**Soil Health Assessment Protocol and Evaluation (SHAPE)**

**Summary (Why important and what we achieve)**

The Soil Health Assessment Protocol and Evaluation (SHAPE) tool is a flexible, robust, and user-friendly soil health interpretation framework grounded in the principles of soil science to:

* Evaluate gains in soil health as a result of practices implemented by the producers in the soil health demonstration trials
* Evaluate soil health laboratory data submitted to the conservation management database
* Identify the most effective management practices to improve soil health in different regions of the U.S.
* Efficiently target soil health programming efforts across the U.S.
* Facilitate adoption of soil health testing by public and private labs and improve accessibility and availability of soil health testing for landowners
* Improve soil health by increased adoption of soil health management systems by landowners

These advancements will promote adoption of soil health practices and ultimately provide improved environmental outcomes and more sustainable agroecosystems.

**How SHAPE works**

The Soil Health Assessment Protocol and Evaluation (SHAPE) tool was developed to score soil health lab measurements across the continental U.S. This tool is based on the principles of soil science as well as cutting-edge statistical methodology that handles the complex interaction of climate and inherent soil conditions. Scoring curves for soil carbon are complete and provide the user with a score ranging from 0-100% that accounts for climate and edaphic conditions at the site. This is the first step in providing scientifically motivated guidance to producers on how land management is affecting the soil. SHAPE has a user-friendly R Shiny app interface to serve a range of stakeholders including scientists, NRCS staff, and the public.

SHAPE Score (%)

Figure 1 illustrates how SHAPE accounts for the influence of climate and soil texture on soil carbon scores. For the same soil type and soil carbon content (2.0%), soils from a warmer climate with less precipitation (Texas) score higher than soils from a cooler climate with higher precipitation (Iowa). You can also see the influence of soil texture. Coarse textured sandy soils are not expected to retain as much soil carbon as finer textured silt loam soils, so they score higher when the carbon content is equal.

SHAPE Score (%)

Figure 2 illustrates how SHAPE interprets the benefit of soil health management systems after accounting for the local soil and climate characteristics. In this example from Missouri show how highly degraded agricultural soils are building carbon with soil health management practices.

**What’s Next?**

* implement a spatially-explicit model already developed by team members that will provide a more refined, regionally-specific interpretation
* incorporate recently completed NRCS high-priority soil health indicator scoring curves into the R Shiny app executable including active carbon, ACE protein, and carbon mineralization (aka soil respiration)
* develop scoring curves for aggregate stability
* incorporate multiple laboratory method options with behind-the-scenes conversion factors and separate scoring functions where equivalencies are not available
* develop a secondary scoring system based on cropping system subgroups for more refined interpretation of soil health management practices
* expand the suite of soil health indicators to maximize end-user options
* embed the SHAPE Shiny app into multiple platforms to serve a range of stakeholders including scientists, NRCS staff, and the public

This inclusive and flexible approach to indicator selection, method selection, and platform options will provide a soil health assessment tool that is easy to use and appeals to a wide range of stakeholders.