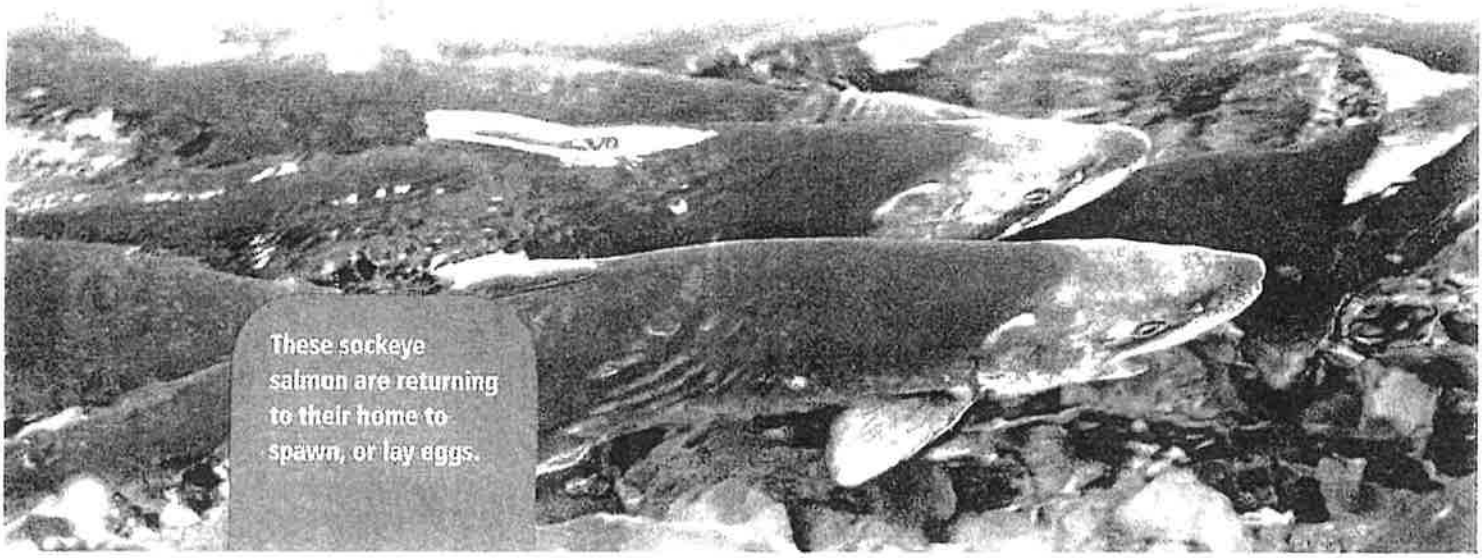
ANIMALS ON

Leaving Home

On a warm summer day, a tiny striped fish wiggles out of the gravel of a riverbed in Northern California. For the next few months this young Pacific salmon, called a fry, explores the section of the river where she was born, feeding on insects and plants. Then instinct, knowledge she was born with, tells her to swim downstream. Tumbling over rocks and through rapids, the salmon finally reaches the mouth of the river, where it meets the sea. Saltwater and freshwater mix and the salmon spends a few weeks feeding on small shellfish as she doubles in size, loses her stripes, and turns a shining silver.

Then the young salmon travels out to sea, swimming for thousands of miles into the ocean. In a few years she will find her way back across the ocean and up the river to the exact section where she was born. How can she do this?

Animals have five senses, just as people do: sight, hearing, touch, taste, and smell. To navigate, they use these senses and other abilities that people don't have, such as echolocation, in ways that scientists are still trying to understand.

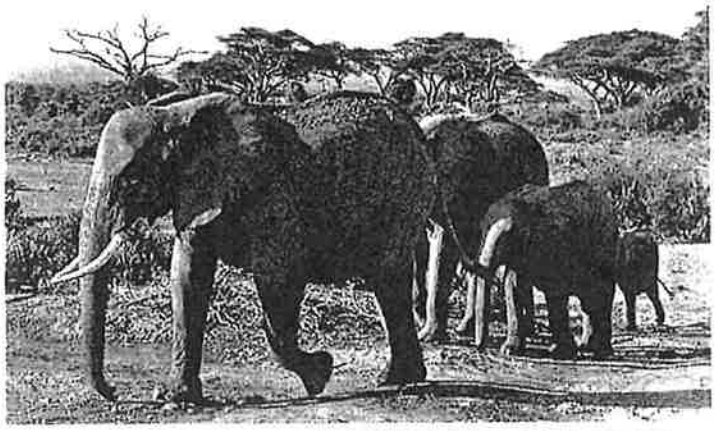


These sockeye salmon are returning to their home to spawn, or lay eggs.

The Move

Elephant Talk

Elephants trumpet when they are excited or alarmed. Mother elephants hum to their newborn babies. But people who study elephants have noticed something odd. A herd might be grazing peacefully in the African grasslands. Suddenly they all lift their heads, flap their ears, and begin to walk together in the same direction. They may walk for miles and then meet another herd. The elephants greet each other with loud trumpeting calls, flapping their ears and twisting their trunks together. It's a gigantic family reunion.



Elephants travel together in groups across the African plains. They follow infrasonic calls their relatives make, sounds too low for human ears.

How did they find each other?

The elephants didn't see each other. If the wind was not blowing the right way, their sense of smell didn't help them. Scientists were puzzled. Dr. Katy Payne solved the puzzle when she recorded elephant sounds at a slow speed. She listened to the tapes at normal speed and heard elephant sounds no human had ever heard before. They were deep rumbles, too low for our ears to hear. But elephants could hear them from miles away. Scientists call this *infrasound*.

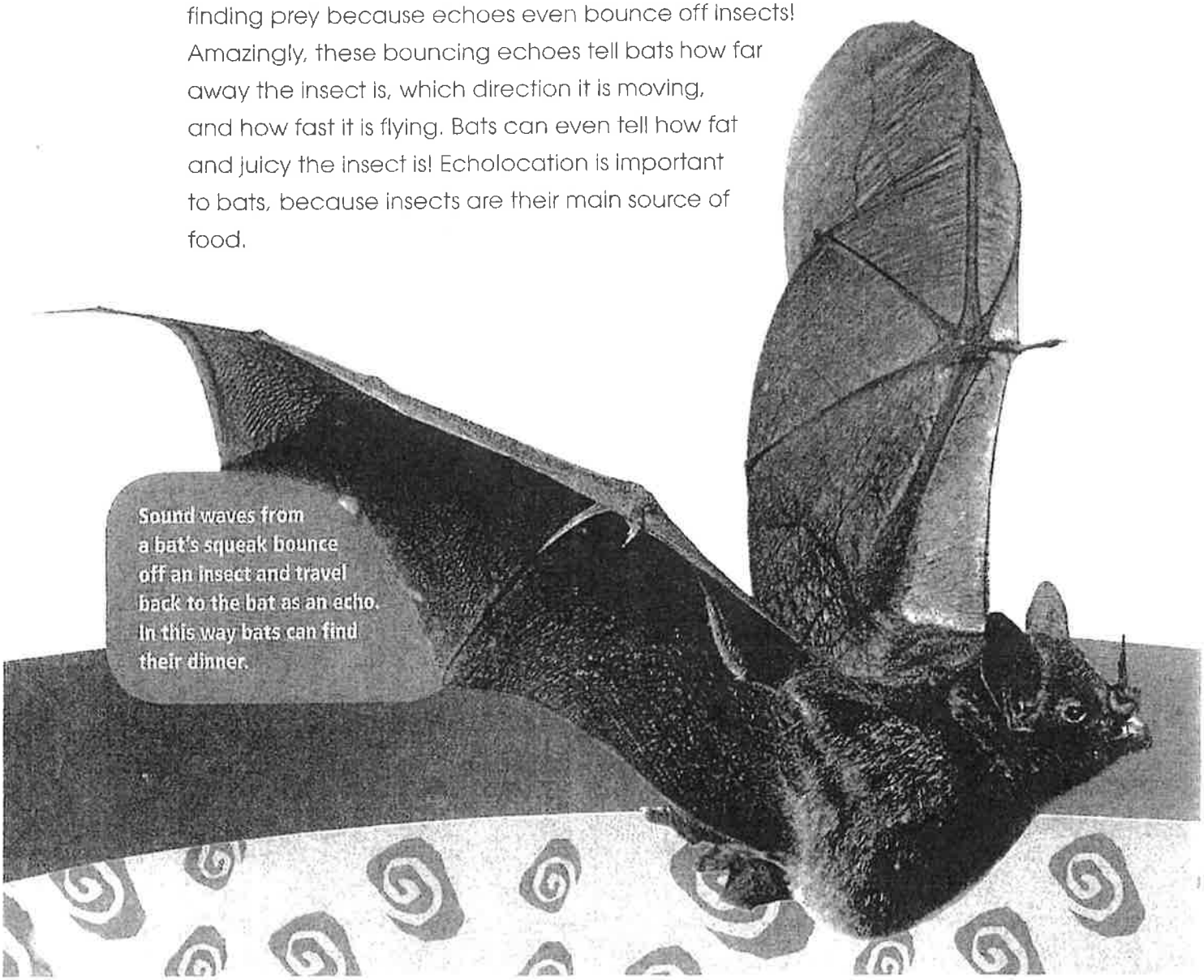
Sound moves in waves through the air. Low sounds like the elephants' rumbles move in long waves that can travel many miles. So elephants rumble back and forth to find each other.

Why Bats Squeak

Bats also make sounds that humans cannot hear. But these sounds are not rumbles. They are high-pitched squeaks. Bats use these squeaks and their excellent hearing to find their way in the dark. They do so through *echolocation*, using echoes to locate something.

If you make a loud sound in a large, empty room, you will hear that sound come back to you as an echo. Echoes are created when sound waves move through the air, hit something, and bounce back. All sounds move in this way, bouncing back if they hit a solid object. But human hearing is not good enough to hear most echoes.

Bats, however, do hear these echoes. Bats make their squeaking sounds as they fly through the dark in search of food. The squeaks bounce off trees, houses, and other objects. This is useful in finding prey because echoes even bounce off insects! Amazingly, these bouncing echoes tell bats how far away the insect is, which direction it is moving, and how fast it is flying. Bats can even tell how fat and juicy the insect is! Echolocation is important to bats, because insects are their main source of food.



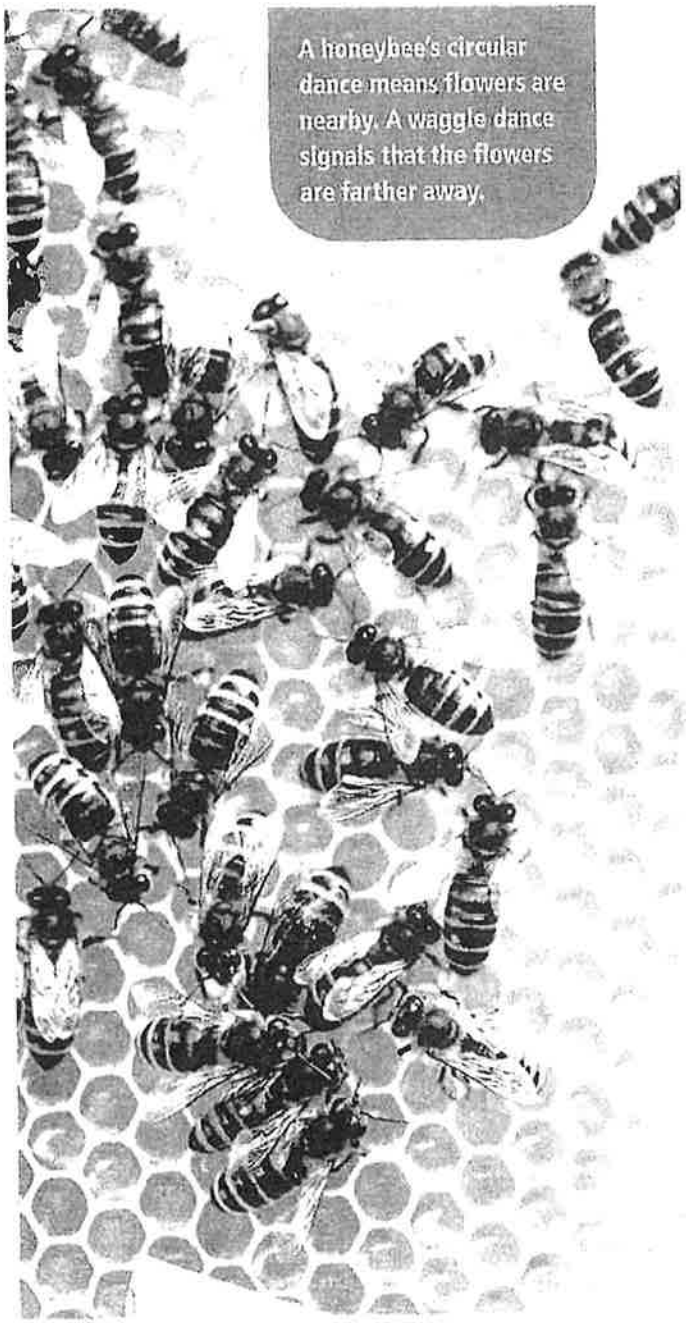
Sound waves from a bat's squeak bounce off an insect and travel back to the bat as an echo. In this way bats can find their dinner.

Why Bees Sing and Dance

Honeybees work together in a hive. Young bees work inside the hive. Older bees go outside to gather pollen and nectar from flowers to make honey. At first they make dozens of short flights to learn the lay of the land. Next, they learn the direction the sun appears to move. Finally, they fly as far as three miles from their hive to gather pollen.

Bees use their sense of smell as well as eyesight to find flowers. They use the sun to find their way home. On cloudy days, they look for landmarks they have learned. Back at the hive, they offer nectar they found to the other bees. Then the bees dance. Sometimes they move in circles. At other times, they zigzag or "waggle."

Beekeepers have long known that bees dance, but it was not until 1947 that scientists discovered why. When honeybees dance, they are telling the other bees where to find food. Researchers also discovered that the sounds bees make while dancing give information about finding flowers. The bees need the whole song and dance routine to learn how to return to the flowers and get nectar, too.



A honeybee's circular dance means flowers are nearby. A waggle dance signals that the flowers are farther away.

Bird Maps and Compasses

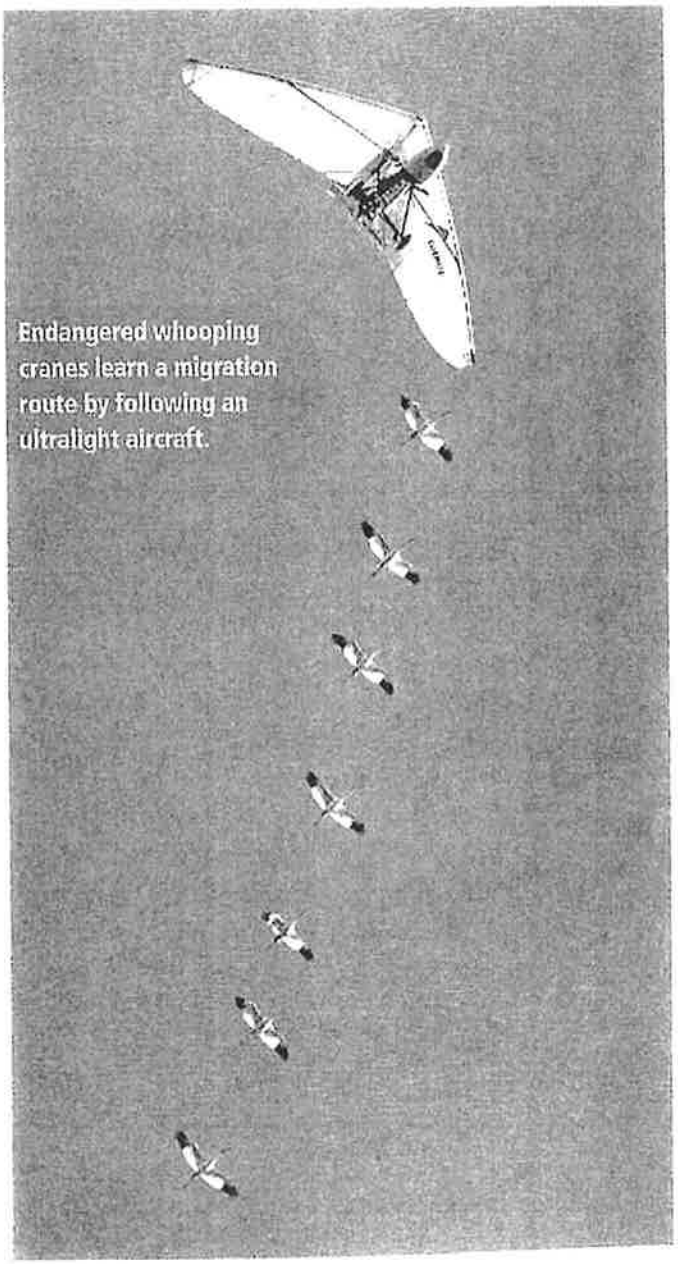
It is easy to get to places you've been to many times before. But traveling a long distance or an unknown route takes more planning. A map and a compass are often helpful for such trips. The map shows you how to get from one place to another. The compass can tell you in what direction you are moving.

Every year hundreds of species of birds take long trips, too. They fly hundreds and thousands of miles from one home to another. In the fall, they fly to warmer climates where food is plentiful all winter. When spring comes, they fly back to raise their young where they were born. For a long time people wondered where the birds went and what routes they took.

A crane in flight.

Researchers now know that migrating birds, such as cranes, are guided by their own sorts of maps and compasses. But it has taken many decades to uncover the secrets of these navigation tools. In the 1800s, scientists started putting bands around birds' legs. The bands contained a name and address. When people found the banded birds, they contacted the person named on the band and told that tracker where and when they had found the bird. In this simple way, scientists learned a lot about where birds traveled, where they stopped, and how fast they moved.

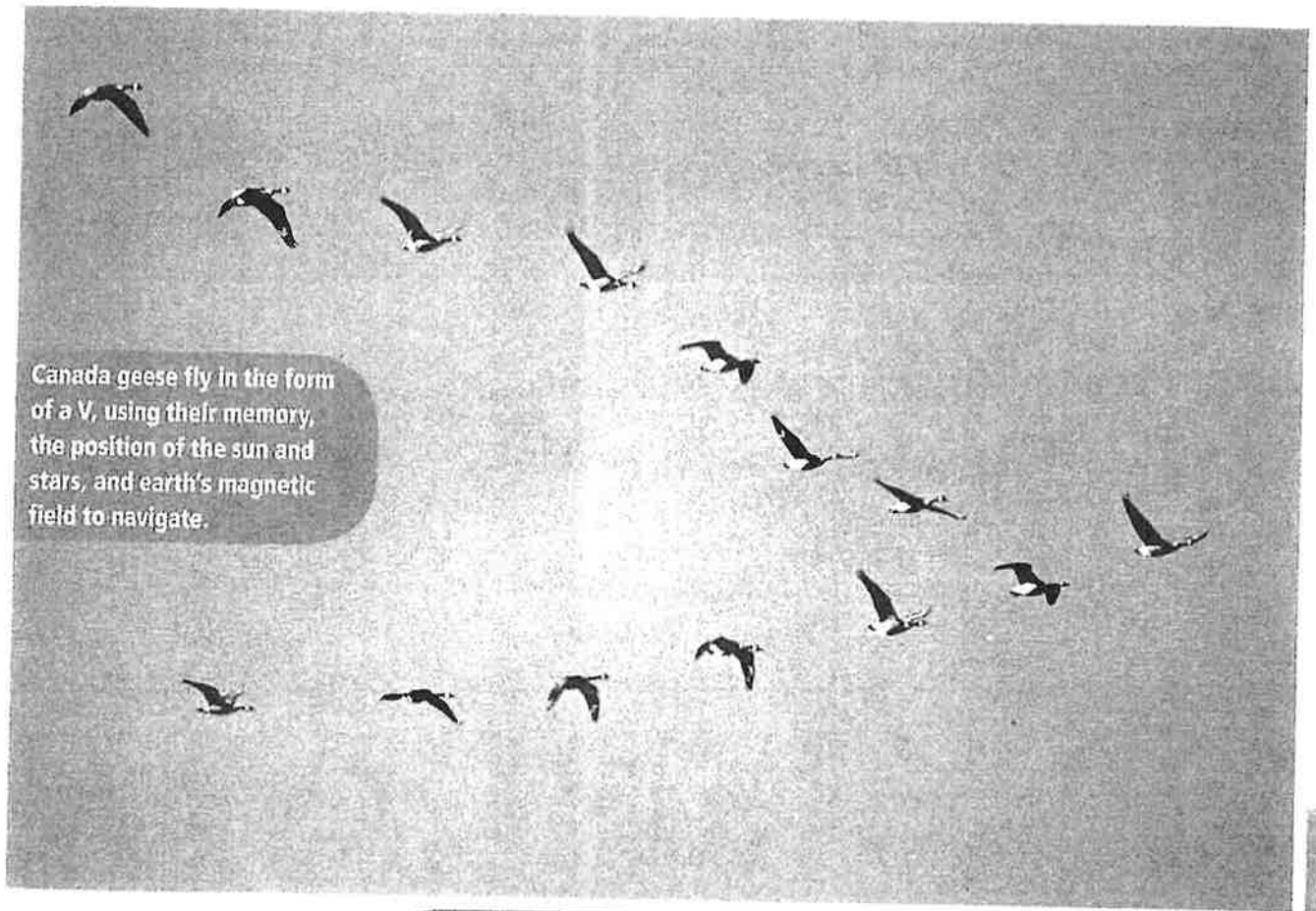
Today scientists still put light aluminum bands on birds' legs. They also use new ways of tracking birds—airplanes, computers, tiny radio transmitters, and satellites. Scientists have answered many questions about how birds navigate.



Endangered whooping cranes learn a migration route by following an ultralight aircraft.

Some birds migrate in a flock. You may have seen Canada geese flying high in the sky in the form of a V. Young birds follow their parents and learn the route that the older geese have traveled before. They may follow a river and remember what it looks like. Certain sounds or smells will stay in their memory. Also, like captains on sailing ships long ago, birds use the position of the sun and stars as a compass to find their way.

Birds and many other animals also use earth's magnetic field to navigate. Chemicals in these animals' brains allow them to sense the magnetic field and travel in the right direction. But scientists are still researching how this happens. They think some birds may actually be able to see earth's magnetic field.



Canada geese fly in the form of a V, using their memory, the position of the sun and stars, and earth's magnetic field to navigate.

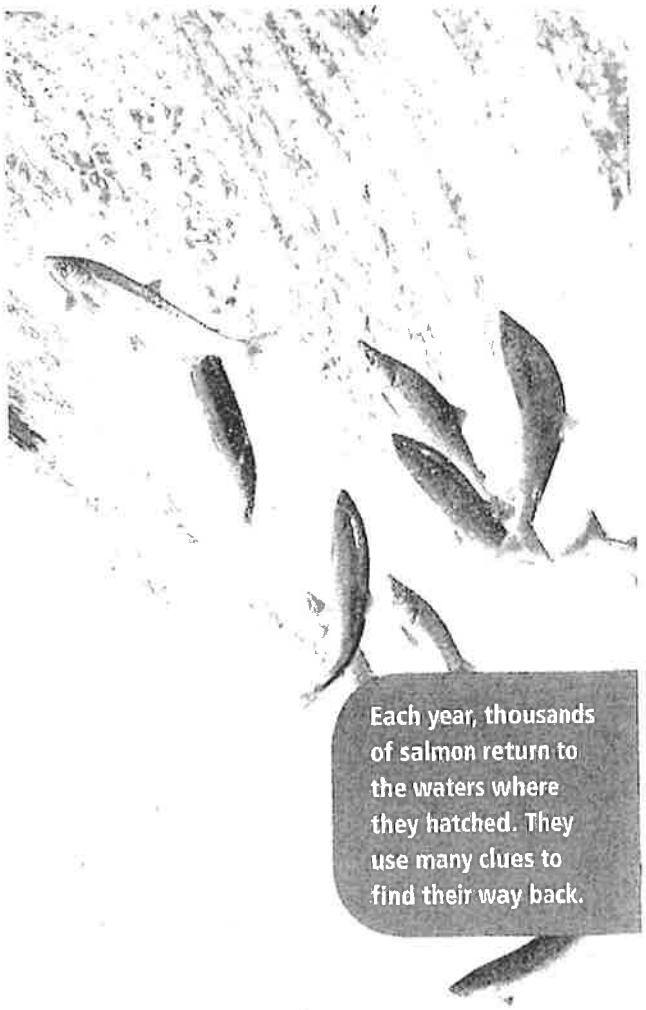
Returning Home

After leaving the river, the Pacific salmon lives in the ocean for the next few years. Eventually, though, she begins her return journey. She is going home to the stream where she was born to lay eggs, or spawn. How does a salmon remember the route she took years before and find her way back?

Scientists don't know all the answers, but here's what they think is happening: a Pacific salmon feels the temperature of the water and the ocean currents. She tastes how the saltiness of the water changes in different places. She sees the location of the sun and the star patterns at night. Like a migrating bird, she can sense the earth's magnetic field to find her way.

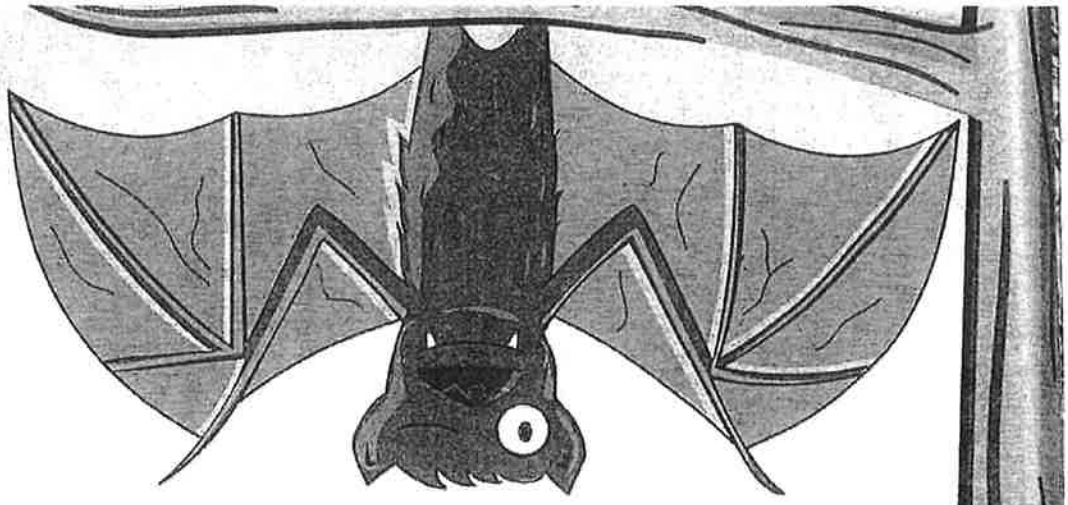
Finally, the salmon remembers the smell of her birthplace. The plants that grow and the leaves that fall from the trees create a special odor for each stream.

She swims up over the rocks and rapids on her last journey. She will lay eggs to create the next generation of Pacific salmon. Then she will die, leaving her fry to make their own journeys using instinct and navigation skills they inherit from their parents.



Each year, thousands of salmon return to the waters where they hatched. They use many clues to find their way back.

Activity Central



ANIMAL MATCH

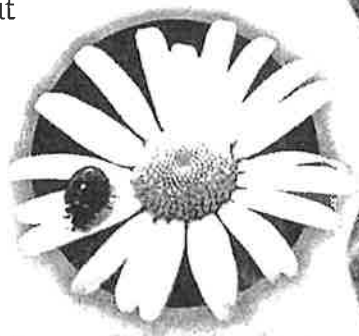
In the article "Animals on the Move," you read about the abilities and habits of many different animals. In the left column below is a list of animals mentioned in the article. The column on the right lists different animal characteristics. On a separate piece of paper, match each description to the animal it describes best. Review the article if you're not sure!

1. Salmon	**A.** makes a rumbling sound that people cannot hear
2. Elephant	**B.** moves in a zigzag motion
3. Bat	**C.** returns to its place of birth to spawn
4. Honeybee	**D.** uses high-pitched squeaks to find its way

WILD SIMILES

Similes are comparisons that use the word *like* or *as*. A simile helps people understand something by comparing it to something else. In the poem "The Whale," for example, the whale says that it is as "Big as a street... With skin like rubber."

Create two or three similes about an animal mentioned in "Animals on the Move" or about an animal of your choice. Use features from the chart below. Take turns reading your similes with a partner.



Feature	Example
size	as tall as a tree
texture	as smooth as glass
movement	racing like the wind
color	as black as ink
sound	cooing like a flute