

Sediment Survey of the Lower Raritan River

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Abstract

The Raritan River system is the largest river system entirely within the state of New Jersey and prior to 2017 there were only seven locations in the lower Raritan with information on sediment contaminants that were discoverable from state and federal data repositories. Given the history of pollution in this area from industrial and commercial land uses, there are important gaps on sediment pollutants that need updating from the main channel, reaching from New Brunswick down to Raritan bay in the Amboys.

Sediment samples and water quality measurements from thirteen transects along this segment of the Raritan River were collected in April 2017. These samples are being processed at the Meadowlands Environmental Research Institute facility which houses an NJDEP certified laboratory to assess the amount of metal and organic pollutant loads associated with the fine particle fraction (<64 um) of the sediments. Distribution patterns, gradients, and hot spots of pollutants associated with the river bed will be analyzed and their distribution patterns visualized using spatial statistics and data visualization techniques.

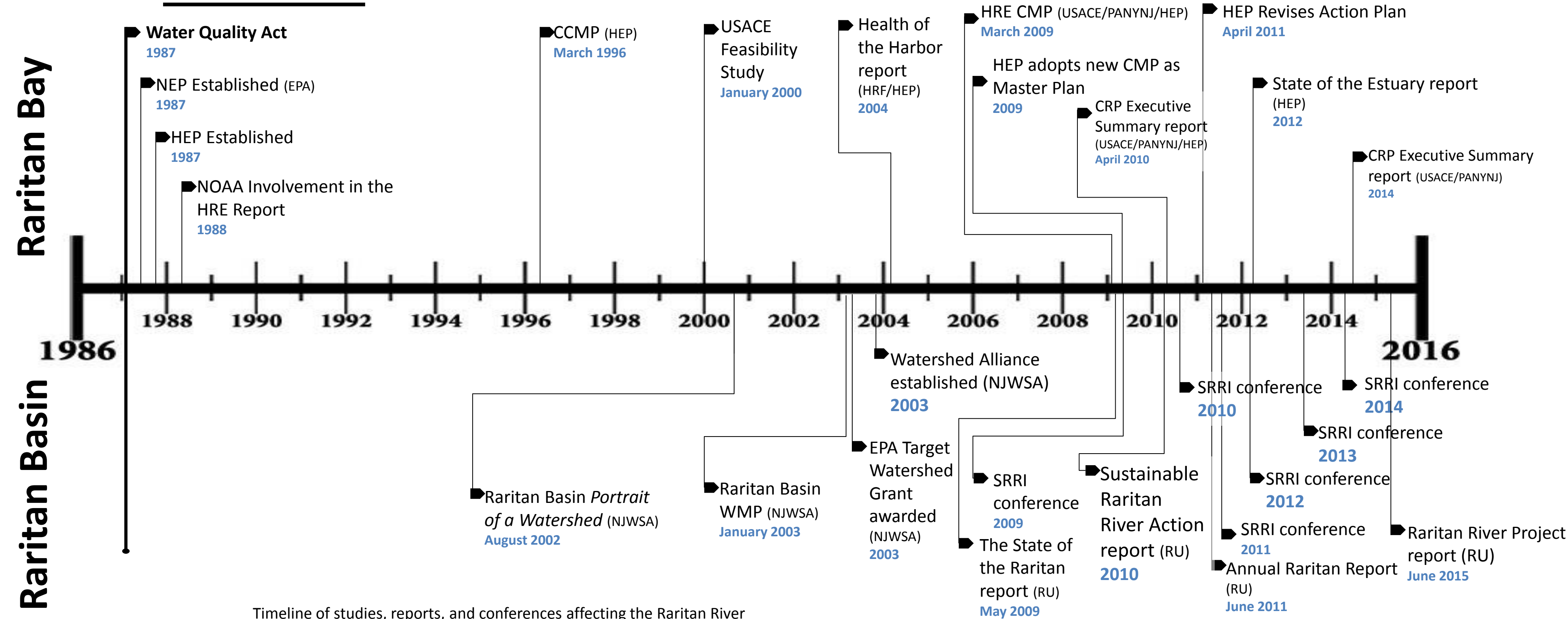
The goal of this research is to understand the current patterns and levels of pollution and to identify areas that need further study, in hopes of establishing a baseline for the lower Raritan River that can be integrated into future initiatives to improve and protect the region's natural resources.

Raritan River Historical Timeline Of Studies, Reports, and Conferences

Recommendations:

- State of the Raritan River Report (2009)**
'Calls for a more ambitious approach to clean up contaminated sites and river beds that are directly impacting the Raritan, and to restore resources damaged in their wake.'
- EPA Rutgers Raritan River Project Report (2015):**
Research to fill data gaps identified in the study
Collect water and sediment samples, analyze for priority pollutants
Monitor dissolved oxygen, pH, temperature, nutrients, and total suspended solids.
Data are needed for a better understanding of the hot spots in the region

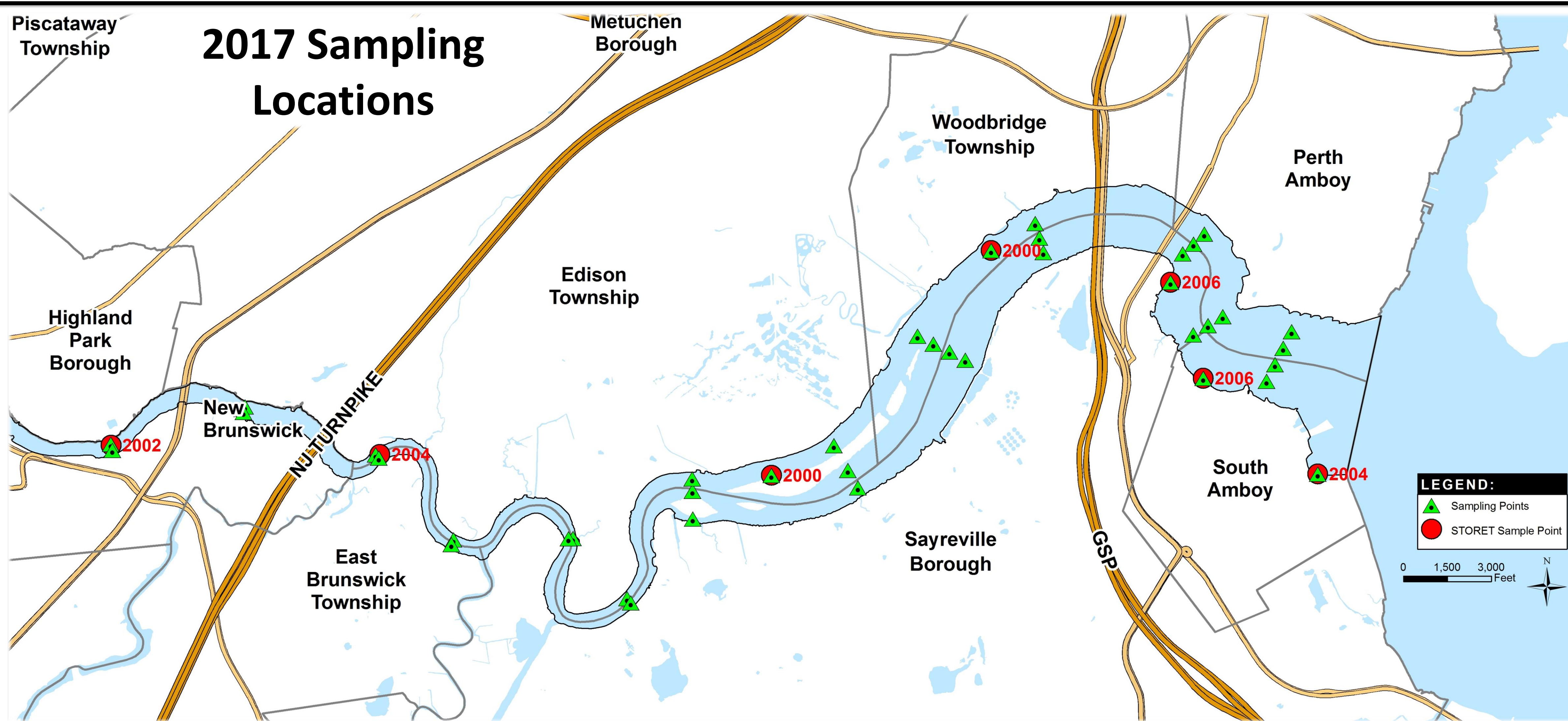
Timeline



2017 Sediment Sampling Campaign

The design includes the seven locations already in the STORET dataset (sampled between 1999 and 2007) and adds 33 new samples along transects covering areas with data gaps.

- Surficial sediment samples
 - A composite of 3 Ponar grab samples was collected during the ebb cycle of the tide to minimize influence from the bay, and the location was marked with a survey grade GPS receiver.
- Sediment parameters measured:
 - Trace elements:** Ag, AL, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Ti, Th, V, U, and Zn
 - Persistent organic pollutants (POPs):** 16 polycyclic aromatic hydrocarbons (PAHs), 114 polychlorinated biphenyl (PCBs) congeners, and 20 organochlorine pesticides (OCPs)
- Surface water quality parameters measured: (Surface & near bottom)
 - salinity, conductivity, dissolved oxygen (DO), oxygen reduction potential (ORP), pH, turbidity, and temperature



Map of the study area and sampling points. Points in red with the year of sampling are the STORET sample points that were resampled during the 2017 sampling campaign

Discussion

- This sampling design aims to capture a shore-to-shore general pattern of contaminant distribution with sufficient resolution to understand the overall pattern and possibly guide future collections around problem areas at even greater resolutions.
- Samples are being analyzed for metals, organics, and persistent organic pollutants
 - Preparation and analysis of the samples is being performed by the NJDEP certified MERI-Lab on a GC-ECD and ICP-MS according to EPA Methods 3545/608 and 3050/200.8 respectively.
 - Certified reference marine sediment (MESS-1) for soils will be run every tenth sample, and a method blank will be run every sixth sample during the gas chromatographic analysis.
- Data visualization
 - Concentrations of each parameter measured will be input into ArcGIS spatial analysis software for interpolation to understand general contaminant dispersion in the Lower Raritan.

2017 Field Work



Members of the MERI research team using the Ponar grab sampler on the R/V Rutgers and the Go-Devil shallow water craft. Each sample is a composite of three Ponar grabs.



Acknowledgements

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