

The adults get fatter and change color to gray and silver-white as they get ready to migrate. The adults do not return to the rivers. They die in the Sargasso Sea, supplying nutrients to the sea creatures that live there.



One eel can lay up to 20 million eggs.