

Spatial Variability in Anthropogenic Sources of Mercury Contamination in Sediments of Urbanized Marshes in The Meadowlands, NJ

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Introduction

- Anderson Creek and Berry's Creek are located in Hackensack River Meadowlands in Bergen County, NJ.
- Surrounding industrial waste, sewage discharge and urban run off have left sediments in the tidal marshes contaminated with Mercury.
- Our objective is to try to understand the spatial variability and relationships between the two marshes.

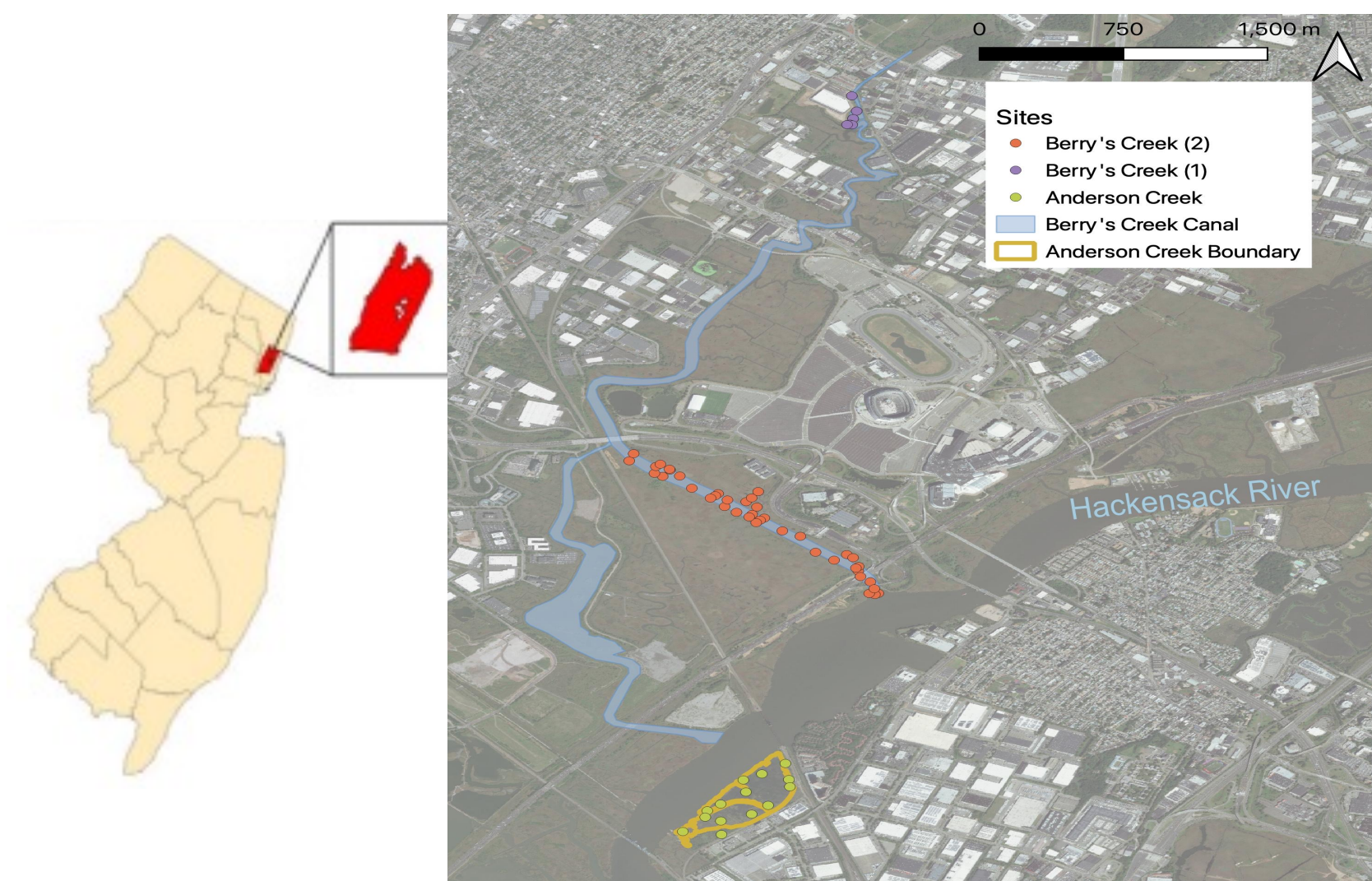


Figure 1. Map and locations of Berry's Creek two sampling sites and Anderson Creek sampling site



Figure 2. Image of Anderson Creek Marsh

Methods

- Sampling site locations and mercury concentrations in sediment data was conducted by TAMS et al for MERI: Sediment Chemistry Data Portal.
- Data was filtered to focus on concentrations of sediments at shallow depths of 0 cm - 91.44 cm in order to compare across the three sampling sites.
- Data was processed in QGIS to understand the spread of mercury contamination and relative hotspots.
- Mercury concentrations were plotted with RStudio by grouping locations in approximate vicinity of stream flow direction.
- Sample concentrations were quantified based on NJDEP Ecological Screening Criteria and CCME.

Results

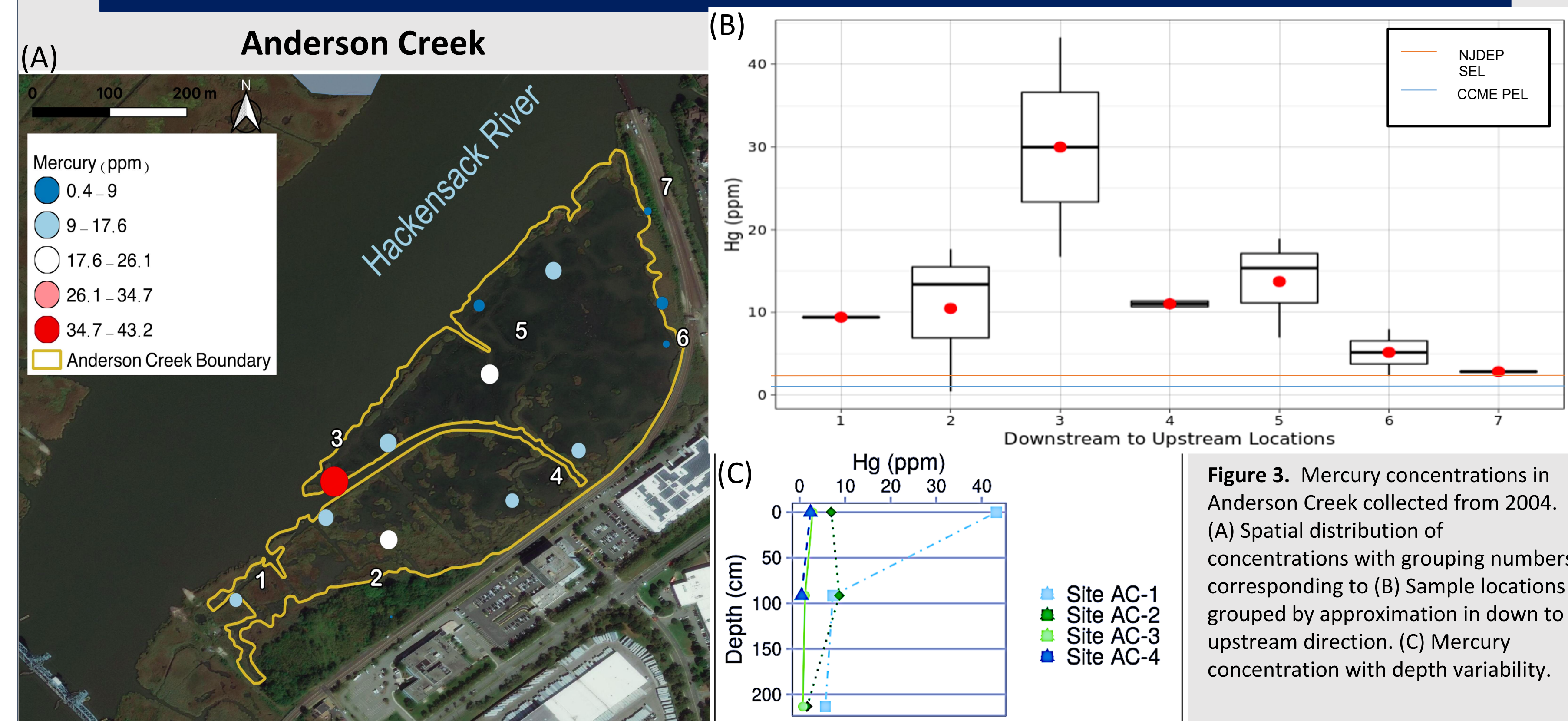


Figure 3. Mercury concentrations in Anderson Creek collected from 2004. (A) Spatial distribution of concentrations with grouping numbers corresponding to (B) Sample locations grouped by approximation in down to upstream direction. (C) Mercury concentration with depth variability.

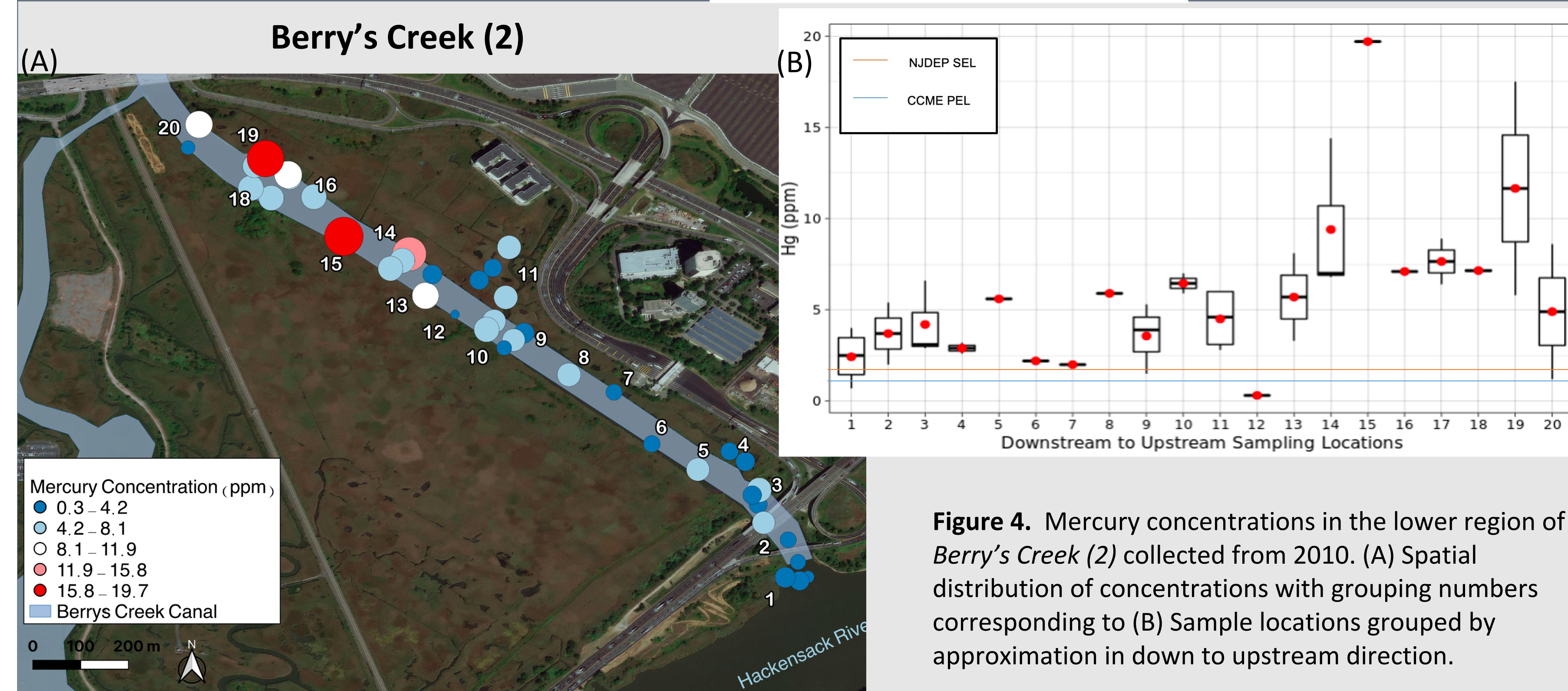


Figure 4. Mercury concentrations in the lower region of Berry's Creek (2) collected from 2010. (A) Spatial distribution of concentrations with grouping numbers corresponding to (B) Sample locations grouped by approximation in down to upstream direction.

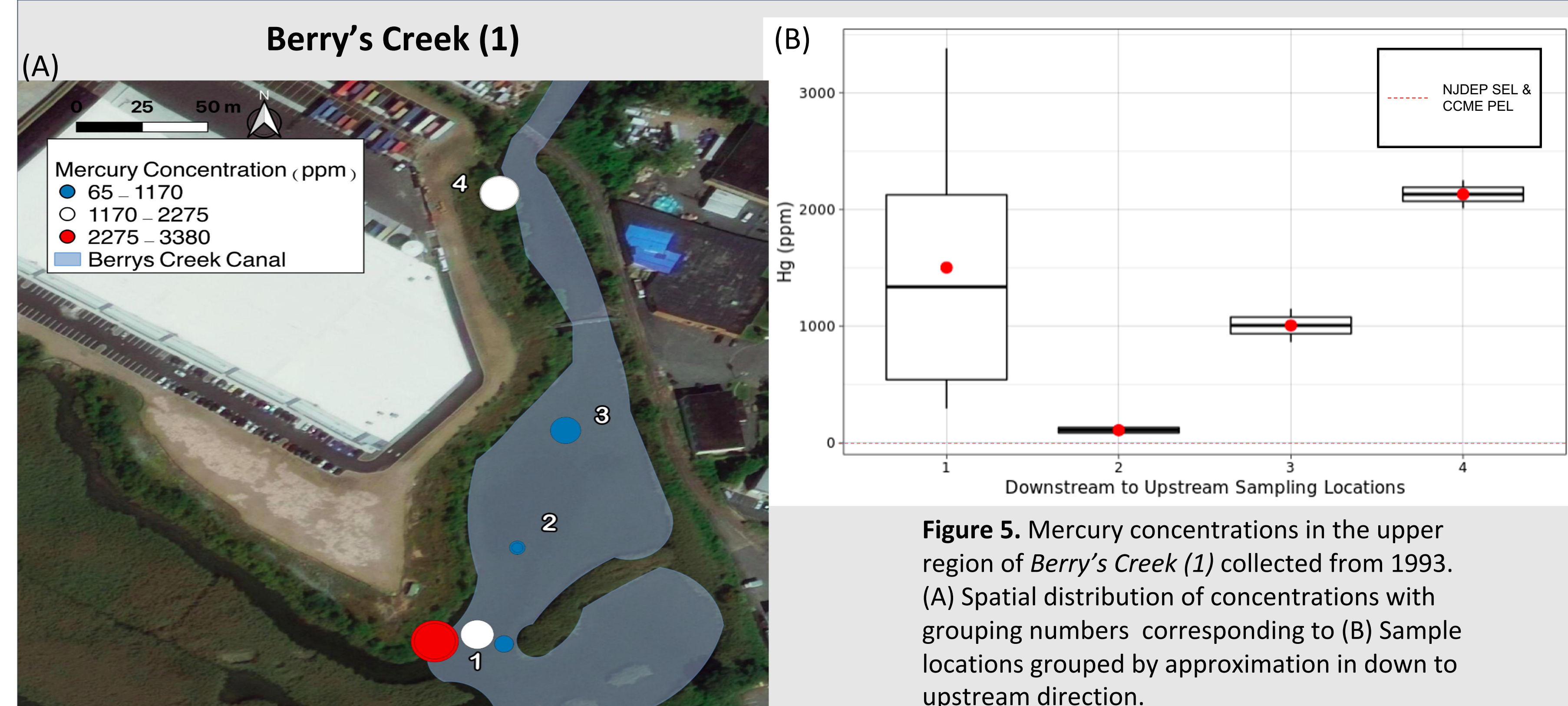


Figure 5. Mercury concentrations in the upper region of Berry's Creek (1) collected from 1993. (A) Spatial distribution of concentrations with grouping numbers corresponding to (B) Sample locations grouped by approximation in down to upstream direction.

Discussion

Table 1. Interim sediment quality guidelines (ISQGs) and probable effect levels (PELs) for mercury (mg·kg⁻¹ dw).

	Freshwater	Marine/estuarine
ISQG	0.17	0.13
PEL	0.486	0.70

Table 2. NJDEP: Ecological Screening Criteria

Toxic Substance	Sediment (ppm)	
	Fresh Water Criteria	
	Lowest Effects Level (LEL) ¹	Severe Effects Level (SEL) ²
Mercury	0.2	0.174 ⁸
		2

- Mercury concentrations are mostly found in surface sediments. The concentrations generally decrease with depth in samples.
- There is a decrease in the distribution of mercury concentrations as we move downstream from Berry's Creek (1) to Berry's Creek (2) and with some variability in Anderson Creek.
- The highest concentrations within each site are found along the waterway edge.

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