**Dynamic Soil Properties (DSPs) for Soil Health (SH) Assessment**

SOW – Project Design Overview

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11/14/2017 – updated January 2021

**Project Objective**: assess the usefulness and repeatability of proposed SH metrics across regions

(secondary) link field assessments to laboratory measurements of soil health

**Projects:** North Carolina, Kansas, Washington, Texas, California, Wisconsin, Oregon, Minnesota, Arizona, Connecticut, Alabama, Maryland, Hawaii

**Terms:**

Project Location: general description of individual project (roughly identified by state or institution)

NRCS advisory ‘team’: group of advisors to project includes - NRCS technical rep, NRCS State Office designee (typically the State Soil Scientists), Soil Science Division designee and Soil Health division designee (these are not finalized yet, but many of you know one or more of them)

**General Core Project Design** (locations may add breadth, subdivisions, or other side projects in consultation with advisory team):

Soil(s) and management systems -- chosen with cooperating NRCS advisory team

Multi-scale replication – want to link results to full extent of soil survey and capture within field variability

For each project location:

1 -2 Soil (s)

2 – 3management systems (and native/reference condition, if applicable)

Within each combo (of soil and management system):

* Locate 3 independent **field/sites** (ideally each site has all combo’s present).
  + - Collect management information
    - Collect field level soil health indicators
  + Within each field site, locate 3 independent **pedons**
    - Collect x,y location
    - Collect location specific field metrics
      * Infiltration
      * Crusts, pedoderm (as appropriate)
    - Limited Soil description – from small pit or ‘large’ probe
      * Horizons, structure, texture, coarse fragments, colors, redox features
    - **Sample pedon** with probe/core at 5 locations within 1 m2
      * Depths 0 -5 cm (supplement with shovel or small pit sample)
      * 5 – 10cm
      * Any other predetermined depth
      * At least separate by genetic horizon (from 10cm – 100cm)
    - Bulk Density for every layer
    - Analyze each sample for predetermined properties
    - Ship chilled sample to SHAC (Missouri Soil Health Lab)
    - Ship portion of sample to KSSL (A horizons only)
      * Rigid container – not crushed
      * Typical container - processed (air dry and sieved <2mm as for analysis)

Within this project, the Soil Science Division designee will designate a location for a pedon with full description and laboratory characterization (one per soil x management system combo is expected).

* Use same depths increments
* Assign all site and pedon information (see excel sheet)
* Will be analyzed for standard KSSL DSP properties and any additional requests
  + Particle size, pH, SOC and IOC, Bgluc, Aggregate Stability, POM

Table. Properties to be measured:

Source material: Soil Health Technical Note No. 450-03: Recommended Soil Health Indicators and Associated Laboratory Procedures SHTN - <https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=44475.wba>

KSSL - <https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1253872.pdf>

SSL - <https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1244466.pdf>

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| --- | --- | --- | --- |
| **Type** | **Indicator/Property** | **Method (general)** | **Method File Name** |
| Field 1 | Field based Soil Health Assessment | Use local | Supply |
| Field 2 | Basic pedon description | NRCS methods: color, texture, redoximorphic features, coarse fragments… | <https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052523.pdf> |
| Field 3 | Infiltration | Single ring | SSL  Field3\_SSL\_Infiltration.doc |
| Field 4 | Infiltration | Cornell Infiltration | Field4\_Cornell\_infiltration.doc |
| Lab 1 | SOC | Dry Combustion  CaCL2 if needed | Lab1\_KSSL\_TOTC.doc  Lab1\_KSSL\_CCE.doc  Or  Equivalent from tech note |
| Lab 2 | Aggregation | ARS/gracenet Macroaggregate Stability method | SHTN  Lab2\_ARS\_aggregatestability.doc  Alternate – new KSSL method to be developed from Mikha and Wills |
| Lab 3 | KSSL WSA | SSL  Lab3\_KSSL\_AggreateStability.doc |
| Lab 4 | Soil Respiration | CO2 respired, 4 da incubation | SHTN  Lab4\_CASH\_SoilRespiration.doc |
| Lab 5 | Enzymes | Multi-enzyme Assay… | SHTN Appendix 4  Alternate from Oregon State |
| Lab 6 | Permanganate Oxidizable C (POX C) | KSSL (modified from Weil’s Active C) | SHTN |
| Lab 7 | Available Organic Nitrogen | Autoclaved Citrate Extractable (ACE) Protein content | SHTN  Lab7\_CASH\_2016\_ACE.doc |
| Lab 8 | Community Structure | Phospholipid Fatty Acid (PLFA) or Ester-linked fatty acid methyl ester profile (EL-FAME) | Contracted to University of Missouri |