

TITLE OF RESEARCH: Analysis of Phosphorus Sources in the Chesapeake Bay

II year project on P sources:

Agricultural and non-agricultural sources of phosphorus in the Delmarva Region

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Three major phosphorus (P) sources have contributed to the degradation of water quality in the Chesapeake Bay: land driven P (agricultural and non-agricultural), mobilized P from bay sediments, and imported P from ocean. Isotopic fingerprinting is the novel and most definitive method to identify these diverse sources and variations among them in an open water. Here we studied series of soil samples collected from 10 different agricultural farms (and total 31 sites) in MD and DE (Fig. 1) that are located in the Delmarva Peninsula within the Chesapeake watershed.

They cover fresh land beginning to start agriculture, under agriculture practice for years and decades and farms with particular rotation of crops as well different P sources (manure, chemical fertilizer as well as human waste (granulite)). We also collected soil nutrient data from past several years from many of these farms to identify relationship of P buildup and particular isotope signature fingerprinting in each soil.

These soils were analyzed for general soil chemistry, concentration of soil P pools particularly on P pools with specific focus on plant available and unavailable pools. Our results show that iron and aluminum oxide bound P are most dominant P pools almost all sites, with most plant available and least plant available split almost equal. Our isotope results suggest few distinct isotope signatures are generated in certain farms and allowed to develop the relationship among soil development, nutrient application, and current state of soil to that of isotope composition.

This allows better understanding of mechanisms that controls the variability of isotopes. Isotope data and estimated underlying mechanisms along with our existing and past research on the Bay sediments, East Creek watershed and other sites in the regions have provided unique insights on the relative roles of agricultural and non-agricultural P sources on water quality

issues in the East Creek and relate to that in the Bay. This research is ongoing and we anticipate an impactful and newsworthy publication soon.

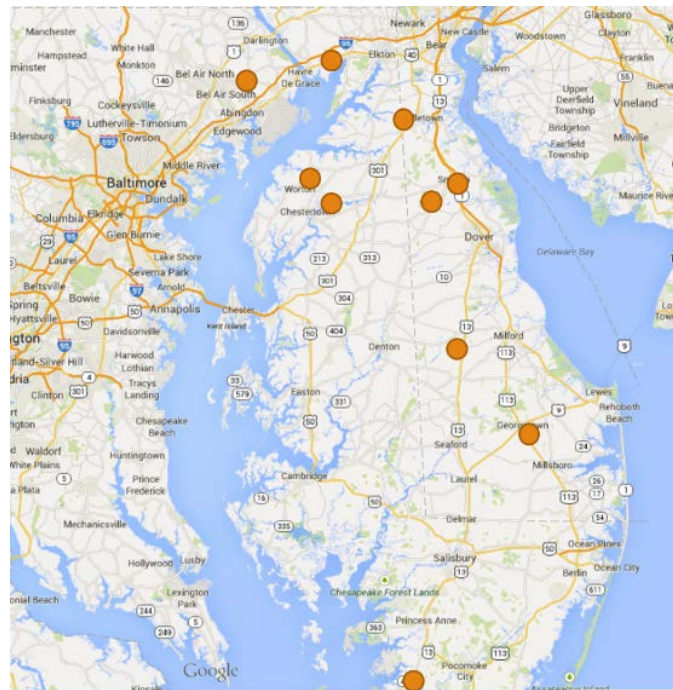


Figure 1. Soil sampling locations on the wider Eastern Shore and adjoining regions in the Delmarva Peninsula. For most sampling locations, multiple (2-7) samples were collected based on different land cover and nutrient management practices.