MLRA Soil Survey Office: 9-STE

Understanding the Substratum in Conservation Planning

NRCS soil scientists have an in-depth knowledge of soil physical, chemical, and biological properties across the land surface as delivered in published soil surveys to a depth of 2 meters. To effectively predict and map the soils at the near surface requires a knowledge of what lies below 2 meters in the deeper substratum (Figure 1). Knowledge of the continuum of soil-to-substratum relationships creates a "window to the subsurface" which can guide decision makers[1] in making more science-based and cost-effective decisions for the benefit of society and private working lands.

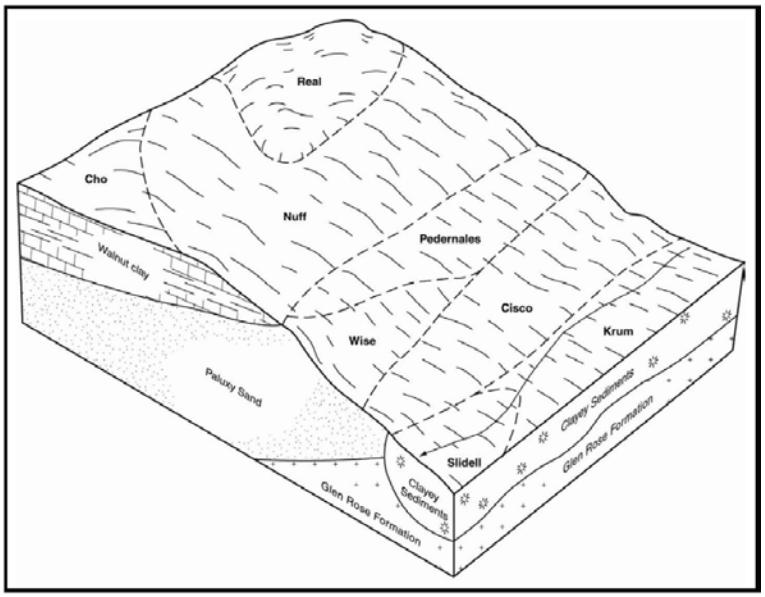

Figure 1. Block diagram from the Soil Survey of Hamilton County, Texas, shows the pattern of soils and underlying material.

In North-Central Texas, many producers wish to manage their working lands to meet the needs of managing a profitable livestock operation, while improving or maintaining fish and wildlife habitat. A successful grazing management plan requires adequate water sources in multiple paddocks to rotate livestock across the entirety of the property and not overutilize resources near a water source. NRCS soil scientists assist conservation planners with on-site geotechnical investigations to design effective watering systems which may include pond reservoir areas. A pond reservoir area requires the expense of excavating a "test pit" to determine if suitable material is available on-site for the pond. In some instances, this is an unnecessary expense because a pond reservoir is not feasible at the desired location.

NRCS soil scientists have knowledge of pedostratigraphy (soil and substratum horizons) and lithostratigraphy (deep substratum bedrock layers) which can assist producers in placing "test pits" in the most advantageous locations (Figure 2). In some instances, on-site investigations may prompt a producer to consider an alternative water source (groundwater) due to the cost of installing a pond liner in the absence of suitable material on-site.

Figure 2. NRCS soil survey and Texas NRCS field office staff discuss the findings on this site for a potential pond reservoir.

Figure 3. NRCS soil survey staff assisting Texas NRCS field office staff in assessing a marginal site for a potential pond reservoir.

Figure 2 shows NRCS soil survey staff and Texas NRCS field office staff discussing the capabilities and limitations for a potential pond reservoir site. The complex pedostratigraphy of this site presented several concerns in designing a permanent water source. To make the on-site determination, Sidney Paulson (soil scientist in green hat) estimated clay content and plasticity while Carson Singleton (range management specialist) operated the bucket auger. Alan Deubler (soil scientist) described the morphology of the excavated soil horizons. Prior to arriving on site, the NRCS staff downloaded site specific information from Web Soil Survey[2]. Lee Gernentz (district technician) brought along the Hamilton County Soil Survey manuscript which not only includes soils descriptions, but contains significant guest-author documentation about the area, not currently available in Web Soil Survey.

Another on-site investigation (Figure 3) shows NRCS soil survey staff assisting Texas NRCS field office staff in assessing a marginal site for a potential pond reservoir. Shelby Hilbert (range management specialist in green hat) and land manager look on as Chance Robinson (soil scientist in straw hat) explains the alluvial gravel layer encountered at depth by Alan Deubler (soil scientist operating bucket auger).

The Stephenville MLRA Soil Survey Office has assisted the Lampasas NRCS Field Office with geotechnical on-site investigations for several years. These investigations assist the field office in making a more science-based and cost-effective recommendation to producers while also informing the NRCS Soil Survey Staff of the needs for future soil survey updates which will improve the soil survey for conservation planning and the public at large.

[1]Wysocki, D.A., P.J. Schoeneberger, H.E. LaGarry. 2005. Soil surveys: A window to the subsurface. Geoderma 126:167-180.

[2]Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed [06/12/2019].