THE MACAULAY LAND USE RESEARCH INSTITUTE

DETECTING CHANGES IN SCOTLAND'S SOIL RESOURCE

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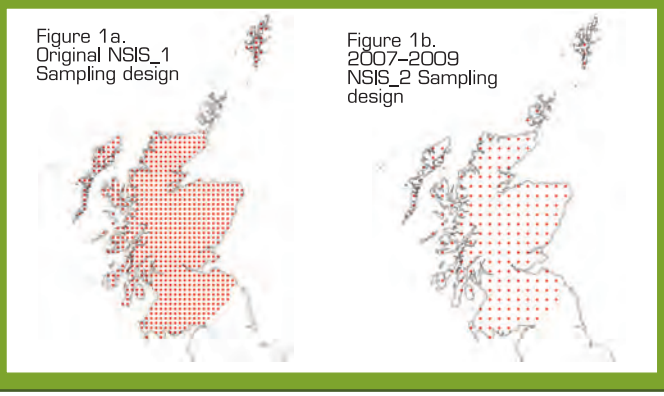
ARE SCOTLAND'S SOILS CHANGING?

Between 1978 and 1988, The Soil Survey of Scotland sampled 721 soils on a 10km grid throughout Scotland (Figure 1a) as an inventory of our soil resource. The soils were analysed for a range of key properties including soil nutrient status and organic carbon content. The results of this National Soils Inventory of Scotland (NSIS) allow us to determine changes in key soil properties over time.

We have a programme to resample a subset of the original NSIS during 2007–09. There are three main objectives:

- Detect changes in key Scottish soil properties
- Test the suitability of soil quality indicators in a wide range of soils and land uses
- Test different sampling methods for monitoring soils at a national scale

We are re-sampling 25% of the original locations on a 20km grid (Figure 1b). This is similar in scale to EU soil monitoring schemes and statistical analyses showed there was no inherent bias in sampling (Figure 2).



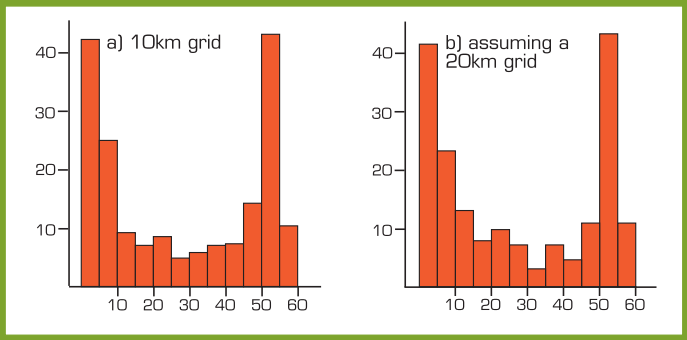
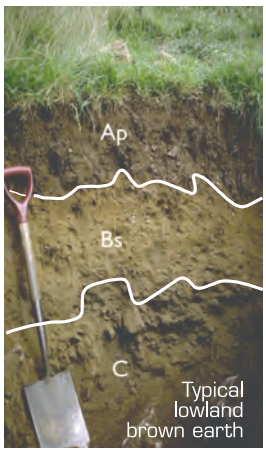
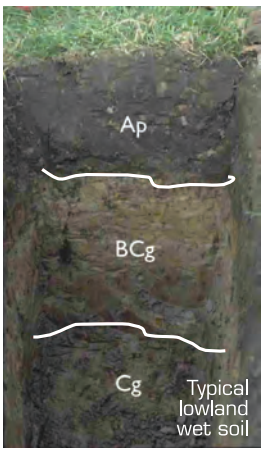


Figure 2. Frequency distribution of carbon contents

DESIGN OF FIELD SAMPLING

Sites are relocated using aerial photographs; a pit is dug to 80cm deep (Figure 3); soil layers identified and characterised (Figure 3); at least 1.5 kg of soil sample is taken from each layer (where possible) and analysed for chemical, physical and biological attributes; additional pits are sampled to determine soil variability; sampling approaches used in other UK schemes are replicated to inform on future soil monitoring methods.





PROGRESS AND FUTURE PLANS

- Over two thirds of the sites have been resampled (2009) including lowland agricultural soils and upland peats (Figure 3)
- Samples are being analysed for the same range of key soil properties as in the original and for new properties to aid the interpretation of any changes detected
- Applying state of the art techniques like analysis of DNA in soils (Figure 4) and testing methods to speed up analysis of soil monitoring schemes

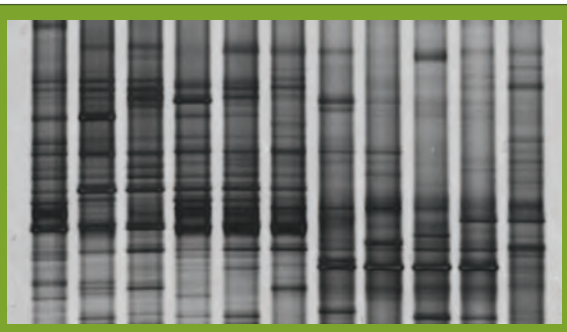


Figure 4. DNA profiles