Long Range Work Plan for the RI Soil Survey (subset of MLRA 144A and 149B Soil Survey Area)

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Note: This is a condensed version of the RI Long Rang Plan for the 2012 Work Planning Conference.

Background:

This work plan for the RI Soil Survey Program was first prepared in 2007 and is updated on an annual or as-needed basis. Sections that are crossed out have been left in to show that they have been addressed or completed.

A meeting to discuss the status and plans for updating the RI soil survey was held on November 9, 2001 between the NRCS and URI. A report from that meeting can be provided upon request.

Section I:
Work Plan for the Maintenance of the (Terrestrial) Soil Survey of Rhode Island (Bristol, Kent, Newport, Providence, and Washington Counties)

1. Purpose for Doing the Work:

The current status of the RI600 SSURGO set is listed as “Update Needed”. The Soil Survey of Rhode Island was correlated in 1977, and published in 1981. Field mapping was conducted during the 1960’s through the mid 1970’s, over 25 soil mappers were involved with the survey. The published survey is compiled on un-rectified aerial photography flown in 1976. Publication scale is 1:15,840. The survey was SSURGO certified in 1996, digitizing was performed during the late 1980’s through early 1990’s. Base map used for digitizing (hydro) was USGS Quadrangle maps in NAD 27 projection.

The purpose for conducting the update on the RI soil survey is to bring both the tabular and spatial soil data up to modern standards for making wise land use interpretations of the soil resource area. The use of modern technology and experienced staff can efficiently bring the RI soil data so it is suited to help the people help the land and water.

2. Description of the Work Area:

Terrestrial Rhode Island covers 775,900 (NASIS) acres and an estimated additional 70,000 acres of un-surveyed subaqueous soils also exists (see section 3). Most of the State is in MLRA 144A with a small portion along the southern coast and offshore island in MLRA 149B. There are four counties in Rhode Island but county government is almost non-existent, each town and city runs their government. Elevation ranges from sea level to 815 feet. Precipitation ranges from 45 to 55 inches per year, all of the state is in the mesic soil temperature regime. Dominant soil orders mapped are Inceptisols, Entisols, and Histosols.

As with most areas in southern New England, RI is undergoing rapid change in land use. The population increased 32% since 1950 (US 2000 Census Data). Due to this rapid change, there is a high demand for accurate and detailed soil information. One-third of the State's population use individual on-site septic systems (about 150,000 households) to deliver sewage effluent. The State program receives approximately 2,300 soil suitability assessments and issues 5,000 permits for septic systems annually. Soils data and information are used in RI to determine the depth to water table, provide hydrologic conditions, and determine the effluent loading rates for septic system design. According to Table 1 soil suitability for septic systems is the number request for soils data in RI. Soil information is also used to define the wetland edge, determine detention basin design size, and many towns have local zoning bylaws that relate to soil survey maps (Jamestown high water ordinance, etc).

There is a high demand for both analog and digital soils data for Rhode Island. Digital soil data is available from two sources; the official Soil Data Mart and Web Soil Survey and the Rhode Island GIS (RIGIS) data server. Many of the users of digital soil data obtain the soil coverage from the RIGIS database since it is provided in the state plane coordinate system (NAD 83, feet) and can be used with other RI data and the attribute table has more information than the SDM. In 2005 257 downloads were logged for the RI soil data from RIGIS. In February of 2009 the RIGIS soil attribute table was updated and improved and there were 276 downloads through September of 2009. The published soil survey is also still being requested, we receive on average 2-4 requests a month for the published survey, in 2005 we mailed out 47 copies and over 100 copies were distributed at workshops and walk in visits.

All of the archived, historic soil surveys and maps have been converted to digital format and are available on the soils.usda.gov page (http://soils.usda.gov/survey/printed_surveys/state.asp?state=Rhode%20Island&abbr=RI).

RI Soils Program – Staffing Information:
RI NRCS currently shares a State Soil Scientist with Connecticut (vacant position) who is stationed in Tolland, CT. The Assistant State Soil Scientist and a Resource Soil Scientist is stationed in the Warwick, RI Field Office. The Assistant State Soil Scientist is responsible for the oversight of soil survey operations in RI and is responsible for providing staff leadership, technical guidance, and assistance in carrying out the statewide soil survey program and delivering technical soil services. The Resource Soil Scientist is responsible for providing technical soil services statewide, serves as the geodata coordinator and is the lead for the Rapid Carbon Assessment. The RSS also is responsible for the Coastal Zone Soil Survey project for RI.

Digital Spatial Data:

Rhode Island was the first State to have a complete, digitized survey. Digitizing began during the late 1980's through 1996 under a contract with a private firm and through URI Environmental Data Center. The base mapping (hydrology and water bodies) used to digitize the survey the USGS Topographic Maps NAD 27. As a result, there is a shift in the current digital soil polygons when overlaid on current NAD 83 DOQ (see figure 1 for an example). A recompilation/re-digitizing is needed to adjust the original line work. It may be possible to attempt re-projecting the original data using modern day GIS projection utilities to see if it does a better job in datum transformations but either way the survey will need to be re-digitized. The polygon data was reviewed by the CT GIS staff and was determined that a simple shift was not possible and a re-digitization is needed.

Over the past 4 years the RI Soil Survey Staff has been reviewing the line work, interpretations, classifications, and quality of the SSURGO survey. While there are noticeable deficiencies in the survey such as major land-use changes (urbanization, gravel operations, etc.), shifts in the digital data (noted above), and adjustments that are needed to align with our modern imagery and elevation models (wetlands and slope breaks) the overall map unit placement is not in need of a complete re-map. The RI staff has not however, had the opportunity to conduct update spot mapping to compare the published survey with modern updated mapping techniques. There are areas that will need revisions to the mapping such as the northwest hills, urban and suburban areas, anthropogenic soil areas, and the Narragansett Basin till area (Newport County). Field investigations will also be needed to conduct transects, collect pedon descriptions to reclassify and recorrelated the soils to modern taxonomy, provide laboratory data, and identify special study areas. In addition, users need to be consulted on deficiencies and data/interpretation needs.

A revised digital survey at a 1:12,000 scale could be completed with the staff level outlined above and with assistance from the MLRA office within a 5-7 year timeline. This can be accomplished with an experienced field soil scientist and utilizing modern technology, good digital imagery, and good elevation data. There is very little chance of receiving financial support from state or local government for any update work but attempts will be made.

The following is a summary of some of the deficiencies in our current RI soil data and action items to address the problem with the final product being a modernized soil survey:

1. **Soil legend changes/needs** (see attachment 1: soil legend with correlation and NASIS notes):
    a. Transects: according to the former Assistant State Soil Scientist that worked on the survey, there were very few, if any, transects conducted during the field mapping for the survey. Transect data is needed for determining map unit components, particularly in complexes. Rhode Island has large areas of soils formed in a thin

loess cap overlying glacial deposits. Many of these soils are used for turf farming and transect data is need to determine the soil composition. Ground-penetrating radar investigations can be used for collecting transect data. Component percentages and inclusions in the current NASIS data are not based on any scientific data, just estimates. Action Plan: Staff time is needed to collect transect data on the major map units and complexes in the legend. Use of geophysical equipment (GPR) will increase quality and efficiency of the data. An estimated 12 months work period should be sufficient time for transects with the requested staffing. GPR can be used to map the large turf farms during winter months; currently there are 3 GPR units and operators in RI, CT, and MA that could accelerate this type of mapping.

b. Completed: ~~Correlation change: Histosol Study: Adrian and Carlisle soils were correlated and mapped in the Rhode Island survey. These Histosols are no longer recognized in the MLRA. Action Plan: a special study of histosols will be needed to determine the proper classification. The main classification data needed is whether the soils are euic or dysic. A three week study of the map units should provide documentation for the re-correlation. Lab data will be needed from URI's Soil Department. Update: This study began in 2006/07 and initial results are showing most of our Histosols are now in the dysic reaction class and should be correlated to Freetown and Swansea series. Re-mapping these areas can be done for many of the large swamps using data collected by URI Geology Department. Contour maps of peat thickness has been produced by the RI soil staff, ground-truthing and GPR transects are needed to determine map unit composition~~. Task completed in FY11

c. Correlation change: Dense till study: Most of the drumlin till soils in western RI is mapped the Paxton-Woodbridge-Ridgebury catena. This catena has a loamy, very dense substratum (2Cd horizon). On-site investigations (backhoe pits) and personal communication with experienced soil mappers have found that most of the areas mapped Paxton-Woodbridge actually consist of the looser, sandier till associated with what has been mapped Montauk (Millis)-Scituate (Montauk soil need to be studied in 144A to define the series). A lot of the areas actually have a supraglacial till over the dense till which is at much lower depths. Action Plan: A special study of the drumlin tills will be needed to characterize and classify the dominant type of lodgement till outside of the Narragansett Carboniferous Basin (Newport tills). Data needed to accurately classify and provide interpretive information include; PSA, bulk

density, mineralogy, Ksat, and water table data. This study can be included with an MLRA 144A wide investigation.

d. Correlation Change: Bridgehampton, till substratum: This unit needs to be re-correlated to Broadbrook or Narragansett soils since there are major differences between the till and outwash soil. There are only 3,000 acres of the unit so a 3 day study of the unit should be adequate to provide enough data to re-correlate the unit. Map units ScA and SdB – Scio soils also need to be re-correlated to Rainbow or Wapping soils as they are mapped on till landforms and the concept of Scio is now used for lake flood deposits.

e. Correlation Change: Highly contrasting complexes: There are two complexes mapped with highly contrasting components – Gloucester and Bridgehampton and Hinckley-Enfield. The complexes total less than 5,000 acres and transect data is needed to either separate the components or provide better percentages of components. These complexes tend to cause problems with our planners trying to work on HEL and Prime Farmland determinations (one is prime the other not, same with erosion).

f. Correlation Change: Frigid floodplain soils: Rumney and Podunk soils have been reclassified as frigid temperature regime they need to be re-correlated to Rippowam and Pootatuck but investigations are needed to determine the classification of our alluvial soils. A graduate study on Riparian soils has shown that a lot of alluvial soils were mapped as outwash soils and there is a major environmental benefit for nitrate removal in alluvial soils. Re-mapping the rivers and major streams may be required (see abstract at: http://a-c-s.confex.com/crops/2008am/webprogram/Paper44335.html). UPDATE: The current RI600 NASIS data shows the Rumney (Ru) and Podunk (Pp) appear to have been reclassified as Rippowam and Pootatuck, respectively a report as to these correlation changes is needed.

g. Completed: ~~Correlation change: Udipsamments: All coastal soils mapped in Rhode Island we mapped the undifferentiated unit "Udipsamments" with no interpretive information. This map unit needs to be re-mapped as part of the coastal and subaqueous soils survey outlined in section 3. Several new map units will need to be added for the coastal soil catena. In addition the anthropogenic landforms in coastal areas will need to be re-mapped. This re-map is currently being conducted under the Coastal Zone Soil Survey update for RI~~. New units (Hooksan-Succotash) established and will be mapped in Phase II and III.

h. Completed: ~~Correlation and Mapping change: Tidal Marsh soils. These coastal areas will also be re-mapped and classified as part of the Coastal Zone Soil Survey update but immediate changes are needed to re-classify the Matunuck Series to histic rather than typic. A study was initiated during 2007 to transect tidal marsh areas. Interns were trained to use a steel rod to probe marshes to determine peat thickness and geo-register the point data and re-map selected marshes. In 2008 work collecting cores and pedon descriptions will be performed~~. Completed new series established, will be mapped during Phase II and III.

i. Classification needs: Although field work for the survey was conducted around the time of Soil Taxonomy, the mapping was still influenced by the 1938 system. Series mapped in Rhode Island need to be re-classified to the current edition of taxonomy. No laboratory data was conducted so some series (major series mapped) will need full characterization. Most of the descriptions on file only go down to 40 inches and cannot be classified to modern placement. Action Plan: Taxonomic classification will be made in NASIS plan outlined in Section 1 but ongoing maintenance will be needed to accurately classify the series mapped.

2. **Mapping/Digitizing Needs** (the re-compilation and re-digitizing will be at a 1:12,000 scale).
   a. Completed: ~~The 6,000 acre town of New Shoreman (also known as Block Island – an offshore island in MLRA 149B) was mapped in one week. Soil map units from the 144A mainland were brought in to map rather than soil types associated with 149B. The mapping on the Island needs to be reviewed to determine if an update is needed. Personal communication with a soil evaluator on the Island has commented about the deficiency of the survey, work with a Quaternary geologist has also reported major mapping errors. The entire Island needs to be re-digitized to amend the shift in the digital soil data (figure 1). A winter detail to the island should be able to provide enough support data to re-map the island in one month. All of the original mapping has been scanned and geo-registered this mapping can be re-digitized to correct the shift by the RI staff in an estimated week~~. Completed in FY11

   b. Urban and suburban areas need to be revised using modern techniques and terminology similar to the map units developed for the New York City survey. Urban and urban-land complexes were not mapped with enough detail to provide useful information; there are 106,000 acres of various forms of urban and sub-urban land based on the 1995 land use coverage for RI. Mapping and legend

work can be assisted by the urban soil office in Staten Island NY. A top priority is to update the map units that are currently listed as Prime and Important Farmland that are now in urban and suburban land uses. A quick analysis was done in 2008 and showed approximately 30,000 acres that are prime/important are now in urban landuses. A similar analysis was done with hydric map units and found about 12,000 acres have been converted.

c. Ongoing: There are large areas in the Northwest hills of the state mapped CkC: Canton and Charlton extremely stony fine sandy loams, 3 to 15 percent slopes. The mapping in this area looks like order 3 mapping (see figure 2 for a comparison of polygon density with Connecticut). The unit has many areas of bedrock outcrops and shallow to deep soils that are not mapped or listed as a component. This has caused numerous problems with construction operations and locations of septic systems. The mapping in this area does not match the detail of the surrounding states. Development is increasing in this area and updated mapping is needed.

d. Narragansett Basin Till Soils – The area of Newport County which lies mainly in the Narragansett Carboniferous Basin is in need of updating. Problems with the existing mapping include; areas mapped Newport soils on A slopes (“well drained” dense till) are almost always Pittstown soils, areas of ledge and saprolite (Cr horizons) exist but were not mapped, and many of the hydric soils were not mapped out.

e. Charlestown End Moraine complex – the Charlestown end moraine is the RI counterpart to the Sandwich end moraine on Cape Cod. Most of the moraine is mapped in a complex consisting of Gloucester and Hinckley soils, Charlton and Canton, and areas of Windsor and Deerfield soils. Observations made have shown that this moraine should be re-mapped to the Plymouth and Barnstable Series. Areas mapped Windsor on the moraine consisted of very bouldery Plymouth Soils during a recent field check.

f. Bedrock differentiating – RI has two major bedrock types – stratified (Narragansett Basin) and un-stratified (Granitic complexes), during the soil survey no attempt was made to differentiate the soils by bedrock type. There are major interpretive differences in the two bedrocks that influence water movement, aquifer recharge, road and construction, and even radon amounts. The bedrock geology map has the bedrock type delineated to the detail needed to make changes work is needed to re-classify the map units and soil types within the stratified rock units.

g. Completed:~~Digital archiving – There is still a high demand for the published soil survey but storage expenses and mailing costs are becoming high. The published survey and the historic surveys from the 1920's need to be scanned and made into an electronic format and posted on the Web. UPDATE: This work has been completed by intern work during 2007.~~

h. Completed: ~~Special features – need to add additional spot symbols such as wet spots, outcrops, etc. This can be done during the update mapping and using other resource data (vernal pools).~~ Completed

i. Completed: ~~Join with neighboring states and fix errors – the current RI SSURGO spatial data does not join with neighboring states of MA and CT. The join work exists in a folder but has never been made to the RI-600 spatial data. There are also several digitizing errors that need to be made to the spatial data. A personal geodatabse of RI-600 has been created and reviewed for correct setup by Carol Radiz to complete this item, assistance is needed on how to conduct and submit to the SDM. UPDATE: This work is slated for completion in FY-10~~. Completed FY 10.

j. Urban and Coastal Flooding Phases – areas subject to urban flooding along the major rivers (Pocasset, Pawtuxet) do not currently provide evidence of flooding in the soils data. This may lead to some potential mis-interpretation of our data and have severe financial costs to soil survey users. Similar situation exists for areas along the coastal zone which is subject to washover flooding caused by storms and hurricanes. A workplan to address this will involve making spatial edits using the FEMA FIRM maps and creating new map phases into the tabular data this can be done in coordination with Item 2b.

k. Prime Farmland changes – a quick review of the RI soils data along with the 2004 Land Use/Land Cover mapping found over 35,000 acres of soils that are currently mapped prime farmland (and subject to FPPA) that no longer fit the definition (see map at: http://www.ri.nrcs.usda.gov/programs/images/PrimeFarmland_loss_small2.png). Table 1 below shows Prime Farmland ratings to be the number 2 rating for the RI soils data during FY-11. A workplan to change these areas into urban and urban-complexes is needed to fix this spatially. This could also be done in conjunction with item 2b and 2j.

3. **Special Studies Needed**: Very little data was collected on the chemical and physical properties of the soils in RI. Special studies needed to provide up to date interpretations include water table data, heavy metal concentrations (urban soils and background info on natural soil areas), lab sampling from the NSSL (only a few pedons were sampled), and geophysical studies. Time is needed to locate and index existing data and determine where gaps exist. New interpretations identified from incoming requests for soils information are recorded to determine the types of uses of soils data in the state. Several gaps in new types of interpretations have been recorded within the past year. These include: large carcass burial sites, salinity phases of tidal soils (workplan item for 2012); ecological habitat related to soil types in coastal areas; Ksat values; heavy metal concentrations in brown fields; anthropogenic soils information and interpretations; hydric soil morphology; and subaqueous soil interpretations.

   SCAN Station: The nearest SCAN (Soil Climate Analysis Network) station is located in the frigid soil area of 144B. A proposal is planned to seek funding to establish a station a near the University of Rhode Island (Peckham Farm). This station will provide long term soil climate data for 144A.

Section II. Long Range Work Plan for the Coastal and Subaqueous Soil Survey of Rhode Island

During the period from 2003 to 2008 (when soil survey re-organization by MLRA began) the RI NRCS office began a process to establish a Center for Coastal Pedology and to set up a Coastal Zone Soil Survey office to conduct the subaqueous soil mapping for the area. When the re-org kicked in the 12-6 office in Tolland took responsibility for all soil survey activities in RI.

Rhode Island NRCS received a $100,000 earmark in FY 2006 and $144,000 in 2008 to develop coastal and subaqueous soil mapping techniques, analyze soil cores, and provide training. A CESU agreement is used to funding for the MapCoast partnership and NRCS staff to provide these deliverables. The MapCoast partnership is also planning to receive earmark money from NOAA which will be spent working on developing a protocol for subaqueous soil mapping.

In 2010 Phase I of the RI Coastal Zone Soil Survey was SSURGO certified (visit: http://www.ri.nrcs.usda.gov/technical/RI_Soil_Survey_2011.html) Phase II was completed in 2012 and Phase III is currently underway.

Freshwater subaqueous soils – funding to conduct a study on the freshwater subaqueous soils in RI was provided to URI. As part of the study a workplan was

approved in FY11 to map 6 ponds in RI (Watchaug, Tucker, Wordens, Bellville, Smith/Sayles, and Bowdish). The current RI-600 SSURGO data has the six freshwater ponds mapped, there are plans to extend the freshwater mapping during the winter months.

Figure 1: Example of shift in digital soil data (1:12,000 scale).

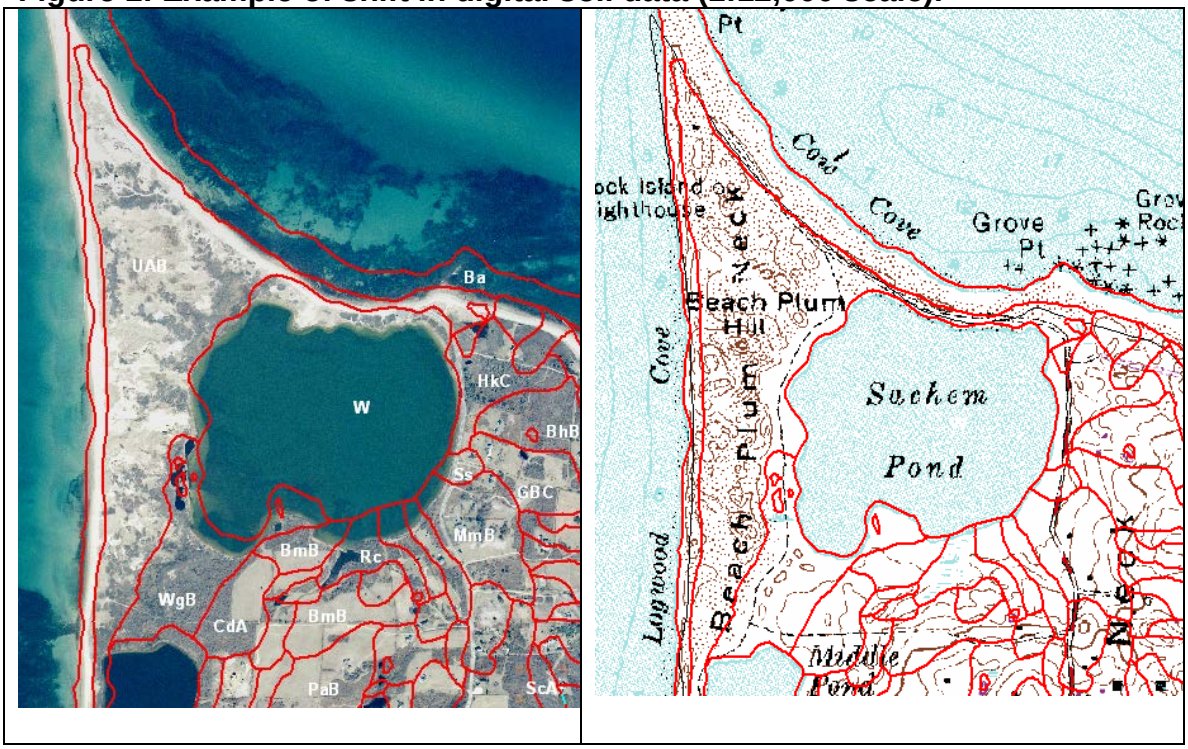


Figure 2: Polygon density of the Northwest Hills (CT and RI).

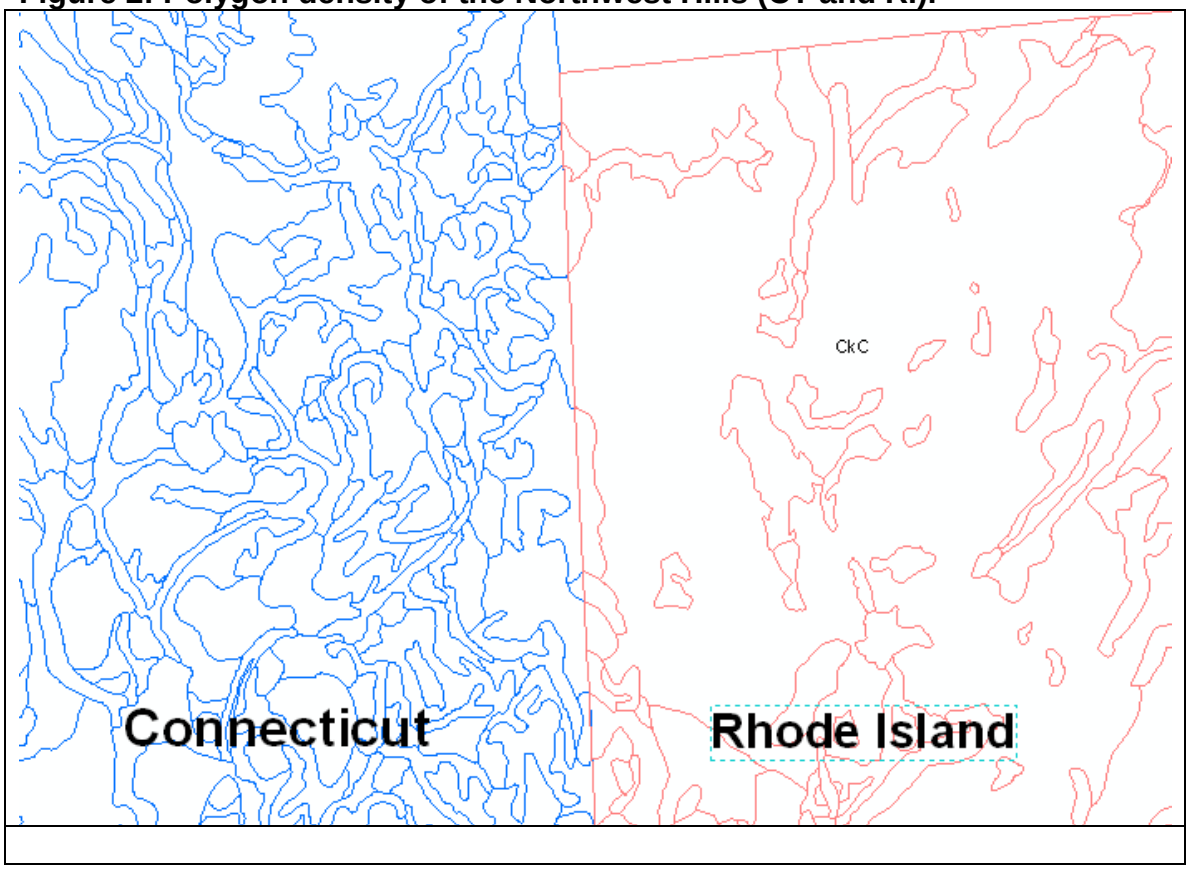
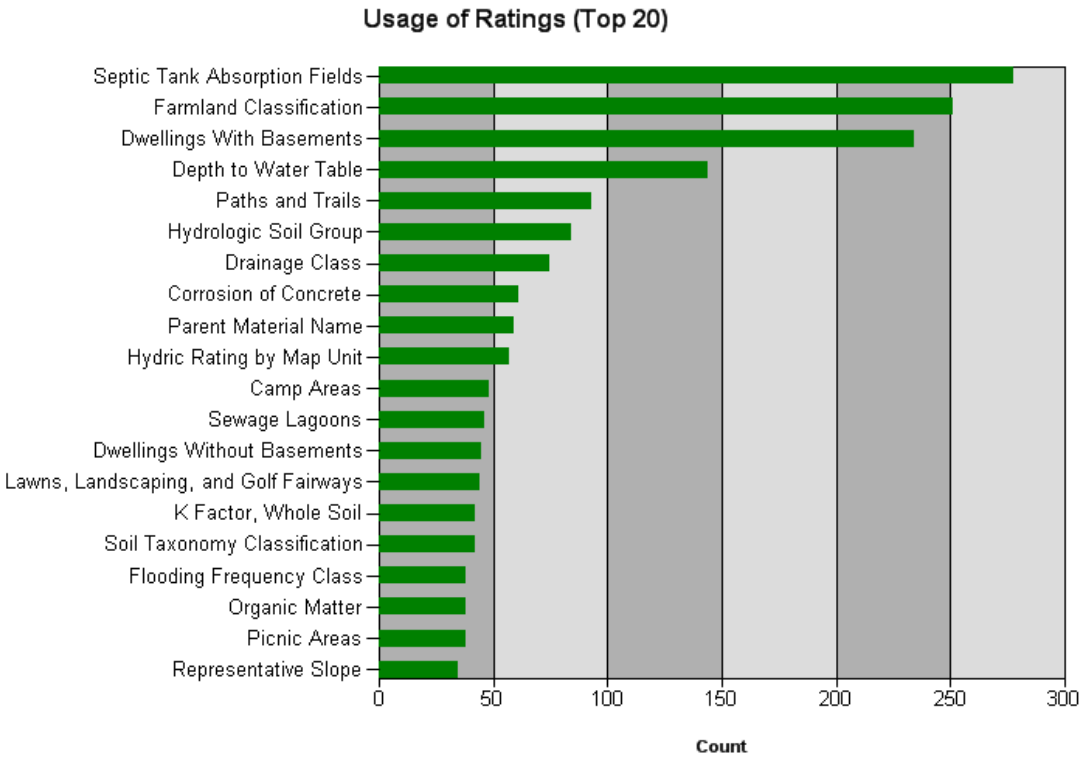


Table 1: Top Ratings for RI Soils Data from the SDM for FY-11:



Attachment 1: Copy of the RI Soil Legend with Correlation Notes.

Note: Attachment 1 is now on the S:\Service_Center\NRCS\aaSoils\Subaqueous\SAS_MappingDocs\RI_Master_CoastalZone_Legend_2010.xls file