

Activity Guide

Use DNA sequences and an online scientific database to discover a new ecological survey technique.

Suitable for: age 11+

Estimated duration: 60 minutes

You will need:

- Pen or pencil
- Site data files
- Site report sheet
- River species list
- Discussion guide
- Answers sheet
- Computer or tablet with internet

Introduction

Wild DNA introduces learners to a DNA-based technique for identification of species in an environment. It compares DNA sequences from the environment to DNA sequences in an online database using bioinformatics.

eDNA stands for environmental DNA: DNA that is gathered from organic material found in the environment. The Darwin Tree of Life project, at the Wellcome Sanger Institute, is producing reference genomes for 70,000 eukaryotic species in Britain and Ireland. eDNA can be compared to these reference genomes to identify species. Data from eDNA can be used in biomonitoring to study the effects of changes (for example season, land use or climate change) on the biodiversity in an environment.

This bioinformatics activity develops skills in using DNA sequence for identification and gives experience of the value of eDNA in ecological surveys. Learners will use data provided to discover what species are found in specific locations.

The challenge

Your company has been asked to carry out an ecological survey of a wetlands area and river system to find out what species are living there. You will use environmental DNA (eDNA) to produce a site report.

Running the activity

How to complete the activity

1. Learners input eDNA sequences, from the 'Site data files', into the online NCBI search tool: <https://blast.ncbi.nlm.nih.gov/>.
2. This allows identification of which species the eDNA is from. Learners identify the species for each eDNA sequence at a location and complete the 'Site report sheet'.
3. Using the 'River species list', learners find out the common names and more information about the species present.
4. Learners research and discuss the impact of the species found in their location on the ecosystem. They may think of conservation actions, if any are possible or needed.

Discussing the answers

In the 'Discussion guide' we provide additional information about stages of the activity. The 'Answers' sheet gives expected answers on the 'Site report sheet' and identifies the species that are predators, endangered, invasive and indicators of good water quality.

The outcomes are intended to encourage group discussion or further research about the use of eDNA in biomonitoring.