Soil Health Metrics for Environmental Land Management Schemes (ELMS) Recommendations to Defra

Introduction

A Soil Security Programme (SSP) group of expert soil health researchers and practitioners met on 20 and 21 May 2019 to discuss which were the most practical and reliable farmer led on farm measurements for soil health, and their potential applicability in the new Environmental Land Management Scheme (ELMS) development.

Workshop objectives

1. Develop a consensus as to the most practical and reliable on farm measurements for soil health;
2. Recommend a soil health measurement methodology for Defra to include in the new Environmental Land Management Scheme (ELMS) development.

A site visit to the National Trust Home Farm at Wimpole, Cambridgeshire was followed by a discussion workshop from which these recommendations were drawn.

For a list of attendees please see Appendix 1.

Recommendations to Defra

Over two days of discussions the SSP Group came to a consensus on a universal suite of recommended metrics, tests and methodology that could promote soil health in the context of the new ELMS.

The group agreed that the sampling and recording of soil health linked to improved soil management should be rewarded as a public good.

The recommendations are as follows:

The Tests

A suite of straightforward metrics should be included in ELMS, these should focus on established tests that can be done by farmers in the field.
We recommend the following soil health indicators tests:

**Universal**
- Mineral soil condition/structure (VESS) / Peat condition assessment (topsoil or topsoil and subsoil as appropriate)
- Earthworm counts in early autumn/late spring
- Lab samples pH, P, K, Mg, SOM (loss on ignition), soil texture

**Optional**
- Slaking test – to measure aggregate stability
- Penetration resistance

**Additional supporting information might include:**
- Recording excessive surface wetness from observations – to indicate drainage problems.
- Photographic record of soil surface condition to identify risks of erosion.

**Development required:**

The metrics listed above have well developed sampling procedures and interpretation guides. However, some work to develop, standardise and prescribe these metrics will be needed before they can be used in ELMS. For example, the VESS for mineral soils developed by AHDB Healthy Grassland Soils will need to be extended to cover upland soils and arable. Peat and peaty soils will need a different type of VESS metric [probably based around vegetation cover and type, depth, wetness and degree of oxidation] to indicate if the soils are declining, stable or building.

**Methodology**

We recommend the use of technology such as smart phones and GPS to make soil monitoring simple, replicable and uniform across industries and land types.

This could be easily done by using GPS fixed sampling points to allow comparisons and replicability over time, and external monitoring. The licencing of existing soil monitoring apps, such as Sectormentor, would be a cost-effective way to roll out this sort of technology.

**Defra will need to create clear guidance on:**

- The number of GPS fixed sampling points required per farm.
- The number of soil samples/ measurements to be taken at each GPS point and frequency of sampling.
- Protocol for bulk sampling of soil for lab analyses around a GPS location.
- Standard sample depth for laboratory soil analyses.
- Approved apps for in field assessments and recording data.
- Timing – soil in correct condition to sample.

We agree that context measures are essential for interpretation

- Texture – Soil types.
- Soil depth.
- Subsoil characteristics.
- Landscape position / topography.
Comments for consideration:

- Payments could be based on a combination of soil health measurements and positive land management options.
- We do not recommend that payment rates (for outcomes) should be based solely on the numerical results from soil tests due to inherent variability.
- Soil health results and trends over time should support the land management decisions / options to improve soil health.
- Farmers should lead and direct the monitoring plan (and implement large parts themselves).
- We believe that additional information and support is needed to help interpret tests and recommend practical on-farm options for improvements. E.g. Guidance from expert advisers to assist data interpretation and self-reporting – to inform options to improve field operations.
- We consider that additional engagement in soil health can be derived from facilitated peer-peer benchmarking and discussion.
- Promote cross-industry support for agreed soil monitoring guide information – what tests, why, how.
- A simple coded dashboard (conscious of colour blindness interpretation) scheme to present results helps interpretation and application of the results by farmers.

Appendix 1 – Attendees

<table>
<thead>
<tr>
<th>First name</th>
<th>Surname</th>
<th>Title / Organisation</th>
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<tbody>
<tr>
<td>Stephen</td>
<td>Briggs</td>
<td>Soil &amp; Water Manager, Innovation for Agriculture</td>
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<tr>
<td>Chris</td>
<td>Collins</td>
<td>Coordinator NERC Soil Security Programme, SSA</td>
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<tr>
<td>Dave</td>
<td>Freeman</td>
<td>Policy Manager, Agricultural Industries Confederation</td>
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<tr>
<td>Helen</td>
<td>Keep</td>
<td>Senior Farm Conservation Officer, Yorkshire Dales National Park</td>
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<tr>
<td>Alastair</td>
<td>Leake</td>
<td>Director of Policy, Allerton Project &amp; GWCT</td>
</tr>
<tr>
<td>Rob</td>
<td>Macklin</td>
<td>Head of Soils and Farming, National Trust</td>
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<td>Lauren</td>
<td>McIntyre</td>
<td>Senior Scientific Officer, Environmental Land Management, Defra</td>
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<td>Mark</td>
<td>Pawlelt</td>
<td>Senior Research Fellow, Cranfield University</td>
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<td>Jessica</td>
<td>Ponting</td>
<td>Knowledge Transfer Manager, SSP</td>
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<tr>
<td>David</td>
<td>Robinson</td>
<td>Soils, Land &amp; Ecohydrology, Centre for Ecology &amp; Hydrology</td>
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<td>Felicity</td>
<td>Roos</td>
<td>Soils and Farming Researcher, National Trust</td>
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<tr>
<td>Abby</td>
<td>Rose</td>
<td>Sectormentor</td>
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<tr>
<td>Richard</td>
<td>Smith</td>
<td>Technical Specialist, Environment Agency, SSA</td>
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<tr>
<td>Elizabeth</td>
<td>Stockdale</td>
<td>Great Soils, AHDB, NIAB</td>
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<td>Paul</td>
<td>Tallowin</td>
<td>National Trust Tenant Farmer, East Maldon, Essex</td>
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<tr>
<td>Callum</td>
<td>Weir</td>
<td>Farm Manager, Wimpole, National Trust</td>
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<tr>
<td>Andy</td>
<td>Whitmore</td>
<td>Principal Research Scientist, Rothamsted</td>
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