

## **Soil Quality Tool – Overview – April 25, 2007**

### **Background:**

In 2005, a Water Quality “Eligibility” Tool was developed to create a nationally uniform process to determine if a producer was meeting the minimum water quality “Standard of Care”. The WQ Tool was piloted in numerous states and then used for the 2006 CSP and worked quite well.

The present criteria for CSP soil quality eligibility is a Soil Condition Index (SCI) value of “0” or higher. The SCI is designed to measure the effects of climate, tillage intensity, and biomass grown and returned to the soil. Although SCI is technically well-documented within (NRCS) for predicting soil carbon trend under a specific management and climate, there have been many concerns that producers in parts of the US are treated unfairly by the SCI for program purposes. By using the SCI method to determine minimum soil quality eligibility, many producers who farmed organically or lived in the warmer climates had difficulty meeting the minimum criteria for eligibility. Additionally, while soil organic matter is a primary measure of soil quality, it is not the complete picture. To address all the functions of the soil (soil quality), a Soil Quality (SQ Tool) Evaluation Tool is being developed to take into consideration other functions of the soil. The proposed SQ Tool will assess management effort in the areas of (1) organic matter, (2) nutrient cycling, (3) soil physical condition, (4) soil biotic habitat, and (5) soil moisture management.

### **Soil Quality Tool**

The SQ Tool will provide producers across the US a more uniform way to assess whether or not they are meeting a minimum level of “Standard of Care” for their soil on their farm. This tool assesses level of management effort for soil quality. With rigorous calibration and testing, it may also estimate soil function. By using the proposed SQ Tool in place of the SCI, soil quality will be assessed using the additional soil quality parameters to provide a more balanced assessment for soil quality minimum “Standard of Care.”

The SQ Tool is combined with the Water Quality Tool because many of the same questions and management practices apply to both Soil and Water Quality. This combined tool is proposed to determine SQ for USDA program eligibility. It is proposed that the final Soil and Water Quality Evaluation Tool be formatted to allow producers to complete the assessment on the Internet as well as using a manual paper assessment.

### **Testing**

Currently, the SQ Tool is being calibrated and tested exhaustively in comparison with the SCI. (Some preliminary results are below.) Once calibrated by its developers, the SQ Tool will be vetted using the same process as the Water Quality Tool, which was tested by NRCS State Office staff in 12-15 states for commonly occurring agricultural systems in their states. Also similar to the WQ Tool process, feedback will also be sought from interested NGOs, such as the Sustainable Agriculture Coalition and the Soil and Water Conservation Society. In addition, several members of the scientific community have agreed to review and test the tool in comparison with measured soil quality data for med- and long-term research plots across the US with organic, no-till, and conservation tillage systems data. This validation will include both quantitative (i.e. comparison of tool outcomes to measured indicators of soil quality, like soil

carbon) and qualitative (i.e. comparisons of researchers' overall assessment of their data with tool outcome using a survey-type instrument). Finally, because the tool is planned for a self-assessment uses, we would like to test its usability with producers. This might be best held until the tool is in its final format. However, testing of the phrasing of questions could be done much earlier. Appropriate permissions for all proposed testing will be obtained.

**Preliminary Outcomes:**

**Example #1 (Fall tillage)**

Corn, soybeans, wheat: 2 years of fall tillage; 2 of 3 years with 30% cover after planting; controlled traffic; monitor soil moisture conditions; basic pest management

Soil Quality Functions				
organic matter	nutrients	physical stability	habitat	soil moisture
YES	YES	YES	YES	YES
NO	YES	NO	YES	YES
9	15	6	12	10

**Example 2 (modified #1)**

Add one year of no till.

Soil Quality Functions				
organic matter	nutrients	physical stability	habitat	soil moisture
YES	YES	YES	YES	YES
YES	YES	YES	YES	YES
14	18	12	18	13

**Example 3 (Organic)**

Organic tomato-wheat rotation, 2 years; fall plow, 1 yr; controlled traffic; no pesticides; soil test for nutrients; no salinity concern

Soil Quality Functions				
organic matter	nutrients	physical stability	habitat	soil moisture
YES	YES	YES	YES	YES
NO	NO	NO	YES	YES
5	10	7	14	8

**Example 4 (modified #3)**

more diverse rotation (add 1 yr ea. corn and hay); cover crops after annuals; nutrient management plan; credits for m manure and legumes.

Soil Quality Functions				
organic matter	nutrients	physical stability	habitat	soil moisture
YES	YES	YES	YES	YES
YES	YES	YES	YES	YES
13	16	13	21	11