

MO-03 Technical Note

Date: November, 2006

Subject: Soil – Ecological Site Correlation

One of the primary interpretations for soils within the Northern Great Basin Region (MO-03) is the assignment of ecological sites to soil components. Properly correlated soils and ecological sites provide the basis for various management decisions. Developing management plans for stocking rates, wildlife habitat potentials, and biomass harvesting are examples. They are also useful to help identify and manage resource concerns such as re-vegetation, erosion and sediment control, and critical habitats.

It is widely recognized that the soil and climate are components of an ecological site and that the interaction between the soils, climate, and vegetation are reflected in the ecological site. As soil and climate are less affected by disturbances, they provide an important point of reference in identification of ecological sites at any stage of disturbance as well as at the reference state (historic climax plant community, HCPC). As state-and-transition models become better defined within ecological sites, dynamic soil properties are expected to help identify or typify various states, and may provide clues to the thresholds at which irreversible changes occur. The soil survey is being looked to as the principal source of data for ecological site location and extent.

In order to effectively provide ecological site interpretations within the soil survey, it is very important to follow an orderly, interdisciplinary path in site identification and soil-site correlation. Effective communication between rangeland management specialists, foresters, and soil scientists is critical. Adequate time for rangeland management specialists and foresters to view ecological sites across their extents and to discuss plant ecology and soil and climate relationships with the soil scientist is a key to successful soil-site correlation. Working together with the soils discipline during mapping provides opportunity to identify and document new ecological sites and the states that exist within existing sites. It should also prove useful to evaluating older ecological site concepts that may be improperly centered on a disturbance state of another site. It is critical to the success of the soil-site correlation process that the plant specialist spends enough time with each soil scientist so that they mutually recognize the soil, climate and landscape relationships to the ecological sites and that the soil scientist is able to recognize and identify sites, and to understand the implication when there are changes in some of the key species.

Circumstances vary from one survey area to another with regard to the amount of time that rangeland management specialists or foresters may be needed. The level of experience of the soil scientists and plant specialists and previous work in the MLRA area are factors to consider. The soil survey project leader should develop a work plan and request plant specialist time as needed. The MO Leader and/or the State Soil Scientist will work with appropriate staff to provide the time necessary. This technical note provides a framework for decision-making and soil-site correlation suitable for the typical soil survey in the Northern Great Basin region and should aid in developing a work plan for soil-site correlation.

The experience of the soil and plant specialists will be factors in how quickly and how precisely the soil, climate, and plant interactions can be identified and typified. Soil-site correlation keys or documentation from existing sites within the MLRA will provide important background to help those with little experience develop consistency and skill in understanding soil-site correlation. Excessive dependence on keys is discouraged since the structure of a key is to distinguish existing sites based on a minimal set of differentiating features. It does not summarize or fully define the site, and may interfere with recognizing new sites or discovering new information about existing sites.

In some cases, the soil scientist classified, correlated, and delineated the soil and the plant specialist independently assigned a range site. The soil and climate features for the range site descriptions were often simply an aggregation of common soil properties for any soils that happened to be tied to the range site. That is not adequate to form a real understanding of the function of the soil and climate in the ecological site concept and should be conscientiously avoided.

In order to adequately describe and correlate ecological sites, the nature of interactions between the soil, climate, and vegetation should be carefully worked out. For some sites, the soil-site interactions may be too subtle for our

current inventory methods to detect. If there is a decision that a new site should be recognized, the fact that we don't fully understand the soil, climate and plant interactions should be noted, so that further study can be done in the future. There is a tendency for both soil scientists and plant specialists to take notes whenever there are changes in the present vegetation. This is recognized as part of the process of mapping and testing soil-site relationships. Transitional areas between sites are documented as are points that are central to the soil-site concepts. It is necessary to recognize transitional areas and document them as such. Much confusion and incorrect site identification can be eliminated by recognizing these transitions. Notes collected in areas of transition should say so. This allows correlation decisions made in handling the soil and site assignments of the transitional areas to become part of the history of mapping decisions.

Protocol for Soil-Site Correlation

- I. Prior to production mapping activities, exploratory studies to identify important soils, landforms, and ecological sites are conducted jointly by the soil scientist (SS) and plant specialist (PS). A skeletal legend is developed with preliminary soil-site correlations.
- II. Soil Scientists pre-delineates map sheet and predicts the soils and ecological sites. Preliminary map unit is assigned an existing map unit or a new map unit concept is postulated.
- III. Soil Scientist describes soil and if the plant specialist is not available, makes the first correlation to ecological site. The plant specialist reviews the site assignment.
 - If the soil and site are compatible with existing concepts, the plant specialist may approve the soil-site correlation based on the documentation gathered by the soil scientist.
 - If the soil and site are not compatible with existing concepts or there is concern about the soil-site correlation by either the soil scientist or plant specialist, then the plant specialist visits the area with the responsible Soil Scientist. The plant specialist and soil scientist study/assess variance from existing sites, (this is not based on a single location; the area is reviewed for consistency and extent.) (Use the plant association table and NRPH initial guidelines for significant differences to determine if plants are outside existing sites. Explanation of the plant association table and initial guidelines are in chapter 3 of the National Range and Pasture Handbook, <ftp://ftp-fc.sc.egov.usda.gov/GLTI/technical/publications/nrph/nrph-ch3.pdf>)
 - A. If after assessing the soil-site properties, there is a variation of plants only and the soil is consistent with an existing site concept:
 - Is the present plant community an expression of the natural variability of reference site?
If yes, document the variation and correlate to the existing site
 - Is the present plant community an expression of a disturbance state of an existing site?
If yes, document the disturbance state and correlate to the existing site
 - Are the plants too different to fit closest existing site, either by production or species composition?
 - Do the present plants and historic use suggest that the site is still close to HCPC?
If yes, document the new site; attempt to distinguish soil/climate features to distinguish site.
 - ❖ Is an adequate soil/site relationship found?
If an adequate soil/site relationship is found, correlate the soil and new ecological site, draft site for review by SRC.
If no adequate soil/site relationship is found, draft the site; correlate to the soil; flag for further study. If continued study yields no clues to soil-site relationship, contact SRC and soils staff for assistance.
If the present plants and historic use do not suggest that the site is close to the HCPC;
 - correlate to a site based on soil and climate
 - document the present vegetation as a new disturbance state
 - notify SRC for review

- B. If after assessing the variation, not only the plants but soil and/or climate don't fit existing sites.
- ❖ If an adequate soil/site relationship is understood –draft a new site for review by SRC; correlate to the soil.
 - ❖ If no adequate soil/site relationship is understood – draft as a tentative new site; correlate to the soil; flag for further study. IF continued study yields no clues to soil-site relationship, contact SRC and Soils staff for assistance.
- C. If after assessing the variation, the soils or climate properties don't fit an existing site but plants do.
- Verify that the pedon location is representative of the area and is not part of transition zone. If not a representative location: relocate pedon to better site—re-check soil-site agreement.
 - ❖ If the location is representative: review historic use/disturbance of the area.
 - Has the site transitioned into a disturbance state that is similar to a legitimate site, but isn't HCPC for the area?
 - correlate to a site based on soil and climate
 - document the present vegetation as a new disturbance state
 - notify SRC for review
 - If the site truly reflects HCPC but the soil/climate properties don't fit the site concept
 - If the soil or climate factors are combining so that it provides an environment close to the existing soil-site concept for the site but due to a different combination of properties.
 - ✓ Does this soil and site exist only as a localized, minor condition?
 - if yes, treat and document as exception, do not modify the "normal" soil-site concept. Correlate, notify SRC of the exception.
 - if not a localized, minor condition, expand the soil-site concept to include the new information. Correlate, notify SRC/SDQS.
 - If the soil or climate factors are not combining to provide an environment close to the existing soil-site concept, but are in fact different from the present site concept
 - Further study needed because this is a change in the soil-site concept from what is presently defined; assign site based on HCPC, flag for study; notify SRC/SDQS; jointly develop a procedure to resolve in a timely way.