Quantitative ecology
with Professor Guillaume Blanchet

Talking *points*

Knowledge
1. What methods do field ecologists use to gather data?
2. What conclusion did Guillaume reach in his study of ground beetles in Alberta's forests?

Comprehension
3. What are some advantages of technology-focused ecological data collection methods, such as satellite images, camera traps and environmental DNA (eDNA)?
4. What role do quantitative ecologists play in conservation efforts?

Application
5. How do you think ecologists processed and analysed their data before computers were widespread? What do you think were the limitations of their work?
6. What variables do you think Guillaume included in the statistical models he created to help conserve copper redhorse fish populations?

Analysis
7. Guillaume mentions the challenge of creating models that predict how ecosystems will respond to climate change. Why do you think this is both challenging and important?
8. Why do you think Guillaume sometimes needs to create his own models, rather than use pre-existing ones?

Synthesis
9. How do you think future advances in technology, such as artificial intelligence (AI), will benefit ecologists as they collect and analyse data?

More *resources*

- Visit Guillaume's Futurum webpage to find the article and activity sheet in French: **www.futurumcareers.com/how-can-statistical-models-answer-ecologys-big-questions**

- iNaturalist is a website where anyone can submit their wildlife sightings. See what species live near you: **www.inaturalist.org/home**

Activities

Collect your ecological data
Choose three (or more) areas near your home or school to compare how the populations of different species vary between them. Decide what ecological questions you hope to answer, which type(s) of organisms you want to study, and what the most appropriate sampling technique is. For example, you could record the number and species of all trees in a 40 × 40 m area, of all small plants within several randomly scattered 1 × 1 m quadrants, of all insects you see as you walk along a 40 m transect line or of all birds you see and hear while sitting quietly for 15 minutes. You will also need to record environmental variables that may impact the ecosystem, such as temperature, altitude (you can find this from maps), wind speed, noise level, proximity to buildings or other human influences, and any others that you can think of that may influence the species you are studying.

Carry out your ecological survey at each location, recording what species you observe (Seek (**www.inaturalist.org/pages/seek_app**), from iNaturalist, is a powerful app for helping you to identify species) and environmental variables.

Analyse your ecological data
You are not a trained quantitative ecologist and do not have access to advanced computer models, but you can still analyse your ecological data to draw conclusions about how environmental factors influence species' populations. For example, you could create graphs to plot the number of species in each area (this is a measure of biodiversity known as richness), the abundance of a single species against a particular variable (e.g., altitude) or the abundance of one species against another. What graphs will best help you answer your research questions?

What trends and correlations can you observe in your data? Why do you think these trends and correlations exist? What conclusions can you draw about the abundance of species in your different study areas? What are the limitations of your data collection and analysis techniques? If you had access to Guillaume's statistical models, what findings from your research would you want to investigate in more detail?