

Natural Resources Conservation Service

Soil Science Division

Soil Survey Region 9



Altus, OK, Soil Survey Office

Groundwater Flow Study is a Concerted Effort

When an Oklahoma landowner requested assistance from the NRCS field office staff in Altus, Oklahoma, he didn't realize it would be a concerted effort of many people with the right expertise to develop and implement a plan. He explained that in parts of his field, productive agriculture was nearly impossible, and machinery would become stuck because of the high-water table. As a result, the Altus Soil Survey staff worked closely with NRCS Engineers, the local District Conservationist, and the landowner to develop a study of groundwater flow and its fluctuation below the soil surface to determine if it was practical to correct the high-water table problem.



A high-water table can cause extensive damage to equipment as well as destroy crops and fields.



The study area was a 480-acre wheat and cotton farm that used a minimal tillage system on high terrace of the Red River Valley in southwestern Oklahoma. Soil Scientists identified the soils as deep to very deep, that had formed in loamy alluvium over residuum (i.e., weathered materials). Soil textures in the surface were fine sandy loam and very fine sandy loam and subsurface textures ranged from clay loam to sandy clay loam. The geology of the area was identified as stratified (i.e., layered) sandstone.

Engineers designed a grid that required 44 soil profile descriptions to measure the overall depth of the soil, depth to bedrock, and how deep the water table was. It was determined that rainfall would infiltrate the soil profile and move laterally, this movement followed the overall topography from East to West.



Sample locations determined by NRCS Engineers to identify water movement within the soils.

When the study was completed, NRCS Soil Survey staff explained the results to the landowner that included the discovery of a pronounced plow pan in the field, and the process of soil infiltration and water movement in the soil profiles. They discussed the benefits of changing to no-till farming and applying soil health management practices. Based on the soil profile descriptions the Soil Survey staff provided, the Engineers developed a plan to install a drainage tile system that would remove groundwater to a discharge point and redirect the subsurface water flow. The District Conservationist assisted the landowner with programs that would benefit his agricultural production. Once the plan was implemented, the landowner experienced an agricultural profitability increase and less damage to equipment.

The Soil Survey staff, NRCS Engineers, and District Conservationist from the Altus, Oklahoma NRCS Service Center worked together to help the landowner achieve a positive outcome, by fixing the high-water table, implementing soil health management practices, and enrolling him in eligible programs.