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Soil Health Demo Trial Minimum Data Sets for Environmental, Financial and Social Data

The Soil Health Demo Trial (SHD) statute in the 2018 Farm Bill requires NRCS to establish protocols for measuring carbon levels in the soil and testing carbon levels on land where SHD conservation practices and systems are applied to evaluate gains in soil health. In developing these consistent protocols, NRCS determined that analysis of carbon levels alone would not be sufficient to evaluate soil health gains. Successful implementation of soil health practices and systems relies on: 1) consideration of the physical, chemical and biological components of soil, 2) an understanding of the economics and financial benefits that accrue to farmers implementing soil health practices and management systems, and 3) the social factors that influence adoption of soil health management systems.

To support successful implementation of SHD, and the collection and reporting of a consistent set of soil health outcomes data, NRCS has developed this guidance document to inform SHD awardees of the required soil health, management, and economics/financial evaluation protocols and methods. Environmental, financial, and social (to the extent possible) data reporting protocols will be established in collaboration with awardees. Consistency in protocols and methods is critical as NRCS develops a national soil health database to support required reporting to Congress and to inform NRCS and partner soil health efforts and initiatives.

SHD awardees consent to contributing their data and evaluations to NRCS as part of a SHD study to be submitted to Congress, as required by the SHD statute. An SHD Field Operations Template and an SHD Soils Template are provided on the CIG Website to capture soil health status, management history and change, and outcome data that are anticipated to be standardized in content and format across all on farm trials. Additional data and evaluations that are specific to your projectshould also be provided. The NRCS team will work with awardees to establish sharing mechanisms that best help NRCS integrate project results and make them available to stakeholders and customers.

Awardees must complete the following minimum requirements:

I. Soil Assessment and Additional Environmental Assessments:

- Use NRCS standard in-field and laboratory methods for soil carbon and other soil health indicator measurements, including soil sampling and submission guidance found in Conservation Activity Standard, Code 216, Soil Testing (CAS 216). Awardees are encouraged to include additional measurements beyond the required NRCSstandard methods. (References: SH Tech Note 450-03, *Recommended Soil Health Indicators and Associated Laboratory Procedures*)

  - In-field assessments must include the State-approved in-field soil health assessment, based on the National In-field Assessment Template, for each conservation management unit. (Reference: Technical Note 450-06, *Announcement of the Cropland In-Field Soil Health Assessment Guide*)
  - Laboratory soil health assessments must include the following set of indicators according to methods in Technical Note 450-03: soil organic carbon (ppm), aggregate stability (%), bioavailable nitrogen (mg/g dry weight), respiration (mg CO_2/g dry weight) and active carbon (ppm).
  - A comprehensive chemical soil test (pH, EC, organic matter, nitrate-N, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, and boron) based on state-approved procedure is required.
  - In arid regions and for high tunnel systems, an irrigation water analysis. At a minimum, the test should include: pH, sodium adsorption ratio (SAR, includes sodium, calcium and magnesium), total dissolved solids (TDS), total alkalinity or carbonates and bicarbonates, chlorides, sulfates, and nitrates.
  - Measurements of bulk density and infiltration are also required beginning with the FY20 awardees. Standardized methods for data collection for these measurements can be discussed with NRCS technical contact.

- Collect current and historic management information from participating producers (tillage, crop rotation, nutrient and other input applications). Management information must reflect the implementation quality of the adopted SH practices and systems, such as any environmental or external factors that may have had an adverse impact on the functionality of the soil health management systems – e.g. late planting of cover crops due to equipment or weather issues. Awardees and NRCS staff will work together to identify whether poor implementation quality of soil health practices is influencing project results and how to best document the challenges.
- Collect other data as available such as impacts of systems on ground water recharge, plant available water, runoff, water quality, flooding, pest resilience, weather resilience, air quality, etc.

Results from the above assessments and tests must be submitted using the SHD Soils and Field Operations Template spreadsheets available from the CIG website under “More Information”.

II. Financial Assessments:

Awardees must collect financial outcomes data to include the profitability (cost of production, current yield and historic yield where available) of implementation of Soil Health Management Systems (SHMS) and practices.

At a minimum, the economic analysis for each On-Farm Trial (OFT) must consist of a Partial Budget Analysis (PBA) which captures, to the fullest extent practicable, all agro-economic changes resulting from the adoption of new Soil Health Practices or the transition to a SHMS *and* an associated Economic Case Study (ECS), unless such analysis is deemed unfeasible by NRCS economists. Additionally, all primary economic data used to generate the PBA and ECS are to be submitted as a deliverable using the SHD Field Operations Template spreadsheet. The economic data collected will serve as the starting point for the economic component of a National Soil Health Database. Financial assistance payments provided to producers are encouraged to be captured in the data but *should not* be reflected in the final economic analysis (PBA/ECS). This is to ensure the economic data are standardized and that the case studies are not affected by temporary financial assistance.

Comparison sites that do not meet SHMS principles (high disturbance, low diversity, low cover, low root presence) nearby on similar soil types (same field, farm, or close by farms) and in the same climate are *strongly* desired *and awardees should make every effort to find such comparison sites to validate economic findings if possible*. If a suitable comparison site cannot be identified, then the development of the required PBA and ECS can be performed via producer interview of historical management practices using the SHD Field Operations Template spreadsheet.

<u>Generating a PBS and ECS using NRCS tools:</u>

If an awardee *does not have* an outlined plan to develop the above minimum required PBA and ECS, then the adaptive economic plan provided below by NRCS may be used.

Year 1: Grantee works with participating producers to develop a Level I T-Chart per Technical Note 200-01, *Basic Economic Analysis Using T-Charts*. If a comparison site is not available for a project site, the producer should be asked to keep a personal account of the practices, systems, costs and other pertinent data points for reference for multiple years (as feasible) before the start of the study. The producer <u>will not</u> be asked to provide enterprise-level data to the study but should be able to confirm whether sufficient data are available for the PBA. If the producer has previously transitioned to a SHMS, then the above data must be available for several years prior to transition to a SHMS or the addition of another SH practice if a suitable comparison site cannot be established, in order for the producer to participate in the economic section of the study.

Year 2, subsequent years: Producer/grantee review the Level I chart and make any additions or deletions as necessary to the list of inputs, outputs, costs and benefits. Values are assigned for each item on the Level-II T-chart using the Technical Note 200-01, as a guide for how to determine the values for each section. If the value of an item cannot be identified, the project's NRCS Technical Contact must be consulted. Once the Level-II chart is complete, the Level-III T-chart is generated using standardized units per Tech Note 200-01. Finally, a PBA can be created using the Level-III T-chart and the methods described in the Tech Note 200-01.

Final Year: Economic case study is developed using the PBA for the entire project period and draft Technical Note, *Developing Conservation Case Studies for Decision-Making*.

Primary economic data collected for the PBA/ECS must be provided to NRCS using the SHD Field Operations Template and SHD Soils Template for inclusion in the National Soil Health Database.

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III. Social Assessment

- Develop summary information on social outcomes and profiles of participating producers with any available information about why management changes were adopted, and challenges and benefits of the changes.

- Describe the impact on producer communities through on-farm field days and other activities to facilitate broader adoption.

Resources:

NRCS Technical Note 450-03, *Recommended Soil Health Indicators and Associated Laboratory Procedures.*

NRCS Technical Note 450-04, *The Basics of Addressing Resource Concerns with Conservation Practices within Integrated Management Systems on Cropland*

NRCS Technical Note 450-06, *Announcement of the Cropland In-Field Soil Health Assessment Guide*

NRCS Technical Note 200-ECN-01, *Basic Economic Analysis Using T-Charts*

NRCS draft Technical Note*, Developing Conservation Case Studies for Decision-making*

NRCS Soil Health Conservation Activity Plan (CAP 116)

NRCS Conservation Activity Standard, Code 216, Soil Testing (CAS 216)

SHD Field Operations Template, Instruction Guide and Soils Template are available for download on the CIG website, under "More information" heading.