

# Statistical ecology

with Professor Joanna Mills Fleming

## Talking points

### Knowledge

1. How much of the Earth is covered by water?
2. What is the average ocean depth?

### Comprehension

3. What methods do marine scientists use to gather ocean data?
4. How does the ocean help mitigate the effects of climate change?

### Application

5. How do you think marine scientists could use satellite images, acoustic sensors and tags to study whale population dynamics? What role would a statistician play in this research project?

### Analysis

6. What are the advantages of the close-kin mark-recapture method for estimating fish populations compared to the traditional mark-recapture method?
7. Why is it important that marine scientists collaborate with people who live and work by the sea? What sort of data do you think these communities can provide?

### Evaluation

8. Would you prefer to approach a career in statistical ecology from a statistics or ecology direction? Why? How do you think you would benefit from each approach?

## Activities

### 1. Design a device for gathering ocean data

Joanna is part of the Ocean Tracking Network, a research platform that tracks marine animals to provide data about their movement. Read about how Emma the seal is filming her life around the coast of Nova Scotia using an attached camera and GPS tracker: [www.oceantrackingnetwork.org/emma-the-seal-bioprobe-provides-window-into-life-on-and-off-sable-island](http://www.oceantrackingnetwork.org/emma-the-seal-bioprobe-provides-window-into-life-on-and-off-sable-island)

What do you think scientists will learn from the data Emma provides? If you had access to these data, what research questions would you try to answer?

Design a device to collect ocean data. For example, this could be a sensor to measure the chemistry or temperature of sea water which attaches to a marine animal. What technology will your device use? What data will it collect? How will statistical ecologists or marine scientists use these data to improve our understanding of the ocean?

### 2. Become a statistician

Design your own statistics project to explore data about your classmates, friends or family members. First, create a questionnaire to collect a range of data about each individual (e.g., age, date of birth, height, number of siblings, etc.) and ask all participants to complete it.

Once you have gathered these data, analyse them to draw conclusions about your study group and the relationships between different categories. To do this, perform statistical calculations on the data and create graphs to visually display them.

For example, what are the mean, mode, median and range of heights in your study group? Which data categories are correlated (e.g., height vs. age, height vs. number of siblings)?

### 3. Take part in a census and analyse international student data

A census is a large-scale survey of a population. Census at School ([www.censusatschool.ca](http://www.censusatschool.ca)) is a free international project designed to engage students with data and statistics. Individuals or classes can sign up to complete the census and access the data collected from students around the world.