Reef Tracks

About this lesson

Students map their own movements over the course of a typical day. The students examine their maps to decipher the behaviour behind the data they have collected. Students then choose an animal on the Reef Tracks website. They examine the data on their chosen animal and consider what behaviours are revealed in the data.

Mathematical purpose

- Students recognise that data tells a story. Students look at data to make hypotheses about the behaviour of people and animals.

Learning intention

- We will learn that data tells a story.

Time
Two to three lessons of approximately 1 hour each.

Resources
- Printed/virtual maps of local area for students to mark up
- Access to the Reef Tracks website
- Maps of the Great Barrier Reef

Australian Academy of Science

Teacher background information

In the second part of this lesson, students use the Reef Tracks website to track a reef animal.

A satellite transmitter has been attached to each animal listed on Reef Tracks. These trackers send out "pings" when the animal surfaces, which is an electronic signal that tells the satellite exactly where the animal is. Each circle on the map represents a ping.

Satellite transmitters are usually used on animals like turtles, whales and seals, because they need to go above water to breathe. They can also be attached to the dorsal fins of sharks, as these fins often breach the surface of the water. For more information on satellite tracking marine animals, see this article.

Tracking you

Students begin by running a tracking experiment on themselves. For a single day, every hour students record their location, e.g. *8 a.m. bus to school, 9 a.m. classroom, 10 a.m. front office, 11 a.m. playground…*

T **Teacher notes:**

- Students can carry out this experiment for an imagined 'typical day' rather than an actual day, particularly if they are working remotely.
- For more variety you could have students map an 'average Saturday' - some students might not leave the house, and some may travel quite far!

Students mark each location on a printed or virtual map and draw a line showing their path between the locations. They measure the distance they have travelled.

Students swap maps with another student and describe the other student's movement..

Questioning to prompt deeper inquiry:

- *What makes your map similar to other maps in the class? What makes your map different?*
- *What general statements can you make about your movements and the movements of others?*
- *What does the map show about your movements? What doesn't the map show?*
- *What does your movement tell you about the different activities that you do during the course of the day?*

T **Teacher notes:**

- While the map shows where students have been, it does not indicate the amount of time they spent in each location. You may prompt students to consider ways they could indicate time on their maps.
- The map does not indicate speed of movement. It is possible to calculate average speed during the course of the day (by dividing total distance travelled by the total time tracked). Depending on your class you may choose to explore this further:
  - ◊ *Why might we calculate our average speed? What does it tell us?*
  - ◊ *Were we really moving at that speed all day?*
  - ◊ *When were you going faster or slower than your average speed? Why?*
  - ◊ *What might have been your average speed between 8 a.m.–11 a.m.? 11 a.m.–2 p.m.? 2 p.m.–5 p.m.? When was it fastest/sloweest? Why?*

Tracking marine animals

Students open the Reef Tracks website and choose an animal. Have the students look at the data on their animal. Allow students time to explore the website and the different tracking features.

Ask the students: *What do you notice about the data on your animal? What do you wonder?*

On a map of the reef, have the students mark the area that their chosen animal is contained in. Have students compare their map to a student with a different animal of the same species, and to a student with an animal of a different species. Discuss similarities and differences between animals.

Questioning to prompt deeper inquiry:

- *How often does your animal ping? What does this tell us about their behaviour?*
- *What is the longest distance your animal has travelled between pings?*
- *Can you tell what time of day your animal is most active?*

Students can look up the top speed of their animal and compare to the speeds recorded on Reef Tracks. How does it compare? Does your animal ever seem to move at its top speed? Why might this be?

Ask the students: *What are some of the biggest differences between the data you have collected on yourselves and the data we might collect on reef animals?*

T **Teacher notes:**

- Marine animal tracking data can also include **depth data.** Depending on your class you may choose to explore this further :
  - ◊ This image from the academic paper "Fine-Scale Movements of the Broadnose Sevengill Shark and Its Main Prey, the Gummy Shark" shows an example of depth tracking data. The image shows the depth profile of a single shark over four one-hour periods in a single day.
  - ◊ Show students the graphs and ask *What do you notice? What do you wonder?*

Linking data with lifecycles

Have students consider: *What does the data tell you about the behaviour of your animal?*

Students can do some additional research on their animal and compare their behviours with the data.

Some questions to consider:

- *When might the animal be feeding?*
- *When is mating season for your animal? When are they raising young? What does the data show about your animal at this time?*
- *Warm and cool currents of water flow through different parts of the ocean at different times of the year. Look at the location of your animal in comparison to these currents. Does your animal prefer warmer or cooler water currents?*

Reflection

Students watch/read some of the videos and articles linked below, then discuss as a class.

- Keeping our Great Barrier Reef great – Australian Academy of Science
- Virtual reef diver – Australian Academy of Science
- More than just temperature—climate change and ocean acidification – Australian Academy of Science
- Climate change and coral bleaching – Australian Academy of Science
- Great Barrier Reef under threat – ABC
- Threats to coral reefs: what are they? – ABC
- Ellison Reef: has it been saved? – ABC

Some possible topics for discussion:

- Rising water temperatures
- Ocean acidification
- Coral bleaching
- Rising sea levels

Help students recognise that the different threats to the reef have flow on effects to all life in the reef, e.g. rising water temperatures will have a big impact on animals and their behaviour, coral bleaching impacts the ecosystem of the entire reef.

Pose the question: *How can the tracking data help inform the ways we can care for reef animals?*

Students may use the data from this activity to form a presentation on their animal and the importance of caring for the reef.