



Soil and Plant Science Division

Technical Soil Services

North Central Soil Survey Region

St. Louis, Missouri—Forest Park Ecological Management and Remediation Efforts

Union, Missouri, Major Land Resource Area (MLRA) Soil Survey Office (SSO)

Purpose

Staff from Forest Park Forever (FPF), a local conservation organization, contacted the Union, Missouri, MLRA SSO to request training and support for ecological management and remediation planning efforts in Forest Park in St. Louis. They were particularly interested in determining the effects of remediation efforts on soil properties and identifying areas where new remediation efforts could be most successful. In addition, they planned to submit several soil samples for full chemical analysis, so Union MLRA SSO staff reviewed and discussed the potential effects of soil properties on remediation efforts.

Background

Established in 1876, Forest Park is the largest park in St. Louis, covering roughly 1,300 acres of land in the city limits. The park covers multiple diverse landforms, ranging from natural, gently rolling hillslopes (i.e., 0 to 15 percent slopes) consisting of mature white oaks to artificial drainageways in the low-lying areas of the park. The Winfield, Harvester, and Fishpot series predominately occur in the park.

Union MLRA SSO staff trained FPF staff in soil survey, soil sampling procedures, the importance of major soil properties, and the relationship between soil and land management. Together, they collected soil data for 64 individual points, and they ran infiltrometers at multiple sites to determine saturated hydraulic conductivity (Ksat) of different landforms (fig. 1). Ksat rates determine how fast water moves through the soil. Understanding the Ksat variability between different soils, landforms, and land management can help FPF staff predict water availability of the soil at different sites and ultimately determine which plantings would be most successful in their remediation plots.

In addition to Ksat data, Union MLRA SSO and FPF staff also collected bulk density at each site. Due to the heavy foot traffic of some areas, FPF staff were interested in gathering bulk density data to understand the impact visitors were having on certain areas of the park. By collecting soil bulk density data, they could identify areas of severe compaction, understand when to protect areas, evaluate the impact of their remediation efforts, and identify new opportunity areas.



Figure 1.—SSO Leader Ralph Tucker (lower middle) and Soil Scientist Ryder Anderson (far right) demonstrate the use of infiltrometers and bulk-density slide hammers for FPF staff.

The Union MLRA SSO staff discussed the data collected from the soil investigation with FPF staff. They observed moderately high to high Ksat rates throughout the park with only minor differences between soils and treatments. The moderately well drained Winfield series had a greater Ksat rate than the Fishpot and Harvester series. Variability



in the Ksat rates was greater in the Harvester and Fishpot series; however, this is likely related to the parent material (human-transported material) and not the management of the site.

Soil bulk density data showed that there were several locations in the park with high bulk density readings (i.e., greater than 1.6 g/cm³). One of these areas was a parking lot that had been previously converted into a savannah-prairie environment. However, some sites in natural areas also exhibited greater bulk density concentrations. Union MLRA SSO staff identified these areas on maps made for the FPF and discussed some possible solutions with FPF staff. Soil chemical data showed that there were multiple sites with extremely acidic (soil pH 3.5-4.4) and high exchangeable sodium concentrations, which was not characteristic of the soils that were at Forest Park. After discussing this issue, the Union MLRA SSO and FPF staff determined that herbicide sprays were likely the culprit of these higher concentrations. Due to these higher concentrations, plot remediation or plant species establishment may be difficult in these areas.

FPF staff planned to send soil samples to the Missouri Soil Health Assessment Center for chemical analysis to determine nutrient availability of several uniquely managed vegetation plots. The Union MLRA staff reviewed and discussed the importance of some soil properties, such as soil organic carbon, soil pH, exchangeable sodium, and nitrogen concentration, and their impact on plant growth. Each of these soil properties has a unique relationship with plants, and if a soil property is not within its optimal range, it can limit plant growth or negatively affect plant health.

Key Outcomes

In response to FPF staff's request, Union MLRA SSO staff provided them with training in soil survey and the relationship between soil and land management as well as support with soil data collection efforts. By extending the training to hands-on fieldwork, Union MLRA SSO staff provided FPF staff with an opportunity to develop a greater depth of understanding of the vital role soil plays in the planning and success of remediation and restoration efforts. Through this partnership with FPF staff, Union MLRA SSO staff helped to provide soil information that will improve future ecological management decisions and aid remediation and restoration efforts throughout the park.