United States Department of Agriculture

Raster Soil Survey – Fact Sheet
Essex County, Vermont Raster Soil Survey Project

Introduction

Essex County is located in the Northeast Highland Physiographic Region of Vermont, bordering New Hampshire. The soils represented in this project are formed principally from lodgment till laid down by glaciers ~10,000 years before the present.

A raster soil survey (RSS) provides a unique soil geographic database product that more precisely represents soil concepts in the landscape than the conventional soil survey geographic database called SSURGO or gSSURGO. RSS uses an array of cells rather than points, lines or polygons used in the SSURGO vector map layers. Digital soil mapping techniques and tools that enlist the expert knowledge of soil scientists can be used to develop a RSS by assigning each raster cell to a given legend class. The RSS legend classes used in the Essex County, Vermont project correspond to conventional SSURGO soil map unit components. These soil components often represent soil series, phases of series, or other soil taxonomic units. In this project, the raster soil survey product is used in part to create the conventional SSURGO database. The two products are described and compared below.

The Raster Soil Survey (RSS) Geographic Database

The Essex County, Vermont RSS was prepared using rule- based reasoning techniques and digital natural resource map layers such as LiDAR derived terrain derivatives, surficial geology, etc. Soil survey staff provided the expert knowledge about the local landscape environment and this knowledge was translated into rules used in the Arc Soil Inference Engine tool (ArcSIE). ArcSIE was used to create raster membership maps for a catena (soils that share the same landform and parent material but vary in drainage class) of soils formed in loamy lodgment till. These membership classes were studied and evaluated for an area of 190,000 plus acres. There were (15) discrete classes derived for the lodgment till soil catena. The RSS catena class membership is mapped in the landscape by one or more 5 meter resolution raster cells or pixels. These classes are supported by geo-referenced field sample points with detailed soil descriptions. These data were also used to validate the raster inference results from ArcSIE and refine soil attribute property data. Each of the catena classes was associated with soil attributes in the National Soil Information System (NASIS), and a set of attribute tables with soil property and interpretive information were prepared. The catena classes are made up of taxonomic families with slope and stoniness phase classes. Figure 1 shows the highly detailed RSS catena class raster (shown in color) compared with the SSURGO map unit lines (white polygons).

The Conventional Soil Survey Geographic Database (SSURGO)

The Essex County, Vermont soil survey was correlated and published in 2011. This soil survey was the first in the U.S. completed to SSURGO standards, in part by using digital soil mapping techniques. Innovative techniques were employed for constructing soil map unit polygons from the raster membership class raster cells or pixels. Traditional soil maps utilize polygons to delineate soil map units. These map units contain a collection of soils (called soil components) with varying, and often dissimilar, properties. Because the polygons represent soil map units and not individual components, the locations of the individual soil components (although described in the map unit description) are not spatially explicit. The RSS catena classified cells in the lodgment till area were spatially aggregated to these polygon map units with a minimum area of 20,000 m^2 (about 5 acres) to meet SSURGO mapping standards. The RSS Geographic Database retains the 5 meter cell or pixel level, location-specific soil information lost during the generalization step.

The RSS meets current soil user demand by providing a unique soil geographic database product that more precisely represents soil concepts in the landscape than the conventional soil survey geographic databases called SSURGO.

For more information, see http://go.usa.gov/9CwP.

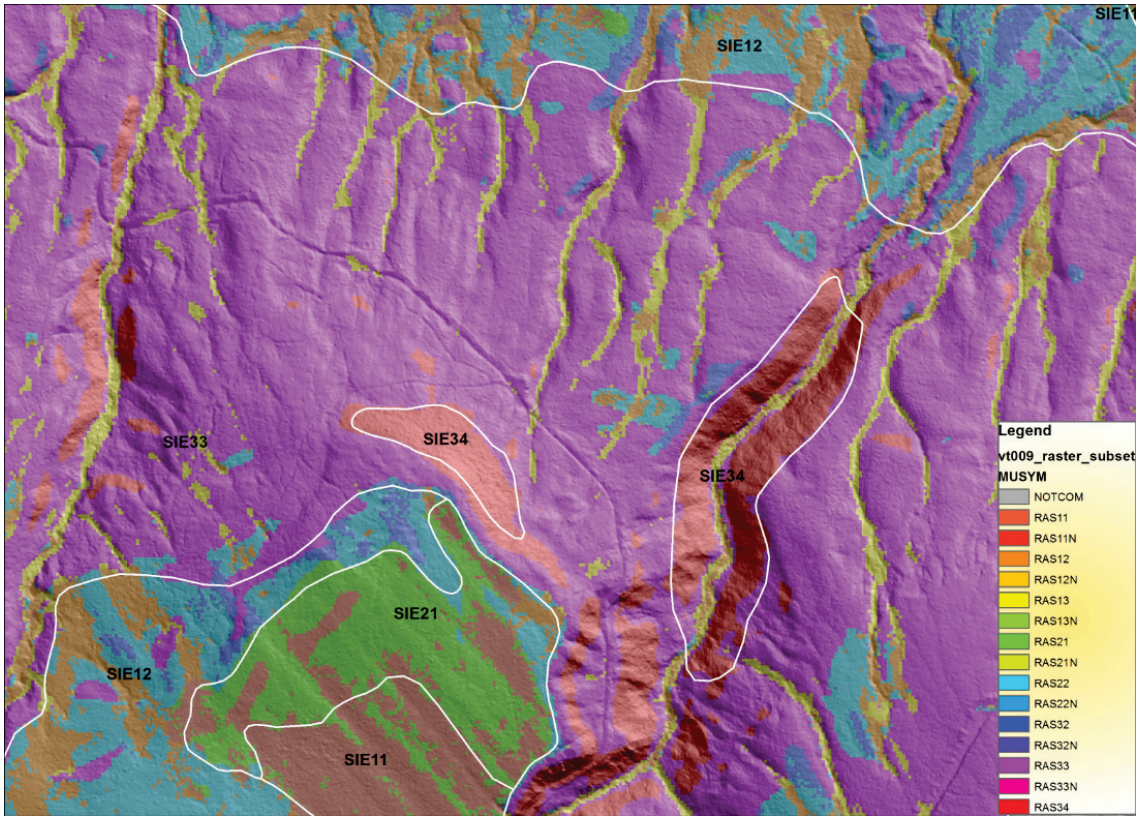

Figure 1.—Essex County Raster Soil Survey classes (color) overlain by SSURGO polygons (white lines with black symbols). The image represents an area that is approximately 1.8 kilometers wide.