Teacher Notes

Themes

- Animal navigation and movement
- Invasive species
- Human reliance and impact on animal migration

Key learning outcomes

- Animals across a range of environments frequently move large distances to suit their needs in food, water, shelter, space and reproduction.
- Migrating animals play an important role in the food chains and reproductive strategies of other non-migrating species.
- Humans influence the movements of many animals, either by introducing invasive species or preventing animals from following their natural movements.

Key curriculum areas

- **Science:** Science Understanding (Biological sciences), Science as a Human Endeavour
- **English:** Literature, Literacy
- **HASS:** Geography
- **Sustainability:** Systems

Publication details

Animal Migrations: Flying, Walking, Swimming

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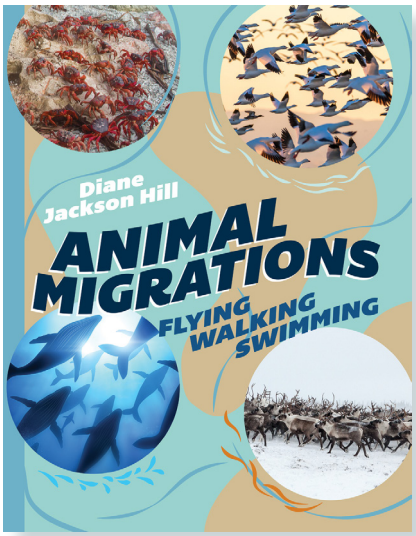

Animal Migrations: Flying, Walking, Swimming

Diane Jackson Hill

About the book

A reindeer treks a continent under unimaginable weather extremes. One tiny bird flies non-stop for nine days, while another flies from the North to South Pole (and back!) every year. A whale swims through the oceans of a hemisphere.

Animal Migrations: Flying, Walking, Swimming offers a fascinating insight into the what, where, why and how of these incredible journeys of survival. It explores the migrations of mammals, birds, insects, fish, reptiles, amphibians, crustaceans and aquatic microorganisms. Discover exceptional and unusual journeys, their effect on our world, and how we can help these migrating animals.

The remarkable adventures covered in *Animal Migrations* show strength, determination, inbuilt knowledge and the importance of community across global connections.

Recommended for

Readers aged 8 to 12 (Years 3 to 6)

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About the author

Diane Jackson Hill is a retired primary school teacher who is passionate about connecting children to the beauty of our incredible world. She is also the author of *Windcatcher: Migration of the Short-tailed Shearwater* (CSIRO Publishing), which won a CBCA Notable Award and a Whitley Award.

Pre-reading questions or activities

Ask students about their favourite destinations, whether they're local or far away. Remaining sensitive to the diversity of travel experiences, discuss what made travel so exciting for them. For those who have travelled less, ask them where they'd like to go. Don't be afraid to share your own travel stories.

Discuss how long it might take to reach certain places around the country or around the world. Share these places on a map, or look them up on Google Earth – calculate travel times, distance and look at pictures of each destination.

Discuss how destinations might vary depending on the time of year. Students might go to the beach in summer or the mountains in winter, for example.

Make connections between factors that might influence their travel destinations, such as food, comfort or distance, and those of animals that might also travel long distances as their own habitats change throughout the year.

Discussion questions

Science

1. Many animals that migrate do so in groups. Read pages 8 and 9 of *Animal Migrations*. Ask the students if they consider humans to be naturally social animals, and if they think of us as migratory. Do we humans have 'safety in numbers' as well?
2. Read pages 15 to 16, and note on a white board the statistics on how far Porcupine Caribou, wildebeests and Bearded Pigs travel. Using a recognisable local map to depict how far smaller distances might be, of 1 to 10 kilometres, invite students to relate the distance the animals might walk in a year to distances they might cover, such as from home to school.
3. Many animals, like whales, travel long distances to eat lots of food in one place, and then long distances to give birth in another. Read Chapter 3 for more examples. Why might these animals move so far for two different activities?

4. Share the map on page 27 with the students and ask them what they notice about the bird flight pathways. Discuss why most of them move on a north-to-south direction, and less on an east-to-west direction. Ask the students how they think birds might be able to cover such enormous distances, compared with other migrating animals.
5. Discuss with students the different ways they might find their way from one place to another. Use the word navigation, and invite them to share ways they might navigate in an unknown environment before reading Chapter 5. Who has used a map? A compass? Satellite navigation?
6. Discuss with students whether their pets migrate. Then ask them how these animals might spread around the world to different countries. Expand this into a conversation about how animals, such as cane toads or rabbits, 'accidentally' migrate, and then read pages 39 to 40 to continue the discussion.
7. Read pages 50 to 51, and discuss with students the various ways migrating animals might help plants 'migrate' as well. Suggest how this might be a problem in weed management.

English

1. Read pages 10 and 11. Ask the students about the kinds of stories the pictographs etched into the rocks might be telling. How might the images be considered types of words? Is it a form of language, art, or both?

HASS

1. Read pages 56 to 59, and discuss with students how an event from 7000 years ago became a story about the land that is still told today. How did the land influence the culture, diet and story-telling of the Gunditjmara people? Read pages 60 and 61, and compare their way of life with that of the Loucheux tribe in the Arctic and the coastal Kwakiutl people in Canada.

Sustainability

1. Discuss with students how humans might interrupt the movements of animals across large distances. Point out there's more than physical barriers to movement – animals can be distracted, have their food sources removed or be scared away. Read Chapter 9 and then ask what kinds of consequences impeded migrations might have on our society.
2. Read Chapter 10, and continue the above discussion in coming up with solutions to some of the most significant obstacles and hazards humans pose to migrating animals.

Activities

Science

Finding magnetic north – Part 1

Safety: This activity uses a sharp needle and strong magnets. For younger and less able students, the activity is safest as a class demonstration.

You will need:

- Strong magnet (If this is done as a demonstration, a small rare-earth magnet can work extremely well. Do not give these to students.)
- Large iron needle
- Small piece of polystyrene or slice of cork
- Bowl
- Water
- A magnetic compass
- Open, sheltered space outside

What to do:

1. Hold the needle firmly in a pincer-grip with one hand and the magnet similarly in the other. Stroke the needle in the same direction at least 20 times with the magnet, without changing its orientation (e.g. flipping it over).
2. Carefully push the needle through a small piece of polystyrene or a slice of cork.
3. Fill a bowl with water. Gently float the magnetised needle in the centre of the bowl.
4. Use the magnetic compass to verify it is pointing in a north–south direction. Note which end points north.
5. Take the bowl outside and use it to find the four points of the compass.

What's happening?

Magnetism is caused by tiny particles in certain materials, such as iron, lining up neatly. By taking an existing magnet with a strong enough force, its particles can literally 'pull' the particles in other materials, such as an iron needle, so they become neatly arranged as well. Together, the crowd of iron particles can all pull together, creating a bigger magnetic field around the needle.

Movements in the minerals making up Earth's core also generate an enormous, planet-sized magnetic field. It's a good thing too! Without it, a lot more radiation from the Sun would hit the surface, making life all but impossible.

Inside Earth's magnetic field, the needle's iron particles are nudged as a single group, pushing the needle around so it lines up with north and south.

Finding magnetic north – Part 2

Safety: This activity takes place outside. Be sun smart, wearing a hat, shirt, sunglasses and sunscreen while limiting the amount of time exposed to sunlight.

You will need:

- A compass (you can use the one from *Finding magnetic north – Part 1*, or a store-bought one)
- A map of the school (preferably with a distance scale)
- A list of directions (see 'Preparation')
- A container with a lid
- A 'prize'

What to do:

Preparation:

1. To prepare the activity for the students, place a container containing prizes – such as certificates of completion or stickers – in a prominent position around the school.
2. Starting at one spot elsewhere on the school grounds, count out distances in steps or metres, and then provide a cardinal direction (north, south, east or west) in which to turn. List these 'steps plus turn' as instructions students must follow.
3. End the instructions near the prize.

Navigation activity:

1. Instruct a small group of students to stand at the starting point. They are to use the scale on the map, or large steps, to measure distances. They must use their compass to determine where north is, and then to use that to determine which way to turn.
2. Give the group a generous time limit to find the prize using the navigation instructions, such as 15 minutes.

Teacher Notes

What's happening?
Many living things – from birds to butterflies and even a few mammals – have evolved ways to take advantage of Earth's magnetic field, using special features of their body to identify directions of north and south. This gives them a big clue on which way to turn to navigate their way long distances.

We might not have a biological compass (though some researchers still think humans might have a weak ability to sense the planet's magnetic field), but we can use a moving magnet to do the same thing.

The migrations game

Safety: This activity uses sharp instruments. Remind students to take care when cutting.

You will need:

- A2 sheets of white card
- Markers
- Coloured paper
- Scissors
- Dice
- Coloured tokens
- (Any other tabletop gaming materials)
- Research materials

What to do:

1. Ask students to choose a migrating animal. Invite them to flick through *Animal Migrations* for inspiration.
2. Direct them to online or physical resources to research as much as they can about their animal's migration, noting routes, distances and special facts.
3. Instruct them to use this information to come up with a board game based on their animal's migration. Help them come up with ideas by suggesting other games they might base it on, such as Snakes and Ladders. They can use dice, make cards, or apply any other creative techniques that might illustrate their game and make it fun to play.
4. Ask students to include a 'How to play' list of instructions with their game.
5. Once students have completed the task, set aside a few hours in an afternoon where everybody swaps games.

Teacher Notes

English

Critter passport

It's impossible to know what an animal might be thinking as it heads out on a migration. But if they had a human mind, they might be finding it exciting, scary or even boring.

Discuss the concepts of personification and anthropomorphisation with the class, emphasising how we as humans relate to things by imagining they were like us. Make it clear how this might mislead us into thinking animals have emotions or ideas that they don't actually think or feel. It also means we might act in support of their conservation, though, where we might otherwise ignore their plight.

Ask the students to choose a migrating animal and to write a diary of a season in migration. How might they express themselves? What might they already know? Are they following other animals, following a magnetic sense, or simply following their noses?

HASS

Remembering country

Work with students in learning about the traditional lands in your area, and whether animals migrated through it. If your school has contact with local Elders, work with them in learning how their culture has changed over time, from when food was sourced from migrating animals to today.

Use this to begin to map around Australia different cultures and language groups, and their dependence on the movements of animals such as eels, waterfowl, insects and even whales. Add these notes to a large map of the country.

Sustainability

Welcome to animal crossroads

Read Chapter 10 together with the class before starting this activity. Pay special attention to page 71, asking different students to read aloud the ways we can assist various animals to ensure their migrations aren't disturbed.

Invite students to work in groups of five. Ask them to designate the following town committee roles to individuals in their group:

- Mayor: The person responsible for overseeing tasks given to each individual in the group, and determining if their ideas are good enough to write down.
- Waste collector: The person responsible for waste removal, bins and recycling.

- Town planner: The person responsible for determining what can happen in different parts of the town, such as where new houses go, where roads and parks can be built, and which areas can have shops or factories.
- Media advisor: The person responsible for writing up short messages the town committee wants the public to know.
- Parks officer: The person responsible for looking after wildlife reserves, and ensuring parks and beaches are clean and tidy.

Once everybody has a role, the mayor can run a town committee meeting to discuss how to make the town as safe and welcoming as possible for migrating animals. Discuss how each person might be able to do something to make each point on page 71 a reality. How might they achieve this?

Australian curriculum links

Year level	Learning area: science	Other learning areas
Year 3	**Science Understanding: Biological sciences** • Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044)	**English: Literature** • Understand that languages have different written and visual communication systems, different oral traditions and different ways of constructing meaning (ACELA1475)
Year 4	**Science Understanding: Biological sciences** • Living things have life cycles (ACSSU072)	**English: Literature** • Use metalanguage to describe the effects of ideas, text structures and language features of literary texts (ACELT1604) **HASS: Geography** • The content in the geography sub-strand provides opportunities to develop students' understanding of place, space, environment, interconnection and sustainability. The content focuses on understandings about sustainability – the ongoing capacity of the environment to sustain human life and wellbeing (ACHASSK087)
Year 5	**Science Understanding: Biological sciences** • Living things have structural features and adaptations that help them to survive in their environment (ACSSU043) **Science as a Human Endeavour** • Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE081)	**English: Literature** • Recognise that ideas in literary texts can be conveyed from different viewpoints, which can lead to different kinds of interpretations and responses (ACELT1610) **English: Literacy** • Show how ideas and points of view in texts are conveyed through the use of vocabulary, including idiomatic expressions, objective and subjective language, and that these can change according to context (ACELY1698) **HASS: Geography** • The content in the geography sub-strand provides opportunities to develop students' understanding of place, space, environment, interconnection, change and sustainability (ACHASSK111)
Year 6	**Science Understanding: Biological sciences** • The growth and survival of living things are affected by physical conditions of their environment (ACSSU094) **Science as a Human Endeavour** • Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098)	**English: Literacy** • Compare texts including media texts that represent ideas and events in different ways, explaining the effects of the different approaches (ACELY1708)
All	**Sustainability: Systems** • OI.1: The biosphere is a dynamic system providing conditions that sustain life on Earth.	

Related books from CSIRO Publishing

For younger readers (aged 5–9):

- *A Shorebird Flying Adventure* (https://www.publish.csiro.au/book/8006)
- *Swim, Shark, Swim!* (https://www.publish.csiro.au/book/8069)
- *The Voyage of Whale and Calf* (https://www.publish.csiro.au/book/8029)
- *Tiny Possum and the Migrating Moths* (https://www.publish.csiro.au/book/8009)
- *Windcatcher: Migration of the Short-tailed Shearwater* (https://www.publish.csiro.au/book/7851)

Other CSIRO resources

CSIRO has developed and delivered a broad range of high-quality STEM education programs and initiatives for nearly 40 years. Our programs aim to inspire the pursuit of further STEM education among students and the community, to equip the emerging workforce with tomorrow's skill sets, and to strengthen collaboration between industry and classrooms across Australia. For more information visit: https://www.csiro.au/en/Education