Soil and Plant Science Division

Technical Soil Services

Northeast Soil Survey Region

Lake Champlain Basin Vergennes Soil Catena Field Tours

St. Johnsbury, Vermont, Major Land Resource Area (MLRA) Soil Survey Office (SSO)

Purpose

In June, the St. Johnsbury MLRA SSO hosted field tours in the Lake Champlain Basin of Vermont at the request of NRCS Vermont. The tours included NRCS MLRA and State staff along with university partners representing the New England Hydric Soils Technical Committee (NEHSTC) and private sector soil scientists belonging to the Soil Science Society of Northern New England (SSSNNE). These tours assessed recent long-term hydrology studies conducted by MLRA staff focused on creating better indicators for hydric soils and defining shifts between soil drainage for soil survey updates.

Background

The Lake Champlain Basin exists within MLRA 142, St. Lawrence-Champlain Plain, a broad lowland shaped by the Wisconsin glaciation that features flat to gently rolling valley floors with thick glacial till, outwash, and glaciolacustrine and marine deposits. Champlain glaciolacustrine clays, particularly those in the Vergennes catena, are among the most intensively used agricultural soils in Vermont due to their high fertility and stable landscape position. However, their inherent gray parent material color is challenging to distinguish from depleted matrices, complicating hydric soil assessment. To improve confidence in field methods for determining soil drainage, it is important to compare soil, site, vegetation data, and quantitative hydrology data. An ongoing MLRA resource inventory project is currently collecting hydrology measurements alongside observations of soil and vegetation data to clarify the relationship between the soil morphology, ecology, and hydrology pertaining to these clays.

These tours focused on the results of that project with the goal of evaluating current hydric soil indicators and determining if new ones are necessary for future wetland delineations and soil survey updates within the Lake Champlain Basin. In 2022, MLRA

staff installed monitoring wells at three different study locations across the Champlain Valley in Vermont. Each study location had three site locations along a landscape transect consisting of an upland, a transitional, and a wetland site. At each site, MLRA staff installed and maintained soil temperature and water level loggers, moisture sensors, and indicator of reduction in soils (IRIS) tubes. MLRA staff also used soil, site, and vegetation descriptions from various other projects such as from ecological site descriptions and dynamic soil property projects.

From June 24 to 26, members from the NEHSTC and SSSNNE participated in the tours, which included site visits to the pits dug for the hydrology project (fig. 1). The days began with a classroom portion in which MRLA Soil Scientist Paul Gadecki discussed the described soil pits and their associated hydrology. MLRA Ecologist Jack Ferrara then talked about the native vegetation associated with the upland and wetland soils and how to best identify dominant species in the field. The attendees proceeded to visit the hydrology sites to see the soil, vegetation, and localized hydrology. In the field, attendees and MLRA staff reviewed the soil color and redoximorphic features found throughout the profiles to determine if the soils met hydric conditions (fig. 2).

Figure 1.—Tour participants reviewing hydric properties of a nearby soil pit while bracing themselves for an impending thunderstorm. The flat, broad landscape of the Lake Champlain Basin is on full display. Photo courtesy of the SSSNNE.

Figure 2.—MLRA Ecologist Jack Ferrara (fourth from the right) discussing soil color with fellow NEHSTC members to determine if the soil at the hydrology monitoring site met hydric criteria. Photo courtesy of University of Rhode Island Research Associate Joe Manetta.

As a result of the tour, the NEHSTC decided to create a new user note in its field guidebook based on an upland soil seen during a tour. This poorly drained soil proved ambiguous and prompted a closer look at the current hydric soil indicators. The location had hydrophytic vegetation and hydrology data from the past 3 years to support a hydric designation, yet the soil color within the top 30 centimeters did not meet the chroma needed to be considered hydric. Uncertainty around this soil necessitated the creation of a problem area in MLRA 142 for similar situations. This new user note will be published in the next version of the NEHSTC field guidebook.

Key Outcomes

The field tours addressed important resource concerns and created opportunities for public and private sector soil scientists in New England to network and learn from one another. The collaborative nature of the tours resulted in critical insight into the drainage transitions of the Vergennes catena, which will be used to improve soil survey updates

that will supply land managers with soil maps of higher accuracy for conservation planning purposes. The collaboration with the SSSNNE and NEHSTC exemplifies the power of using partner organizations and institutional knowledge for developing and strengthening soil survey products (fig. 3).

Figure 3.—Donald Parizek, former NRCS soil scientist and current NEHSTC member, demonstrating the high plasticity of the heavy clay soils found in the Champlain Valley. His knowledge provided insight into the heavy clay soils of this area. Photo courtesy of University of Rhode Island Research Associate Joe Manetta.