Soil Characteristics GUI / Mapping Tool

* Primarily interested in using the tool to group soils into ecological sites and ecological site groups within a Major Land Resource Area or Land Resource Unit.
  + Choose soil characteristics that I want grouped
    - Those characteristics are captured on the spreadsheet and in Jason’s SQL.
  + Identify map unit components that have those soil characteristics
    - Already captured in Jason’s SQL via MUKEY.
  + View the dominant component, dominant condition map units. Be able to set minimum percent of dominant component or condition (ie map units with 100%, at least 70% etc)
    - Can this be a user-entry box in the GUI, allowing user to enter a positive integer between 1-100?
  + Be able to turn on/view (separately) additional map units with minor component having those characteristics. Be able to set minimum percent of minor component (ie >0% of map unit, or at least 25% of map unit)
    - Similar to above it re: dominant component/dominant condition?... Just let the user enter the value they want? The value might ideally be captured as something like, “Percent of component acres in the mapunit is greater than \_\_\_ and less than \_\_\_.” User would enter values in each blank; limited to a value between 1-100.
  + View the data as aggregated by the Normalized Major Component display.
    - All calculations within the “analytical” GUI would be performed on this normalized major component data. Calculations should not be performed on any of the other scripts (those run to extract Dominant Component or All Components).
  + View the map result online (visual check review)
  + Download the result as a geodatabase or shapefile (I like the shapefile idea because it is easier for me to add to the maps that I have created for the work I am doing)
* Ideally, I would be able to create multiple ecological site or ecological site groups at once -ie set up “ecosite units” each with their own soil characteristics, to create the ecological site or site group map for the MLRA or LRU, or even a ranch.
* The dream is to incorporate the scripts+GUIs into web soil survey so everyone can use them. Web soil survey is hooked to EDIT, so the user could potentially get some state and transition information, production ranges, species lists for the ecosite units built.
* Simplify some of the outputs:
  + Within both GUIs (the “non-analytical” and the “analytical”), group the Landforms from SSURGO into CEAP-GL categories: Bottom, Terrace, Depression, Upland.
  + What else can we have the GUI group into categories, for ease of data interpretation and/or mapping concepts?
* Perform the following selections/calculations in the “analytical” GUI, using only the script that contains the Normalized Component Percents:
  + What are the most important drivers of a vegetation and/or ecological site change or concept? Should we consider identifying properties at different “scales” within the mapunit (see table below), or just leave the data output and map display as it comes out of the SSURGO script for each component?

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| **Method** | **Description** |
| Dominant Condition | Groups components in a map unit based on like-values for the attribute. For each group, percent composition becomes the sum of the percent composition of all components in the group. These groups therefore represent conditions rather than components. If more than one group shares the highest percent composition, a corresponding tie-breaker rule determines which value is returned. |
| Dominant Component | Returns the attribute value associated with the component that has the highest percent composition in the map unit. If more than one component shares the highest percent composition, a corresponding tie-breaker rule determines which value is returned. |
| Most Limiting | Suitable only for attributes used to generate a soil suitability rating for a particular use. The most limiting result among all components of the map unit is returned. This method may or may not represent the dominant condition. The result may be based on the limitations of a map unit component of minor extent. |
| Least Limiting | Suitable only for attributes used to generate a soil suitability rating for a particular use. The least limiting result among all components of the map unit is returned. This method may or may not represent the dominant condition. The result may be based on the limitations of a map unit component of minor extent. |
| Weighted Average | Computes a weighted average of the value for all components in the map unit. Percent composition is the weighting factor. |
| All Components | Returns the lowest or highest attribute value among all components of the map unit, depending on the corresponding tie-breaker rule. In this case, the tie-breaker rule indicates whether the lowest or highest value among all components is returned. For this aggregation method, percent composition ties cannot occur. The result returned represents either the minimum or the maximum value of the corresponding attribute throughout the map unit. The result may be based on a map unit component of minor extent. |
| Absence/ Presence | Returns a value, for all components of a map unit, that indicates if a condition is always present, never present, or partially present or whether the condition’s presence or absence is unknown. |
| No Aggregation Necessary | Although the majority of soil attributes are associated with a component of a map unit, some are associated with a map unit as a whole. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the “aggregation method” for any attribute of a map unit is referred to as No Aggregation Necessary. |
| Component Percent Cutoff | Components whose percent composition is below the cutoff value are not considered. If no cutoff value is specified, all components in the database are considered. |
| Tie-Break Rule | Indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie. |
| Interpret Nulls as Zero | Indicates if a null value for a component should be converted to zero before aggregation. This conversion is done only for map units that have at least one component for which the attribute value is not null. |
| Layer Options | For an attribute of a soil horizon, a fixed depth range must be specified. Either centimeters or inches may be used, but the bottom depth must be greater than the top depth. The top depth can be greater than zero. When “Surface Layer” is specified, only the surface layer or horizon is used to derive a value for a component. When “All Layers” is specified, all layers recorded for a component are considered when deriving the value for that component. Whenever more than one layer or horizon is considered, a weighted average value is returned based upon layer or horizon thickness. |
| Month Range | For an attribute that is recorded by month, a range of months must be specified. |

* + - Dominant Condition:
      * ESD\_Name and ESD\_ID
      * Profile depth (eg, very shallow, shallow, moderately deep, deep, very deep)
      * Restriction depth
      * Chemistry criteria (eg, SAR, EC, CaCO3)
      * Volume of Coarse Fragments in the profile
      * Percent Cover of Coarse Fragments on the surface
      * What else? Are any of the above unnecessary as Dominant Condition?
    - Dominant Component:
      * ESD\_Name and ESD\_ID
      * Profile depth (eg, very shallow, shallow, moderately deep, deep, very deep)
      * Restriction depth
      * Chemistry criteria (eg, SAR, EC, CaCO3)
      * Volume of Coarse Fragments in the profile
      * Percent Cover of Coarse Fragments on the surface
      * What else? Are any of the above unnecessary as Dominant Condition?
    - Least limiting soil properties: ??
    - Most limiting soil properties: Same data elements as for Dominant Condition/Dom Component, but return results as a Most Limiting analysis. Does this even make sense??
    - Are weighted averages helpful, or do we just need min/max values? I think the Min/Max values would fall under the Most-Limiting data property, not weighted average.
      * Some properties can be calculated. For those, a weighted average may be helpful, or the Min or Max might be preferred. Eg, If SAR is the concern, I’d select SAR when weighted avg for the components is greater than {user entry}. Or could select it based on Min value = {user entry}. Or on Max value = {user entry}.
    - No Aggregation Necessary: Is this the case for most of the data? Or do we want to explore using the aggregation types and examples above?
      * Lori’s preference: Use two methods; see if the thematic mapping reveals differences:
        + Dominant Condition on the items listed above.
        + Dominant Component on the items listed above.
* Add Rainfall Erosivity Values (from the Global Rainfall Erosivity ArcGIS datalayer available thru data request at <https://esdac.jrc.ec.europa.eu/content/global-rainfall-erosivity>) to the map layer, so we can spatially join the R-Factor to each mapunit. The R-factors in NASIS are unreliable, so prefer to use the R-Factors developed in the Global Rainfall Erosivity data layer.
  + R-Factor joined/related to Jason’s tabular SQL output in ArcGIS, and then just displayed as a selection within the GUI. Mike, this would be an extra step for your team to perform. Is this okay?