PROTOCOL OF MULTI-SITE STUDY FOCUSING ON PER- AND POLYFLUOROALKYL SUBSTANCES QUANTIFICATION, FATE, AND TRANSPORT PROCESSES.

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Based on EPA's Unregulated Contaminant Monitoring Rule (UCMR3) data, PFAS were detected in 20 public water systems, located in 11 counties of North Carolina (NC). Placing NC as the third highest state for PFAS exposure. A field protocol was established to determine the relevance of PFAS fate, transport, and accumulation across multiple sites in NC.

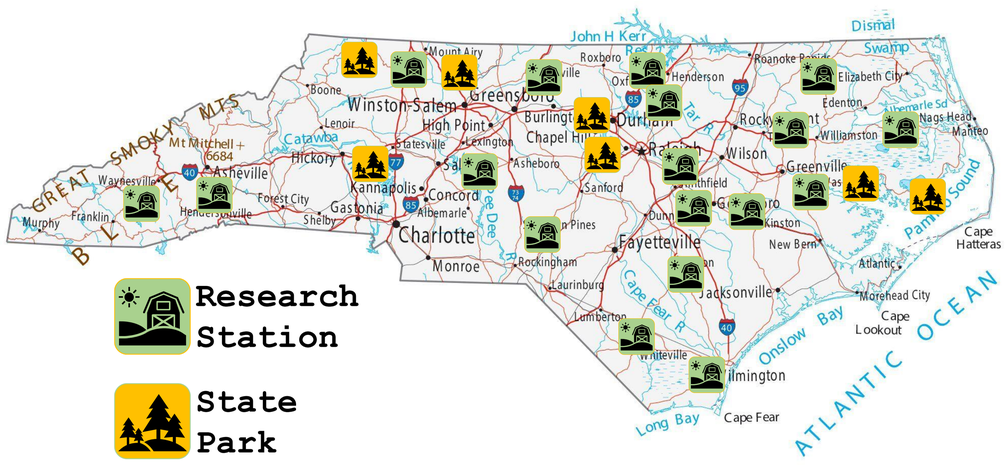

Figure 1. Map with the Research Stations/Farms and State Parks selected for this study.

Water bodies were categorized as input (irrigation, elements present in the water are transferred to the field), output (drainage, elements from the field can be transferred by runoff) and dual (can be used as an agricultural drainage but is also a temporary reservoir for groundwater that is used for irrigation)

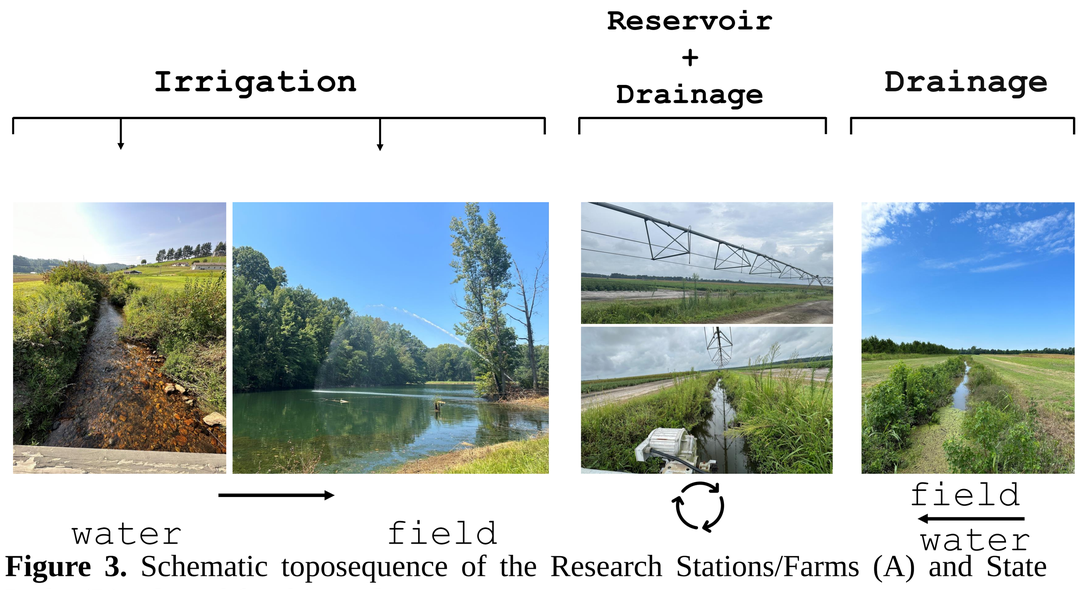

Figure 3. Schematic toposequence of the Research Stations/Farms (A) and State Parks (B) selected for this study

In each field, triplicates of 6 samples were collected (1 foot deep/30cm) every 20 feet. Total 18 soil cores per field, 32 per location.

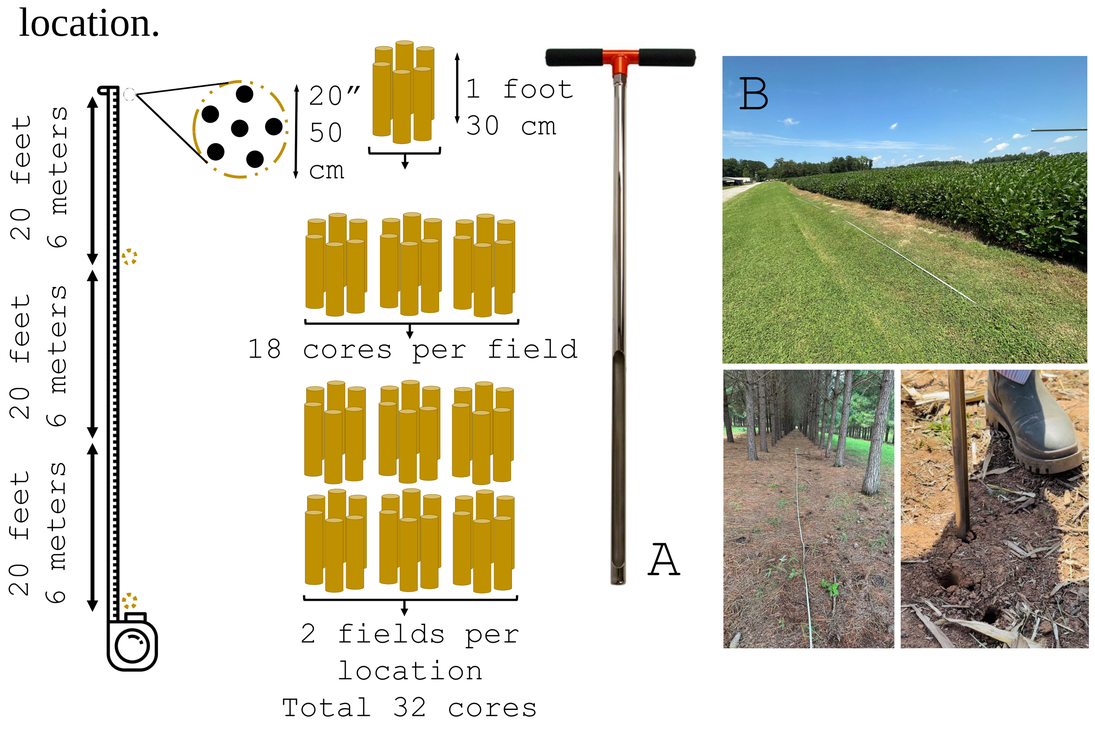

Figure 4. Soil sampling procedure and materials. A. AMS 7/8" X 33" Plated Soil Probe with Handle, 5/8" thread.

Eighteen Research Stations and seven State Parks were selected. The points provided significant variation covering the three main soil regions of NC: Coastal Plain, Piedmont and Mountains. The sampling effort using Research Stations plays a crucial part in this project. Allowing a representative data collection throughout the state, including different agricultural practices, without affecting any individual farmers.

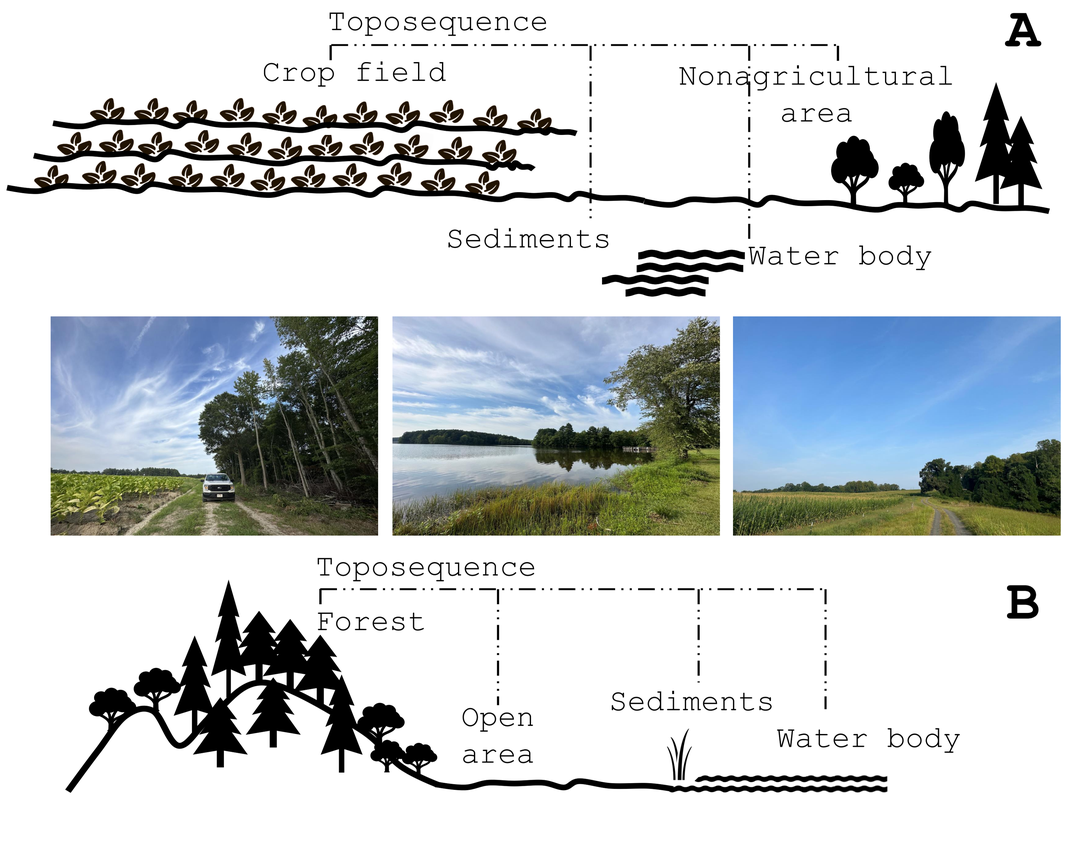

Figure 2. Schematic toposequence of the Research Stations/Farms (A) and State Parks (B) selected for this study

A toposequence including soil, sediment, and water was collected. Soil cores were acquired using a slide hammer sampler, with a plated soil probe.

Before and between sampling points, the soil sampler was washed and decontaminated. The equipment was sprayed with methanol followed by LC-MS grade nano pure water.

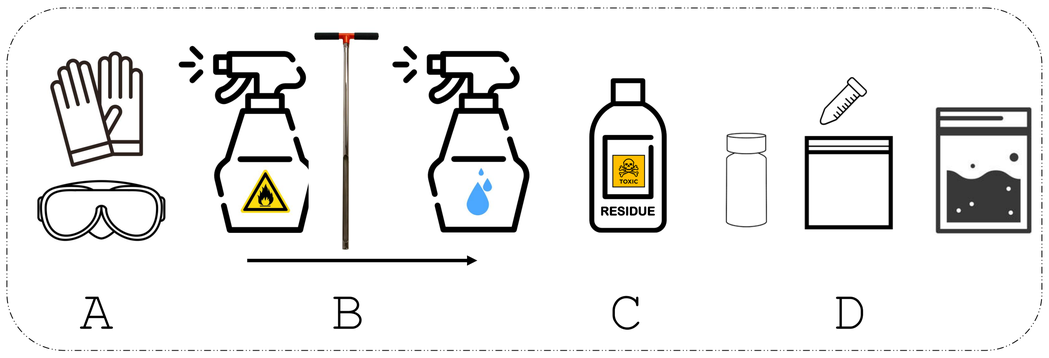

Figure 5. A. Personal protective equipment, B. equipment decontamination, C. container for residue. D. storage procedure.

Water and sediment samples were collected in HDPE amber bottles. Soil samples were collected in Ziplock bags, 2 soil aliquots were store in HDPE centrifuge tubes. Samples collected for PFAS analysis were kept in ice then shipped to ALARC in dry ice. A total of 302 samples were collected. We are currently processing soil samples for texture, pH, organic matter and nutrients. All samples will go through PFAS analysis, and selected ones will be use for different microbiology/molecular tests.