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The varied assortment of stream and river physical conditions present in the County today represent a complicated history of interacting changes in watershed hydrology, river and land management, and sediment transport and deposition – all factors that have been at work since the settling of Anne Arundel in the 1600s by European colonists. Believing that knowledge of past conditions can inform current restoration activities and approaches, the County is working with USGS on a project to examine pre-Colonial riparian area ecological conditions and channel geomorphology. But how to do it without disturbing existing channels and surrounding wetland areas? To start, sediment core samples were collected along transects at the study sites and are being assessed for a variety of factors. From the core samples, sediment stratigraphy along with a physical characterization of the sediment layers present is being determined. Additionally, the paleoecology of the sites is being evaluated by examining pollen, macrofossil presence, and buried wood occurrence found in the collected cores. Finally, radioisotope dating is being done on select sediment layers to determine the history of the sedimentology and ecology observed in these cores. From all this information, a picture of the historic of the floodplain/riparian ecology area begins to appear.

The collection of sediment core samples assembled so far are not really the same as comprehensive sampling across the floodplain/riparian area landscape. Conducting such comprehensive sampling is expensive and destructive to the streams and wetlands you wish to study, often involving the digging of trenches across floodplains with heavy equipment. To build this more comprehensive picture, the County and USGS agreed to expand the paleochannel investigation work to include using a less costly and less destructive alternative to floodplain trenching that would also provide a more comprehensive assessment. Earlier this year, the USGS began using ground penetrating radar (GPR) to peek below the accumulated sediments and gain that more comprehensive understanding of the historical floodplain sedimentology and the evolving stream configuration at previously selected study sites. GPR allows one to look deep below the soil surface in a non-destructive way. The resulting data paints a picture of the soil layers present under the ground, as the radar waves are reflected back differently by the various types of soil layers present at the site. By executing this scanning work along the transects where the core samples were collected, USGS scientists are able to better extrapolate the detailed stratigraphic condition information, derived from the core samples, to the larger floodplain study area without disturbing these fragile systems. Collectively, this entire body of work will inform our understanding of the pre-colonial channel form and streamside vegetative community in the Coastal Plain of Anne Arundel County.

Below are photographs showing the GPR sled and field crews at Bacon Ridge Branch, on 1/29/21.

Photo log: All taken at Bacon Ridge Branch on January 29, 2021 by CJV.



Dragging radar sled on dry land



Unit showing radar image floodplain



Dragging sled across ice



Dragging sled across spit of land in stream



Dragging sled on dry land.



A shot of the radar sled



Another spit of land shot, same location as the first one.



Dragging sled along transect across floodplain.



USGS crew discussing transect evaluation. Tape shows transect location.