

South River Floodplain Surface Soil Investigation

Part 1- Upper Floodplain

Working Hypotheses

- Hg concentrations are highest in the <5 year floodplain area.
- Hg is associated with finer grain size particles and particle size is partially determined by geomorphic setting.
- Hg concentrations in the floodplain increase within the first river mile downstream from the footbridge at the former DuPont facility and then gradually decreases downstream from the peak.
- Historic floodplain accretions represent storage features containing higher Hg mass compared to other floodplain features with little to no historic accretion.
- Historic floodplain accretions are associated with former mill dams, point bar associated fine grain deposits and other fine grained accretions.
- Higher total Hg concentrations occur on particles at depth (>15 cm) in discrete layers in the 0 to 2 year storm interval inundation areas.
- Enriched Hg in discrete layers decreases in depth with distance from the river or do not occur in discrete layers.

Objectives

- Develop an understanding of the spatial distribution of Hg in floodplain soils, banks, historic accretions and tributary banks.
- Determine to what extent the Hg concentration in floodplain soils changes spatially under similar and differing land use conditions.
- Further develop understanding of relationship between soil Hg concentrations and soil depth.
- Further develop current understanding of relationship between Hg concentrations and particle size or associations with various size particles, including soil colloids.

Goals

- Identify potential sources and sinks of Hg to the river related to fine grained sediment deposits and floodplain deposits.
- Begin to understand terrestrial ecology exposure conditions.
- Refine Mass Balance in the floodplain.
- Determine whether the majority of the mass of Hg is located within the 5 year floodplain.
- Determine whether the majority of the mass of Hg is located within the first twelve river miles downstream of the plant.
- Learn enough about the distribution on the Hg in the flood plain to allow focused studies in given reaches or distances from the river.

Reaches

- Main Street Bridge to Hopemen Parkway
- Hopemen Parkway to Holsinger Footbridge
- Holsinger Footbridge to New Hope-Crimora Road Bridge
- Hew Hope-Crimora Road Bridge to Patterson Mill Road Bridge
- Patterson Mill Road Bridge to Grand Caverns Bridge
- Grand Caverns Bridge to Part Republic Road Bridge

Inundation Levels

- 0 to 2 year flood
- 2 to 5 year flood
- 5 to 62 year flood

Land use

- Forest
- Open space
- Hay/pasture
- Crop land
- Wetland

Samples per site

- At each site, 2.5 ft cores will be taken in 6 inch increments.
- The 0-6 inch core and a consolidated sample of the remaining 4 increments will be analyzed for total Hg, Loss of Ignition (volatile solids), moisture content and particle size.
- All 5 increments will be archived for possible future analysis.
- Wetland samples will also be analyzed for methyl Hg.

Total number of samples

At each reach there will be 3 inundation levels with 30 sampling sites each. Each reach will also have 10 wetland samples. So per reach, there will be a total of 100 sampling sites. There are 6 reaches, so there will be a total of **600** sampling sites. At each site there will be 5 samples taken, but only 2 analyzed. So in total, there will be **1200** samples analyzed and **3600** samples archived.

Timeline

- We figured we could run 3 crews at a time and would hopefully average 8 sites per crew per day. If that works out and we are able to work 4-5 days a week, it should take us 5-6 weeks to complete sampling.
- We hope to start mid-February
- Wetland samples we plan to collect when it warms up (end of March?) because we want to also test for methyl-Hg.