

Statistical Approaches for Soil Survey Updates

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The National Cooperative Soil Survey is responsible for constructing soil maps detailing the location of soil series throughout the US. Reports are generated for each county that contain maps and soil map unit descriptions. These maps are periodically updated to provide current information on the range of values for particle composition, depth of horizons, and other related attributes. Methods for updating soil surveys have been largely based on purposive sampling. Summary statistics used to describe the characteristics of a soil map unit include ranges and representative values (midpoints of ranges).

Statistical sample selection has frequently been avoided because it is believed to be resource intensive. However, many types of statistical designs are available that provide a balance between sample size and data collection needs. Random samples can also be used to provide improved estimates of means and ranges as well as a wider variety of parameters (e.g., percentiles) to summarize soil map unit characteristics. The variability associated with these estimates can also be quantified.

The NRCS, Iowa Cooperative Soil Survey, and Iowa State University are collaborating in MLRA 107 to implement a statistical sampling plan for soil survey updates. The multi-phase design balances the need to obtain data at numerous geographically dispersed points with the availability of resources for collecting observations and lab samples. Regression estimation is used to estimate horizon-specific characteristics for soil map units or other regions within the survey. In addition to providing improved estimates of the soil characteristics, the resulting database contains complete, spatially-linked data for use in modeling environmental processes.