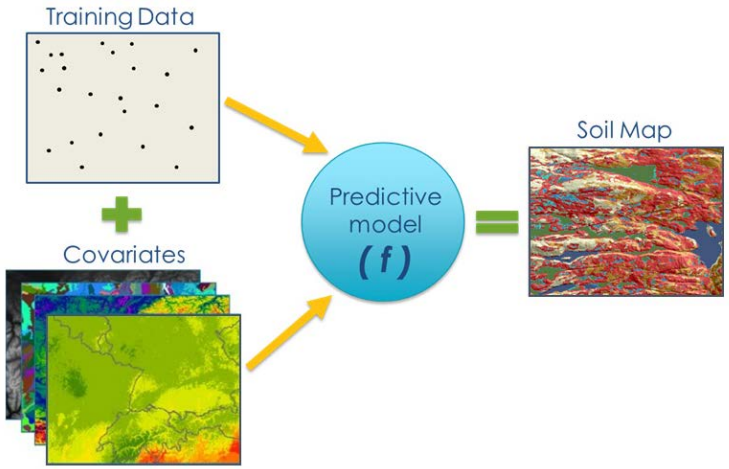
What is Digital Soil Mapping?

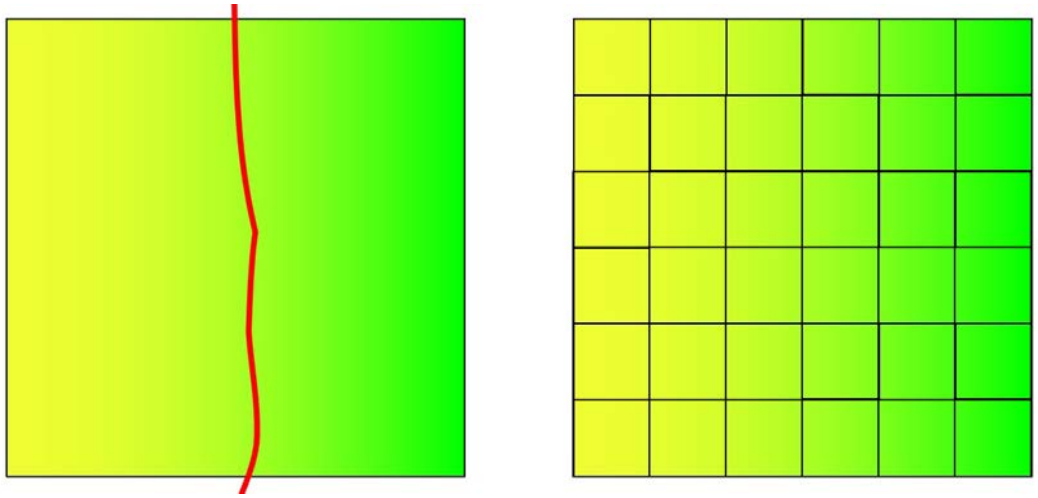
The generation of geographically referenced soil databases based on quantitative relationships between spatially explicit environmental data and measurements made in the field and laboratory (McBratney et al., 2003); the spatial prediction of soil classes or properties from point data and environmental raster data using a statistical algorithm.

Using what soil scientists know and understand about landscape relationships in conjunction with technological resources to generate a map that communicates soil knowledge to users. Field observations can be easily combined with raster data representing soil forming factors (covariates) and evaluated using a statistical algorithm to predict the distribution of soil classes or properties across an area. Now that's cool!



Digital Soil Mapping in a Nutshell

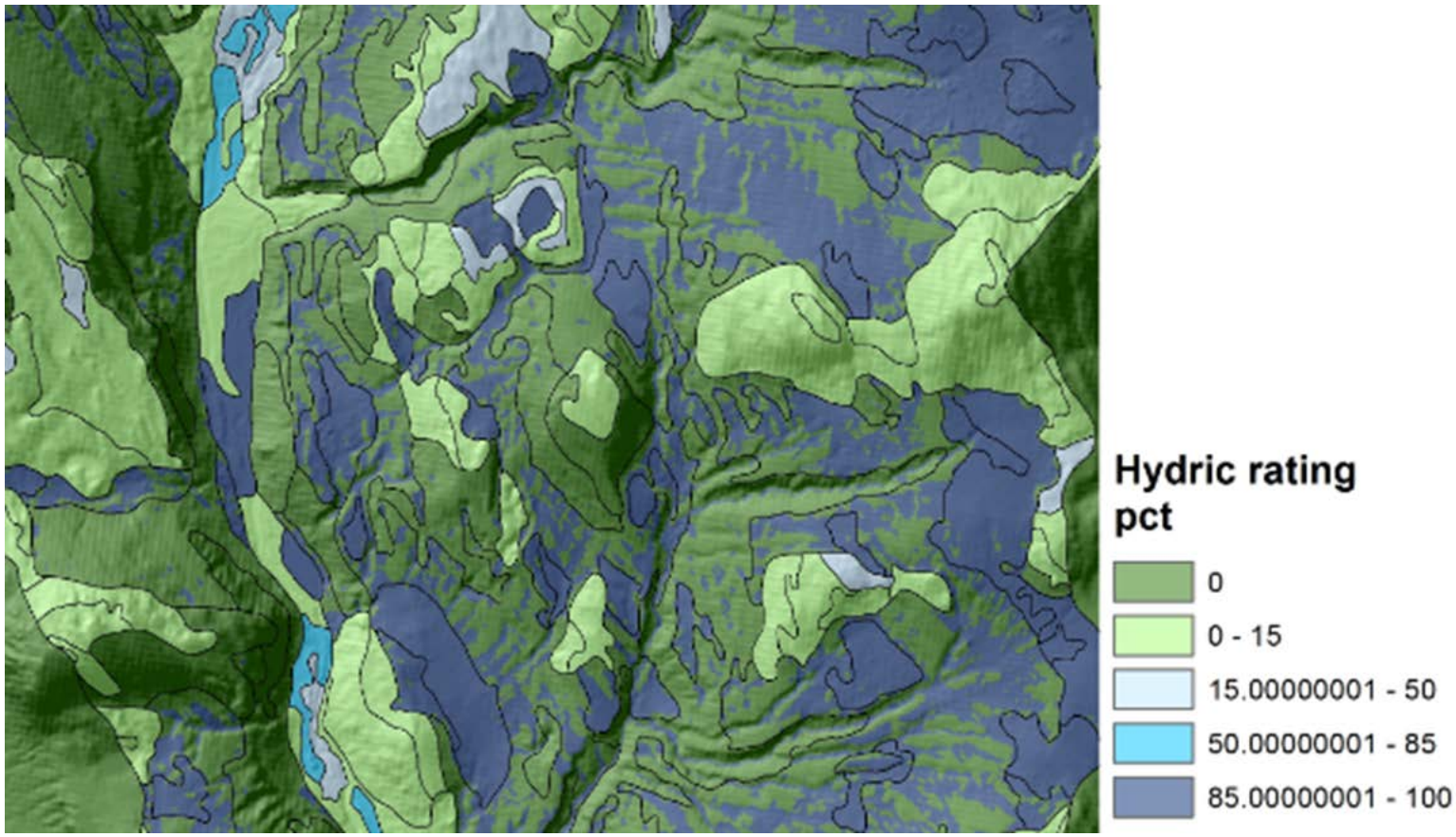
- The product of Digital Soil Mapping is raster soils data.
- The raster data is composed of 2-dimensional cells (pixels) organized into a grid in which each pixel has a specific geographic location and contains soil data.
- In conventional mapping, the primary question is "Where is the boundary between two soils?" and the focus is on those marginal areas, i.e. the boundary between polygons (left figure below).
  With digital soil mapping and raster data, the central concept is well defined with variation expressed across the landscape (right figure below)



- Digital soil maps in raster form can more explicitly represent the spatial distribution of soil classes or properties and can document the uncertainty of the soil prediction.
- Methods are available to facilitate the rapid inventory, re-inventory, and project-based management of lands in a changing environment.

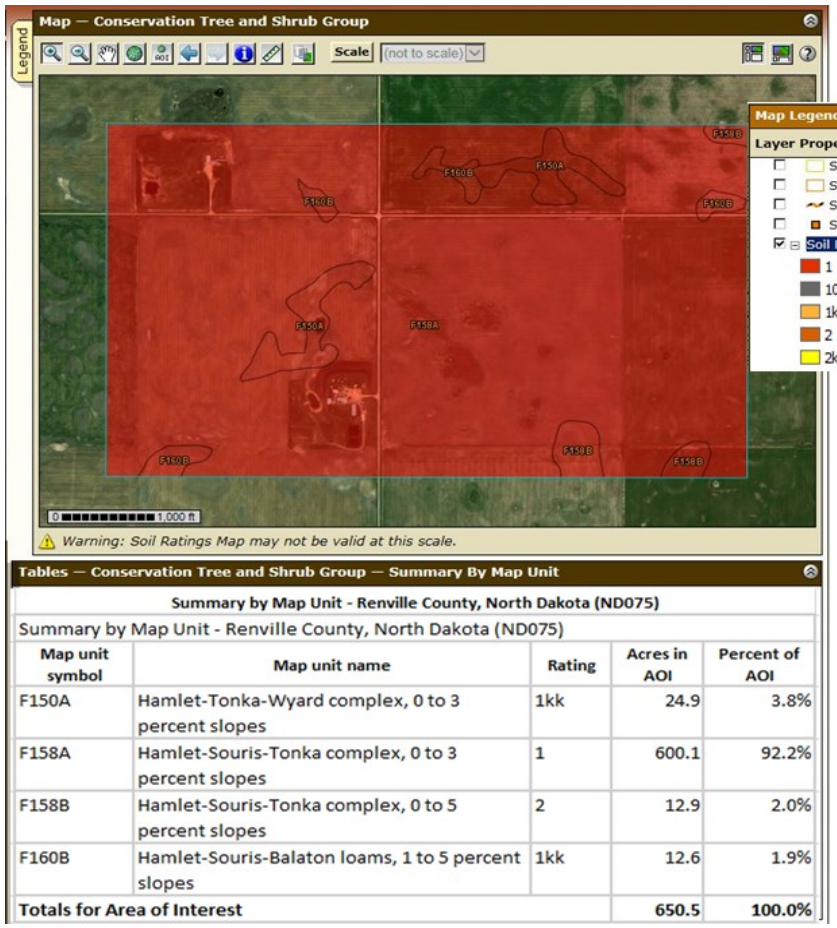
What higher resolution data would allow

- Better representation of soil scientist's knowledge
- Quicker and more complete understanding of the soil conditions for soil survey users
    - Note the areas in Essex County, Vermont that are non-hydric, in a SSURGO polygon that would be depicted as hydric
        - Tabular records do indicate the estimated percent of non-hydric soils, but how useful is that information without spatial representation?



Essex County, Vermont Raster Soil Survey

- Better representation of soil scientist's knowledge and better use of associated raster data
    - Note the Souris Till Plain, North Dakota raster update that allows for more specific interpretations based on how the soils change across the landscape, thus enabling more detailed conservation planning decisions.



Tables — Conservation Tree and Shrub Group — Summary By Map Unit

Summary by Map Unit - Renville County, North Dakota (ND075)

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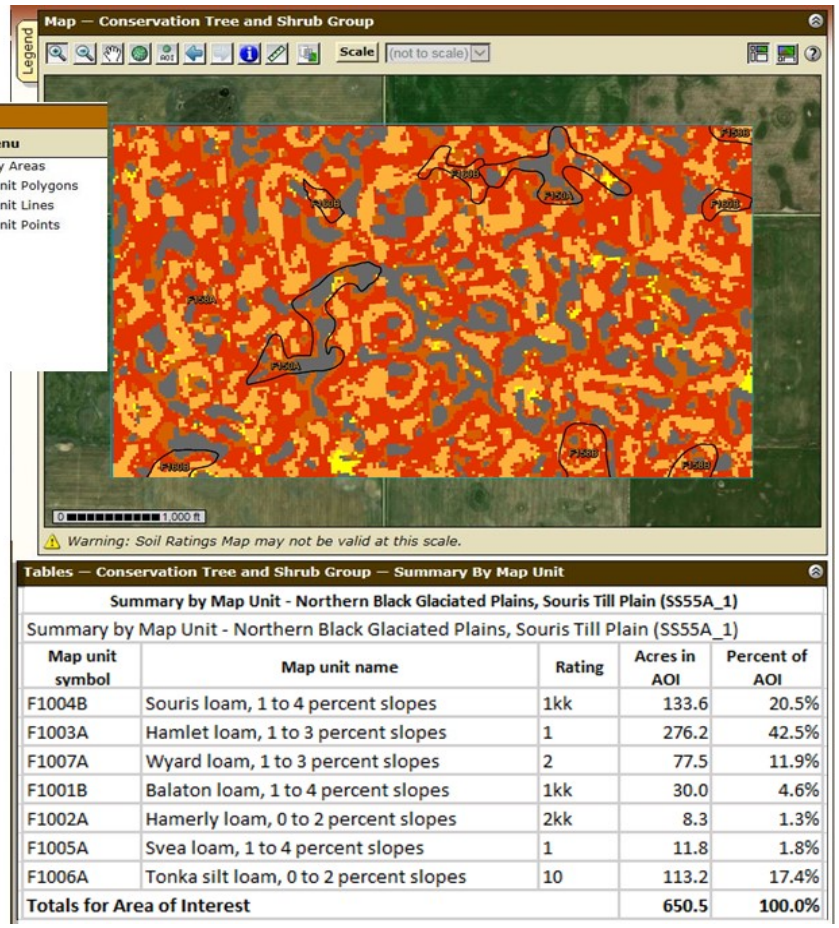
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
F150A	Hamlet-Tonka-Wyard complex, 0 to 3 percent slopes	1kk	24.9	3.8%
F158A	Hamlet-Souris-Tonka complex, 0 to 3 percent slopes	1	600.1	92.2%
F158B	Hamlet-Souris-Tonka complex, 0 to 5 percent slopes	2	12.9	2.0%
F160B	Hamlet-Souris-Balaton loams, 1 to 5 percent slopes	1kk	12.6	1.9%
Totals for Area of Interest			**650.5**	**100.0%**



Tables — Conservation Tree and Shrub Group — Summary By Map Unit

Summary by Map Unit - Northern Black Glaciated Plains, Souris Till Plain (SS55A_1)

Summary by Map Unit - Northern Black Glaciated Plains, Souris Till Plain (SS55A_1)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
F1004B	Souris loam, 1 to 4 percent slopes	1kk	133.6	20.5%
F1003A	Hamlet loam, 1 to 3 percent slopes	1	276.2	42.5%
F1007A	Wyard loam, 1 to 3 percent slopes	2	77.5	11.9%
F1001B	Balaton loam, 1 to 4 percent slopes	1kk	30.0	4.6%
F1002A	Hamerly loam, 0 to 2 percent slopes	2kk	8.3	1.3%
F1005A	Svea loam, 1 to 4 percent slopes	1	11.8	1.8%
F1006A	Tonka silt loam, 0 to 2 percent slopes	10	113.2	17.4%
Totals for Area of Interest			**650.5**	**100.0%**

What is needed

- Immediate adoption of the raster-based approach for all soil survey mapping projects
- Raster data as a deliverable for all projects
- Devote USDA-NRCS resources to develop a delivery system for raster data that functions similarly to web soil survey and soil data viewer
- Proactive integration of raster data technology into conservation planning tools