**RESOURCE LIBRARY**

ACTIVITY : 1 HR 30 MINS

## Animal Navigation

Students discuss the navigation methods of migratory animals. Then they watch videos, draw mental maps, and make connections between their maps and how migratory animals use mental maps and other cues.

**GRADES**

5 - 8

**SUBJECTS**

*Biology, Ecology, Experiential Learning, Geography, Physical Geography*
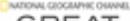
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3 Videos

# OVERVIEW

Students discuss the navigation methods of migratory animals. Then they watch videos, draw mental maps, and make connections between their maps and how migratory animals use mental maps and other cues.

For the complete activity with media resources, visit:

http://www.nationalgeographic.org/activity/animal-navigation/

# Program

NATIONAL GEOGRAPHIC CHANNEL
GREAT
MIGRATIONS

# DIRECTIONS

**1. Discuss how animals navigate.**

Ask: *If you want to go somewhere that you have never visited before, how do you find your way?* Write students' responses on the board. Explain to students that animals navigate in a similar way. But animals do not have a compass, GPS, street signs, or maps. Ask: *How do animals navigate then?* Tell students that animals use environmental cues, instincts, and internal cues to help them navigate. Provide students with an example of animal navigation: the monarch butterfly flies thousands of kilometers or miles over lands it has never seen. Monarchs and other migratory species use a complex combination of navigational aids that scientists do not yet fully understand. Ask: *Why is it important to understand how animals navigate?*

**2. Give students a "curiosity quiz" about animal navigation methods.**

Write the following list on the board: 1) genetics; 2) mental maps; 3) instinct; 4) sun and moon; 5) stars; 6) smell; 7) magnetic field; 8) communication and signaling among individuals; 9) ocean currents. Ask students to number a blank piece of paper 1-9. Ask them to write **H** for human method, **W** for wild animal method, or **B** for both. Tell students they will have an opportunity to check and revise their answers later in this activity.

**3. Build background about migratory animal navigation methods.**

Read aloud the information below about navigation methods used by migratory animals. As you read, have students list additional examples or questions they think of on the same piece of paper as their curiosity quiz.

- **Genetics**—some scientists believe that migratory animals genetically inherit migratory routes from their parents.
- **Mental maps**—rather than a paper map, a mental map is carried in the mind and includes known landmarks, such as rivers, trees, and mountains. Simple migrations, such as altitudinal migrations (up and down a mountain) can be navigated with a mental map.
- **Instinct**—instinct also helps animals with simple migrations. For example, gray whales mostly follow the west coast of Canada and the United States as they migrate between Alaska and Baja, Mexico. Dolphins follow the topography of the ocean floor.
- **Sun and Moon**—some animals follow the sun as it crosses the sky from east to west. Starlings orient themselves using the path of the sun. Clouds, time of year, and moving at night can make it impractical to use the sun as the only cue for direction.
- **Stars**—hundreds of years ago, explorers used the stars to navigate their course as they traveled over land and sea. Animals use stars, such as Betelgeuse and the North Star, most

likely because those stars are very bright and often visible. Using the stars, Mallard ducks can find north.

- **Smell**—over small distances, or at specific locations on a migratory path, scents can help animals find their way. For example, salmon use scents in rivers to find spawning areas to lay their own eggs—in the same area where they were hatched. Scientists think wildebeest follow the scent of rain on the dry Serengeti soils to reach greener pastures.
- **Magnetic field**—the Earth has a magnetic field, and although humans usually cannot detect it without a compass, some animals have the ability to detect and use it for their migrations. It helps them know which way is north. Scientists are not sure exactly how animals use the magnetic field, but it's similar to humans using a compass to find magnetic north.
- **Communication and signaling among individuals**—some animals that migrate in groups communicate as they travel to help with navigation. For example, whales use sound to tell each other where they are and where they are headed.
- **Ocean currents**—some animals can use ocean currents to navigate to and from breeding or feeding grounds. Some eggs, larvae, and young fish drift passively with ocean currents. Some adult fish migrate to breeding grounds by deliberately moving against ocean currents.

**4. Watch video clips from _Great Migrations_.**

Show students the video clips "Red Crab Eggs," "Wildebeest Migration," and "Sperm Whale Migration." Ask:

- _Which navigational method(s) does each species use?_
- _Do you think any of the species' routes are more difficult to navigate than others? Explain._

**5. Have students draw mental maps of a familiar place.**

Tell students that both humans and migratory animals use mental maps. Have students draw mental maps showing areas they are very familiar with, such as the area between students' homes and your school, or between two well-known, local landmarks. Ask students to include a title, symbols for landmarks, roads, and any other relevant symbols. Then ask them to include a legend that explains those symbols.

**6. Have students share their maps and discuss how migratory animals use mental maps.**

Have students share their maps with each other. Ask:

- *How are your maps similar? How are they different?*
- *Are any two maps exactly the same? Why or why not?*
- *How are your mental maps different from those of migrating animals?*
- *What is the farthest you have ever been from home? How accurate would your mental map be if you needed to use it to get to that faraway place?*
- *How do you think migratory animals use their mental maps for faraway places where they travel?*

# Informal Assessment

As a class, discuss students' answers from the curiosity quiz in Step 2. Encourage students to use information from the activity to confirm or revise their answers. As you discuss each item, ask students to give additional examples of how humans, wildlife, or both use a particular navigation method.

# Extending the Learning

Ask: *Do you think humans have an internal compass like migratory animals? Do you think you can accurately find north if you are lost?* As a class, go outside or into a large indoor room with open space, such as a gym. Use a compass to determine which direction is north. Then have students work in pairs, taking turns being blindfolded and being the leader. Ask each leader to help the blindfolded student "get lost." After about one minute, have leaders remove the blindfolds and ask the "lost" student if he or she can correctly identify north. Have each pair take 3-5 turns being blindfolded, and see how many times students can correctly identify north. Have each pair tally their data. As a class, discuss how accurately students could locate north. Put all of the class data into a chart to analyze. Ask: *Was your original assumption correct? How do we use our internal compass? Do you think internal navigation cues are still important for humans even though we have technology, such as GPS, street signs, and maps that helps us figure out where we are going? Why or why not?*

## OBJECTIVES

# Subjects & Disciplines

**Biology**
- Ecology
- Experiential Learning

**Geography**

- [Physical Geography](#)

# Learning Objectives

Students will:

- describe how animals navigate
- explain specific navigation methods for migratory animals
- make connections between how they use mental maps and how migratory animals use mental maps and migration cues

# Teaching Approach

- Learning-for-use

# Teaching Methods

- Discussions
- Hands-on learning
- Multimedia instruction

# Skills Summary

This activity targets the following skills:

- Critical Thinking Skills
  - Analyzing
  - Creating
  - Understanding
- Geographic Skills
  - [Acquiring Geographic Information](#)
  - [Analyzing Geographic Information](#)
  - [Answering Geographic Questions](#)

# National Standards, Principles, and Practices

# NATIONAL GEOGRAPHY STANDARDS

- **Standard 2:**
How to use mental maps to organize information about people, places, and environments in a spatial context
- **Standard 3:**
How to analyze the spatial organization of people, places, and environments on Earth&#39;s surface

# NATIONAL SCIENCE EDUCATION STANDARDS

- **(5-8) Standard C-1:**
Structure and function in living systems
- **(5-8) Standard C-4:**
Populations and ecosystems
- **(5-8) Standard C-5:**
Diversity and adaptations of organisms

**Preparation**

**What You'll Need**

## MATERIALS YOU PROVIDE

- Blindfolds
- Compasses
- Drawing paper
- Paper
- Pencils
- Pens

## REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector, Speakers
- Plug-Ins: Flash

## PHYSICAL SPACE

- Classroom

- Large-group instruction

# BACKGROUND & VOCABULARY

# Background Information

Animal migration is the large-scale movement of a species from one place to another. Most species migrate during specific seasons, in search of food or water, or for mating reasons. Different species obey different internal and external signals that cue their migration. Animals find their way by using an internal compass and mental maps, as well as other cues, to help them navigate.

# Prior Knowledge

["examples of animal migration", "reasons animals migrate", "animal migration cues"]

# Recommended Prior Activities

- Internal and External Migration Cues
- Many Moves of Migration
- Why Animals Migrate

# Vocabulary

| Term | Part of Speech | Definition |
|------|----------------|------------|
| animal migration | noun | process where a community of animals leaves a habitat for part of the year or part of their lives, and moves to habitats that are more hospitable. |
| current | noun | steady, predictable flow of fluid within a larger body of that fluid. |
| genetics | noun | the study of heredity, or how characteristics are passed down from one generation to the next. |

| Term | Part of Speech | Definition |
|---|---|---|
| Global Positioning System (GPS) | noun | system of satellites and receiving devices used to determine the location of something on Earth. |
| instinct | noun | natural motivation or behavior. |
| landmark | noun | a prominent feature that guides in navigation or marks a site. |
| magnetic field | noun | area around and affected by a magnet or charged particle. |
| map | noun | symbolic representation of selected characteristics of a place, usually drawn on a flat surface. |
| mental map | noun | an internal representation of a person's personal perceptions, knowledge, and thoughts about a geographic area. |
| migrate | verb | to move from one place or activity to another. |
| migratory | adjective | organisms that travel from one place to another at predictable times of the year. |
| navigate | verb | to plan and direct the course of a journey. |
| topography | noun | the shape of the surface features of an area. |

## For Further Exploration

## Articles & Profiles

- National Geographic Magazine: Animal Migrations

## Interactives

- National Geographic Animals: Migrations Quiz
- National Geographic Channel: Great Migrations—3D Animal Migration Globe

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