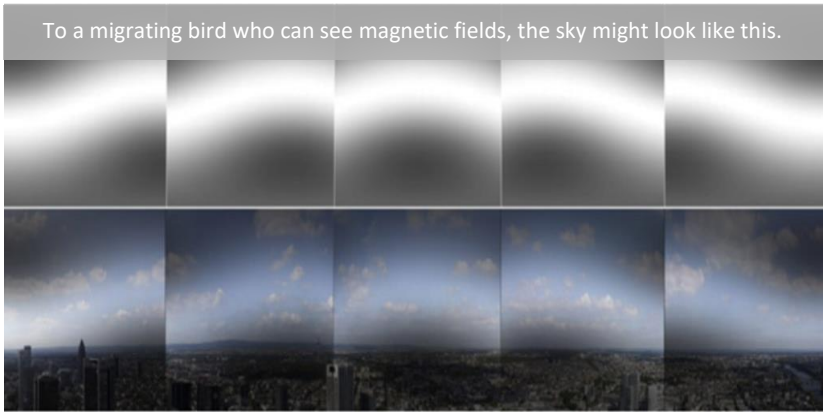
TaHome Nature Education: Navigation
Grades K-2

Reading: Finding the Way

Humans and other animals must find their way every day, whether it is across continents and oceans during migration, or around the corner to the neighborhood park. You may have GPS systems, maps, and adults that help you find your way, but have you ever wondered how other animals are able to do this without technology and often without any help or teaching? Finding the way is called **navigation**, and it can look different for various animals and purposes. Sometimes animals and humans use similar navigation methods, and other times animals have navigation abilities that humans lack.


To a migrating bird who can see magnetic fields, the sky might look like this.

The earth has **magnetic fields** caused by the molten iron core swirling beneath the surface of the earth. Many animals (including humans) have a mineral called magnetite in their bodies, that help them sense these fields, much like an internal compass. Others have a special protein in their eye to help them see the magnetic fields. Animals know where to go based on the patterns of magnetic fields. Animals that use magnetism to navigate include birds, salmon, butterflies, and sea turtles.

These magnetic fields determine the **cardinal directions**, North, East, South, and West, which humans use to make maps, understand directions, and navigate. A compass usually points North, and when we look at a map it is often oriented so that North is up, East is to the right, South is down, and West is to the left. Looking at this map of Lake Tahoe, which shore of the lake do you live closest to, the North, East, South, or West?

At Tahoe the sun is positioned in the South when it is highest in the sky. We can tell direction, time of year, and time of day using the sun, and so can many animals. You may have noticed at Lake Tahoe that the sun comes up over the Nevada side (East shore) and sets over the California side (West shore). From Truckee, the sun rises from behind Mt. Rose and the Verdi Range and sets behind the Sierra Crest. Paying attention to these kinds of details is something you might not often think to do, but it is vital to some animals' survival. Animals known to use the position and path of the sun to navigate include reptiles, bees, fish, butterflies, and ants.

Nocturnal animals can also use the sky to help them navigate. Some will make note of where the sun sets to help them know where they are and where to go. Once the sun is down, they can use the stars. Dung Beetles have a special sensitivity to polarized light, which allows them to use moonlight to navigate at night. The patterns of stars seen in the night sky, called constellations, vary in different parts of the world and during different seasons. Before humans had GPS and maps, our ancestors used these reliable star patterns to navigate. Many animals rely on the maps of the night sky too, such as seals, moths, migrating birds, and frogs.

Kokanee Salmon in Taylor Creek

Other special senses also can be used to help an animal get where it wants to go. The Kokanee Salmon living in Lake Tahoe use their sense of smell. Salmon are hatched in streams that empty into Lake Tahoe, such as Taylor Creek in South Lake Tahoe. After hatching in late winter, they will stay in the creek for a couple of months. During this time, they build a strong memory of the creeks unique scent. Later in the spring, the Kokanee turn downstream and head to Lake Tahoe, where they will spend the next few years. When the Kokanee Salmon is old enough to lay or fertilize their own eggs, they will find their way back to the same creek where they hatched by following that familiar smell from their earliest days.

Animals and humans may also use **landmarks** as a navigation tool. This is often the easiest way for people to begin learning to navigate. You learn the landmarks in your home and can navigate to them, such as learning the path from the front door to your bedroom by going up the stairs and opening the door past the bathroom. With enough practice, you can navigate around parts of your home in the dark. Next you might learn the landmarks on your street, like what your neighboring houses look like, or the stores on the street you must travel on before turning onto your own street. Animals can follow landmarks like rivers, mountain ranges, and other large and visible land features across thousands of miles during migration.

This Western Tanager may use magnetic fields, landmarks, the sun, and the night sky to find its way from Central America to Lake Tahoe.

Have you ever thought about the ways you navigate? Do you think you could learn to be better at finding your way or to navigate using the methods of other animals? What tools might help you to do this? Explore the activities below to improve your navigation skills.

Activities for Grades K-2

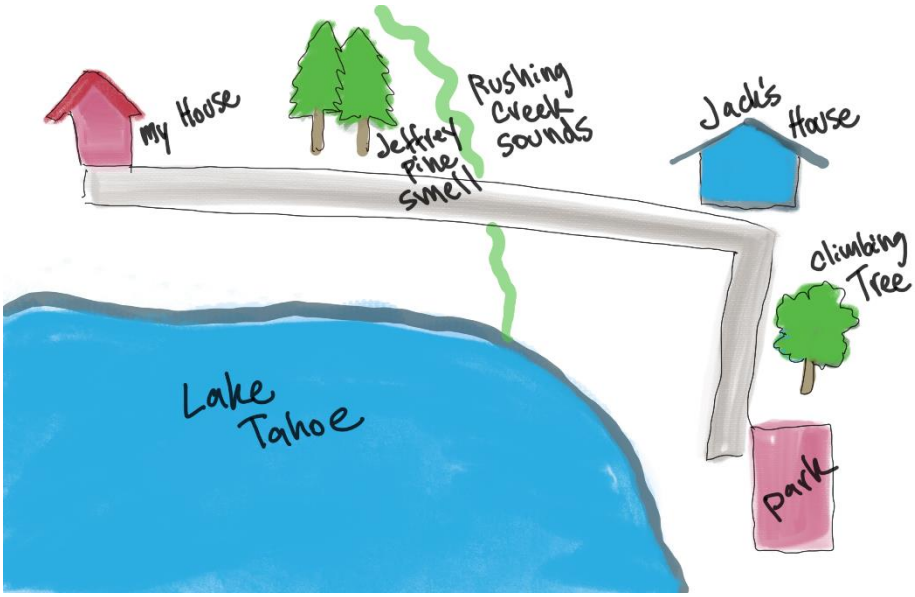
Knowing You Are Home

Animals use their senses to help them know where they are and where to go, like the Kokanee Salmon finding their way home by smell. What observations can you make with your senses to help you know that you are close to home? What smells, sights, and sounds remind you of home? Have you spent a night or more away from home and noticed how different these sights, sounds, and smells were? Tell a family member a list of the sensory landmarks that help you know when you are home. Consider these ideas for your list:

- Smells inside your home, like your family's favorite food
- Smells outside your home, such as the sweet scent of Jeffrey Pines
- Sounds of any family members voices, pets, or wildlife that live around your home
- Sounds of features in or around your home, such as a busy road, fire station signals, or a rushing creek, or even the sounds of your furnace, refrigerator, or plumbing
- Natural landmarks you can see from or near your home, such as a mountaintop, large rockface, a creek or lake, or a unique tree
- Standout features of your home, such as a brightly painted front door or a unique mailbox

Map Making

Use some of the sensory landmarks from your Knowing You Are Home list to create a map. This map should show the route from your home to some close-by destination (within walking distance!) you frequently visit, such as a neighborhood park or your school.

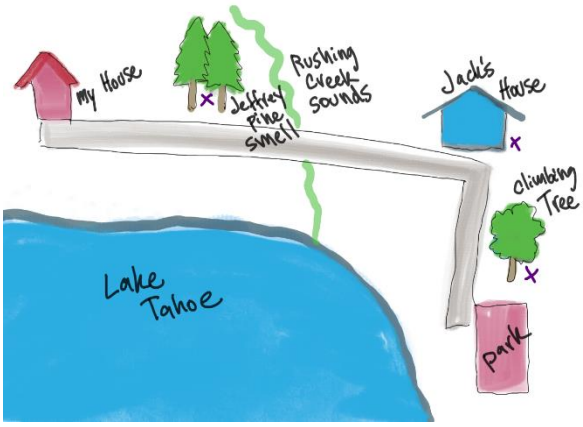


The next time you travel this route make a note of at least three sight landmarks between your home and your destination. These landmarks could be from your list or new landmarks. Also note where this landmark is in relation to you on the route. Your notes might say:

- Landmark #1: When I leave home, Lake Tahoe is along my right.
- Landmark #2: My friend's Jack's house is on the corner where I turn right.
- Landmark #3: The tree I like to climb is on my left just before the park.

Next, take out a blank piece of paper to begin your map:

1. Start by drawing your home in the top left corner and your destination in the bottom right corner in red.
2. Now, draw a straight path from your home to your destination in black.
3. Along the path, draw your sight landmarks in the order that they appear along the path in blue.
4. Finally, add in some of the sensory landmarks from the list you created that fall along this path in green.



Treasure Map

Use the map you create to do a treasure hunt. First, gather 3-4 pieces of "treasure", such as a few small treats or coins. Place them in a bag marked "For treasure hunt! Do not disturb" to avoid losing them. Ask and adult or older sibling to be a helper and place these pieces of treasure next to landmarks marked on your map.

On your map, this helper should mark each spot where the treasure is hidden with a purple X. Finally, take your helper along your route and try to find each hidden treasure at the marked X's.

Play Compass Commander

Play this game with a group of 5 or more people. First, you will need an open space outdoors where you can easily run around. Next, use a compass (most phones have a compass application on them) and stand in the center of this space. Figure out which direction each of the four cardinal points (North, East, South, West) are from your spot in the center. Mark each of these points by putting a marker at each of the four directions, such as a weighted down piece of paper with the correct direction written on it.

To play, one person will be the caller and everyone else will be players. Have all players begin in the center. The caller will then call out a command to run to one of the four cardinal directions (such as calling out "East!") and the players will all run in that direction to the marker. The last person to the marker is out. Then the caller will call out a new direction and the players will run to that marker; again, the last person to the marker will be out. Continue playing until one player remains. This player wins and becomes the new caller.

Once the players have learned each of the four cardinal directions, try adding more commands that a caller can use. These calls are based on navigating animals. Here are some recommendations:

- Migrating Birds: When this command is called, players must quickly make a wing flapping motion with their arms. The last player to do this is out.
- Migrating Whales: Players must lay on their stomach and make their best whale sounds. The last player to do this is out.
- Navigating Butterflies: Players must place two fingers on their head like butterfly antennae and bend their elbows to flap around like a butterfly. The last player to do this is out.

Words to Know

Navigation: Finding a route to a specific destination

Magnetic Fields: The area around a magnetic object that is affected by the magnet

Cardinal Directions: North, East, South, and West

Landmarks: An object or feature of an area that is easily sensed and recognized to help you know your location

Palabras para conocer

Navegación

Campo magnético

Direcciones cardinales

Punto de referencia

Further Learning

Complete the migration mazes for a Kokanee Salmon and a Painted Lady Butterfly in the TINS Activity Book on pages eight and nine.

Learn more about Kokanee Salmon in Lake Tahoe in this coloring book.

Practice more map making skills with these fun activities.