SOIL AND PLANT SCIENCE DIVISION

Technical Soil Services

Soil Survey Region

Bryan, Texas, Major Land Resource Area (MLRA) Soil Survey Office (SSO)

Soil Scientists Teach Boy Scouts of America about Soil-Plant Interactions

Purpose

On December 27, 2023, Natural Resources Conservation Service (NRCS) Soil and Plant Science Division (SPSD) staff Adryn Velasquez (soil scientist) and Dr. Beyhan Amichev (MLRA soil survey leader) were invited to the Boy Scouts of America's Winter Camp at Camp Strake, located near Coldspring, Texas. The goal of this field class was to teach the scouts about the role of soils in terrestrial ecosystems and to demonstrate effective soil survey techniques used to observe and study soil-plant interactions, including root growth, soil organic matter accumulation, the presence of leaf litter for the prevention of soil erosion, as well as native plant identification.

Background

Winter Camp is a week-long camp held after the holiday season, where scout troops of Boy Scouts of America (10 to 18 years of age) participate in classes and activities to earn merit badges. Winter Camp is held annually at Camp Strake, which is 2,816 acres in size and located within the Sam Houston National Forest. Camp Strake was established in 2020 by the Boy Scouts of America Sam Houston Council as a venue to teach scouts about terrestrial ecosystems in outdoor hands-on classes. This part of the Western Coastal Plains MLRA in Texas is nicknamed "the piney woods" since it is primarily comprised of pine tree forests. The land at Camp Strake was under loblolly pine tree production for many decades prior to being purchased by the Boy Scouts of America. Since then, some native vegetation has begun to establish itself.

Boy Scouts of America provide opportunities for the scouts to earn merit badges in STEM (science, technology, engineering, and mathematics). Scouts can earn badges by

taking classes in geology, energy, oceanography, robotics, nuclear science, and environmental science, among others. The teacher of the Environmental Sciences class, Mr. Buckley, has been inviting NRCS soil scientists every year since 2013 to this class to talk about soils to the scout troops. Mr. Buckley has been involved with the Boy Scouts of America for more than 40 years. He was a scout himself for many years, a troop leader when his children became boy scouts, and volunteers to teach the environmental science classes since he retired as a geologist.

There were two class sessions, morning, and afternoon, intended for field observation and knowledge on terrestrial ecosystems and factors that influence ecosystem health and vegetation. There were approximately 25 students in each session. The class began by describing the importance of soils for vegetation growth and the types of soils that can be found in the area. In both sessions, the discussion aimed to describe the soil characteristics that can be observed in a shallow soil pit and relate that knowledge to tree growth at the whole ecosystem level. One demonstration site was put on a side slope, and a second site was in a bottomland position. The two soils that were contrasted, the Leggett and Woodville soil series, provided a good discussion regarding soil water availability.

The soil scientists demonstrated the bull probe for extracting soil cores, which was an exciting moment for the scouts, as well as using shovel and hand auger tools to dig some soil samples (Fig. 1). The discussion about important soil properties and functions for a healthy ecosystem included: organic matter accumulation in the soil from leaf later, tree roots, and root exudates all contributing to stabilization of organic matter in the soil to improve soil health; clay, silt, and sand particles in the soil, using the analogy of a beach ball-baseball-pinhead for sand-silt-clay size differences; and the importance of water retention accommodated by the mixture of these soil particles, defining soil texture and structure; and finally, soil color as an indicator of soil fertility and organic matter accumulation as well as water retention for plant growth (Fig. 2 and Fig. 3). The scouts learned that soils have horizons, and the amount of clay in them controls soil water movement and storage. Using these concepts, the soil scientists also explained why the plant communities are different at the two sites and why some plants will thrive where others will not.

Key Outcomes

The scouts in the class learned about the fun and important aspects of being a soil scientist. They learned that soil properties and functions can be used as valuable tools for resource management and how soil science compliments other sciences aimed at understanding the natural world.

The range of knowledge among the scouts was from 7th to 11th grade, and there was a visible interest in the class topic as most students would take notes and were attentive to what can be observed underneath their feet at a soil pit and discussing the not visible parts of a forested ecosystem. A take-home message for the scouts was that vegetation productivity above ground is connected to soil health below ground. SPSD staff participation in this class was a great opportunity to show young people and the volunteering adults in attendance that careers in soil science are very rewarding. Dr. Amichev and Ms. Velasquez also talked about the wealth of soils information available from USDA-NRCS-SPSD maintained web tools such as Web Soil Survey (WSS) and Soil Web.

Figure 1.—SPSD soil scientist Adryn Velasquez (center) talks to the scouts about the vegetation types based on position on the landscape and soil type after demonstrating the use of a bull probe to extract soil cores. Scouts took notes about the soils and vegetation observed at the first site as compared to the second site.

Figure 2.—SPSD soil scientist Dr. Amichev, introduces the scouts to the concept of characterizing a soil profile at the first site. The top three soil horizons of the Leggett soil series found at the site were used for discussion about soil properties and functions.

Figure 3.—Dr. Amichev discusses the soil at the second site for the class, an example of a bottomland Woodville soil series that has shrink-swell clay and has vertic properties.