PCBs in Floodplain Soils and Shrews of the Hudson River, NY

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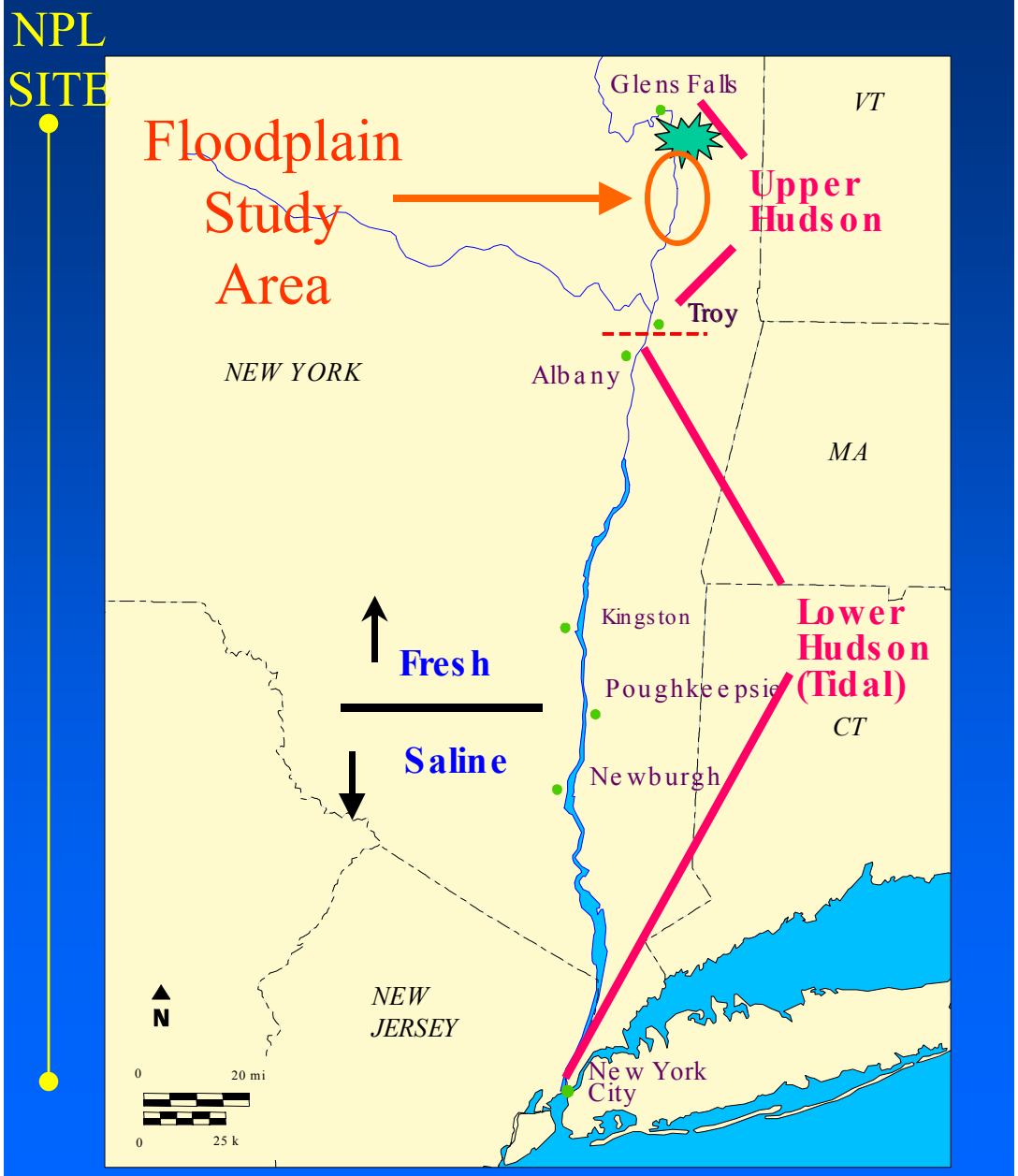
Presentation Overview

- Background on PCB Contamination
- Assessing Floodplain PCB Contamination
  - Objectives
  - Methods
  - Results
  - Conclusions

Upper and Lower Hudson River



PCB Exposure in the Upper Hudson River

- Sediment range: 0.012 - 4,000 mg/kg
- Water range: 0.0052 – 9 ug/L
- Recent Maximum in Biota (mg/kg):

  - Fish: 27 – 445 (fillet)
  - Benthos: 10-20
  - Great Blue Heron: 220 (fat)
  - Tree Swallows: 77 (egg)
  - Snapping turtle: 3,091 (fat)
  - Otter: 22.5 (liver)

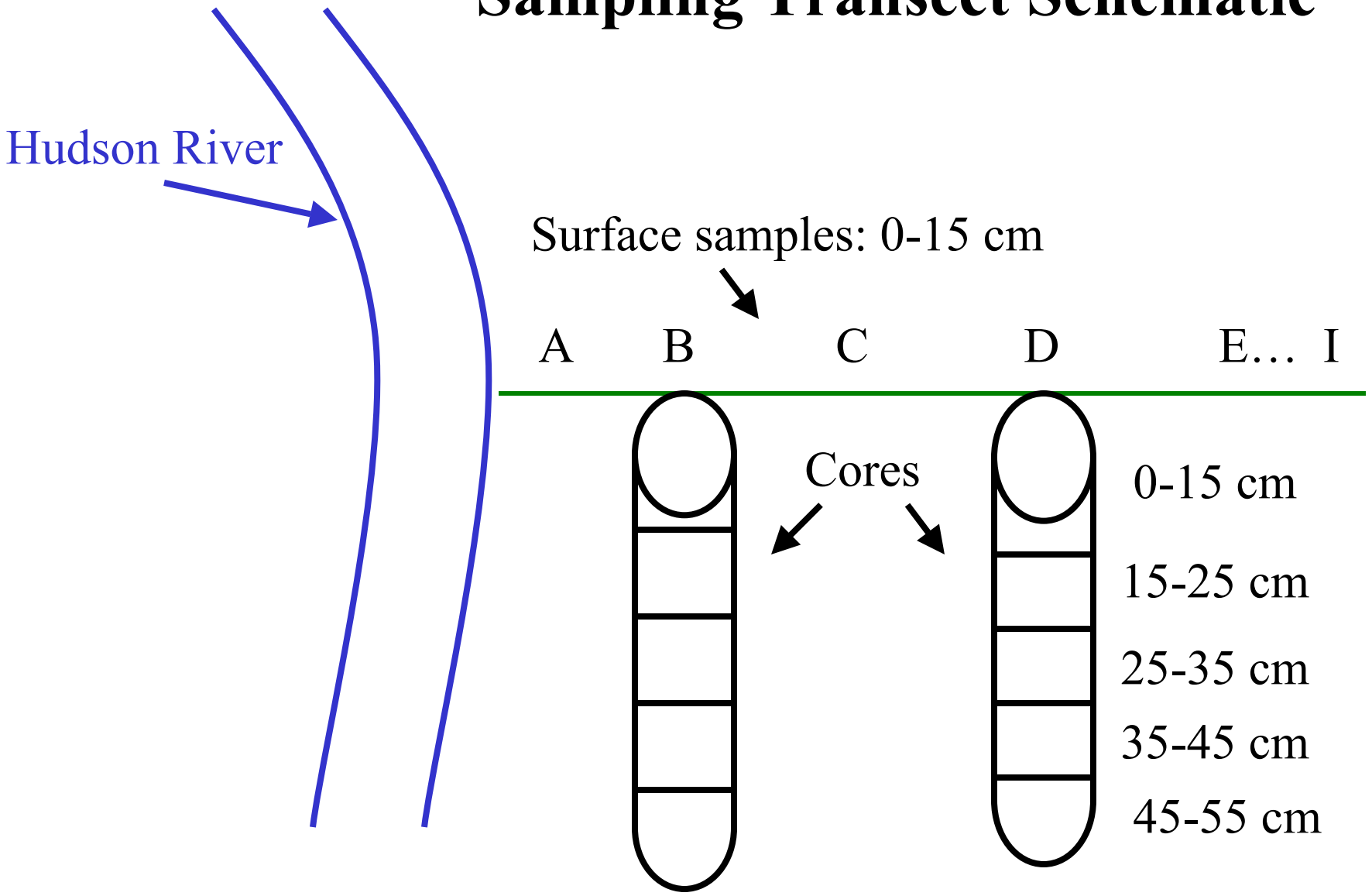
Objectives

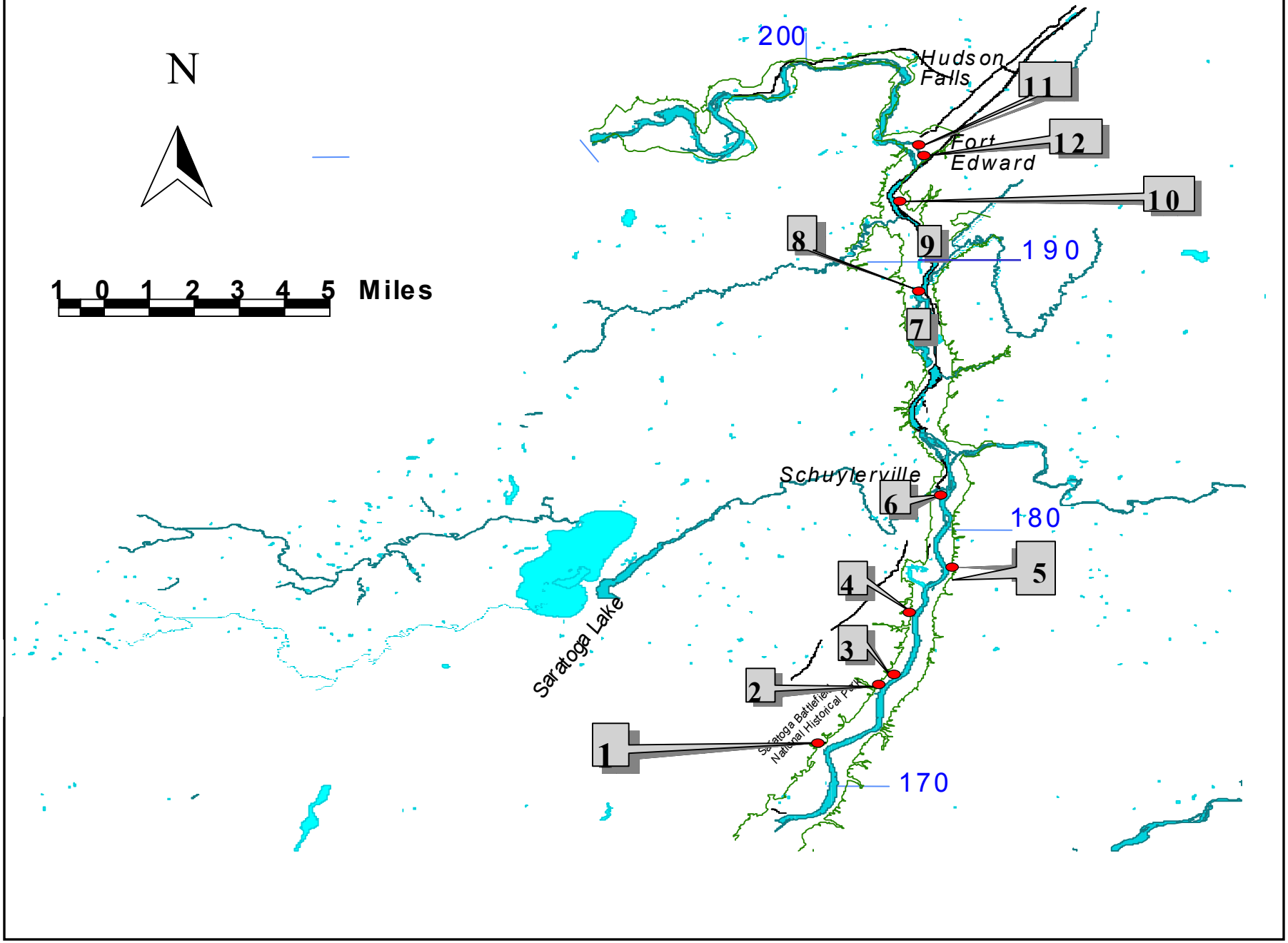
- As part of a NRDA, conduct a screening level assessment to determine if:
  - 1. floodplain soils of the Upper Hudson River are contaminated with PCBs, and
  - 2. terrestrial biota using those floodplains are contaminated with PCBs.

Sampling Design: Soils

- 11 transects in floodplains along ~23 miles between Ft Edward and Stillwater
- Transects = 6-9 surface grabs per transect, w/in ~400 feet of the Hudson (see schematic)
- Two cores per transect, 4 sections per core
- 179 soil samples analyzed for total PCBs, TOC, grain size

Sampling Transect Schematic




N
1 0 1 2 3 4 5 Miles
200
190
180
170
Hudson Falls
Fort Edward
Schuylerville
Saratoga Lake
Saratoga Battlefield National Historical Park
1
2
3
4
5
6
7
8
9
10
11
12

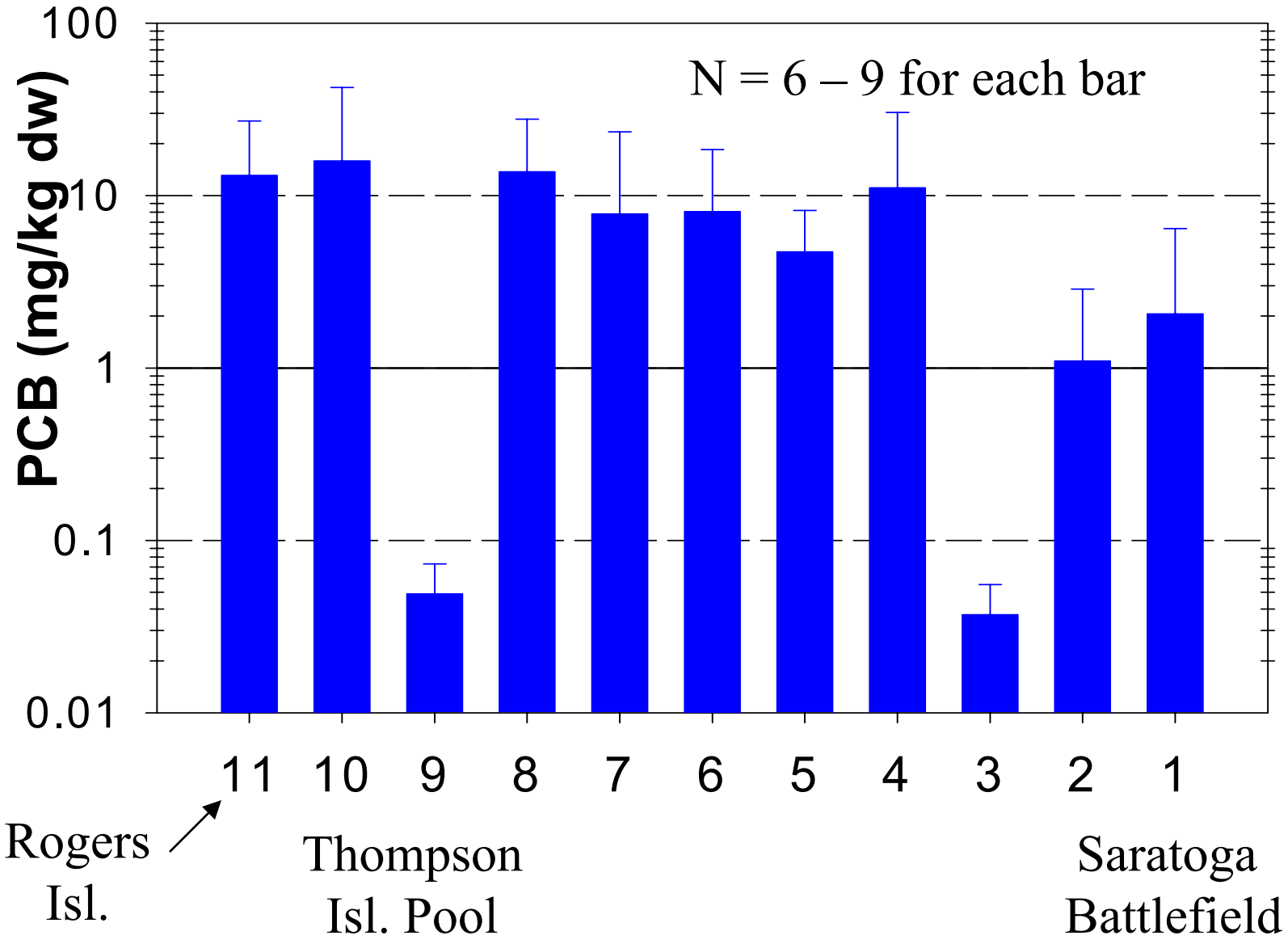
Sampling Design: Biota

- 1. Shrews:
  - Predator known to accumulate organochlorines
  - Close association with soil to depths of 50 cm
  - Important prey item for owls and other predators.
- Up to 5 shrews collected at each transect w/traps
- Most collected w/in 20 m of transect.
- 43 shrews analyzed for total PCBs and lipids, sex, & length
- 2. Earthworms: collected @ each site and archived

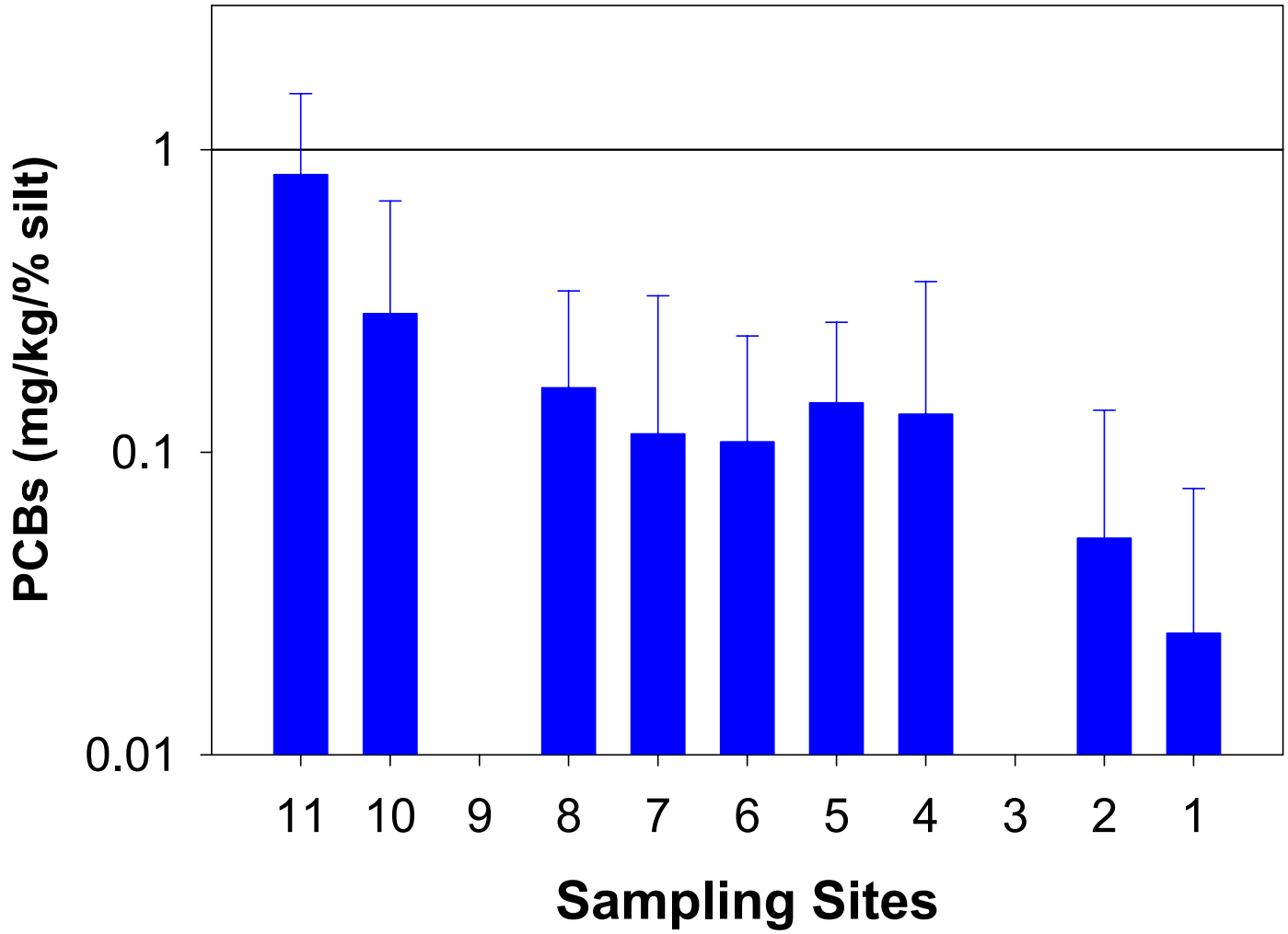
PCB Floodplain Summary Statistics

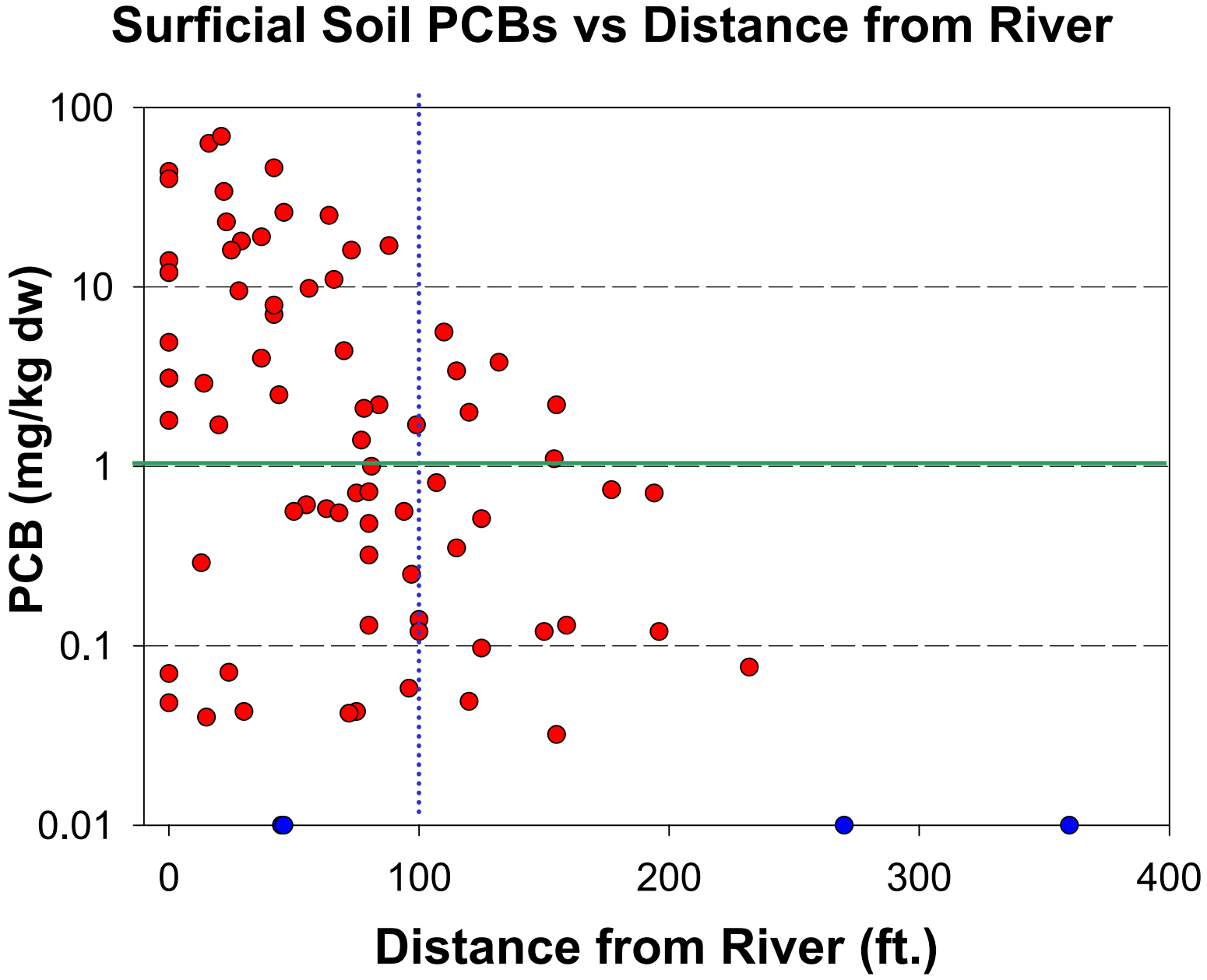
	RANGE	MEAN
Soil (mg/kg dry wt)	<0.011 - 360	8.2
Soil (mg/kg TOC)	<0.3 – 10,435	268
Shrew (mg/kg wet wt)	0.048 – 38	1.8
Shrew (mg/kg lipid)	3.1 – 1642	4.1

Surficial (0-15 cm) Soil PCBs vs Sampling Sites



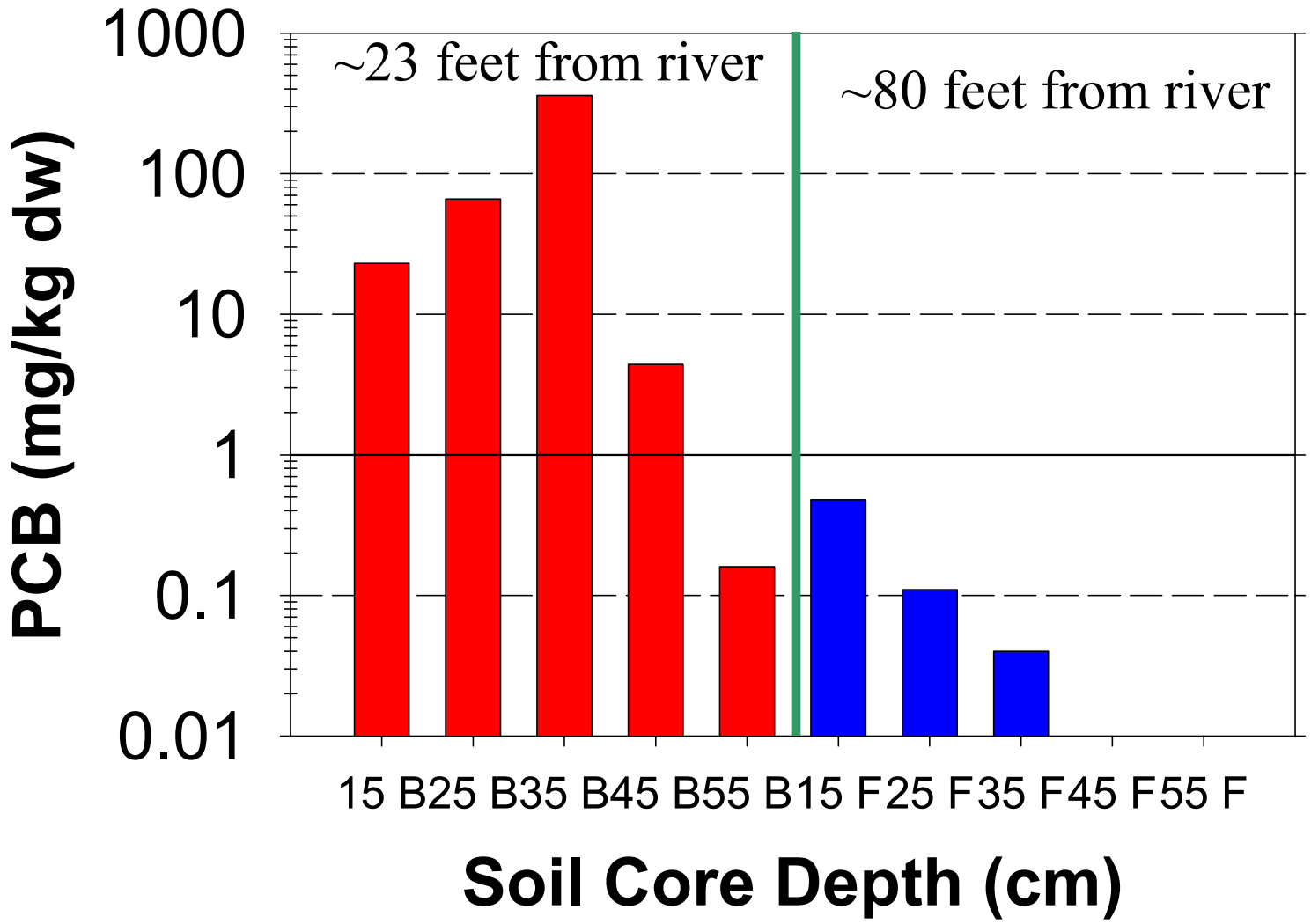
Surficial Soil PCBs vs. Sampling Sites Normalized to Percent Silt




Surficial Soil PCBs vs Distance from River
PCB (mg/kg dw)
100
10
1
0.1
0.01
0
100
200
300
400
Distance from River (ft.)

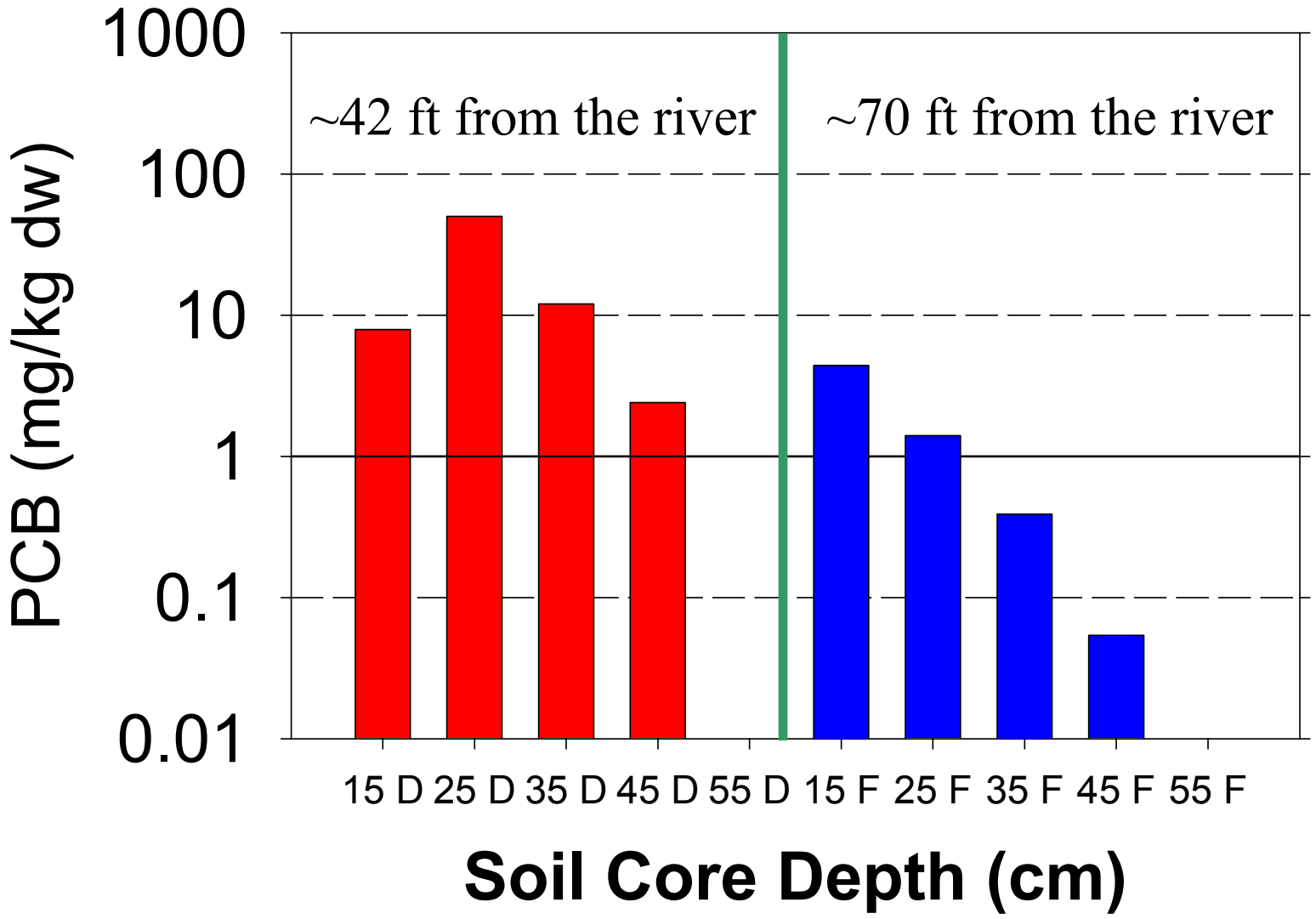
Total PCB Depth Profiles

Thompson Island Pool (Site 8, RM 188.81)

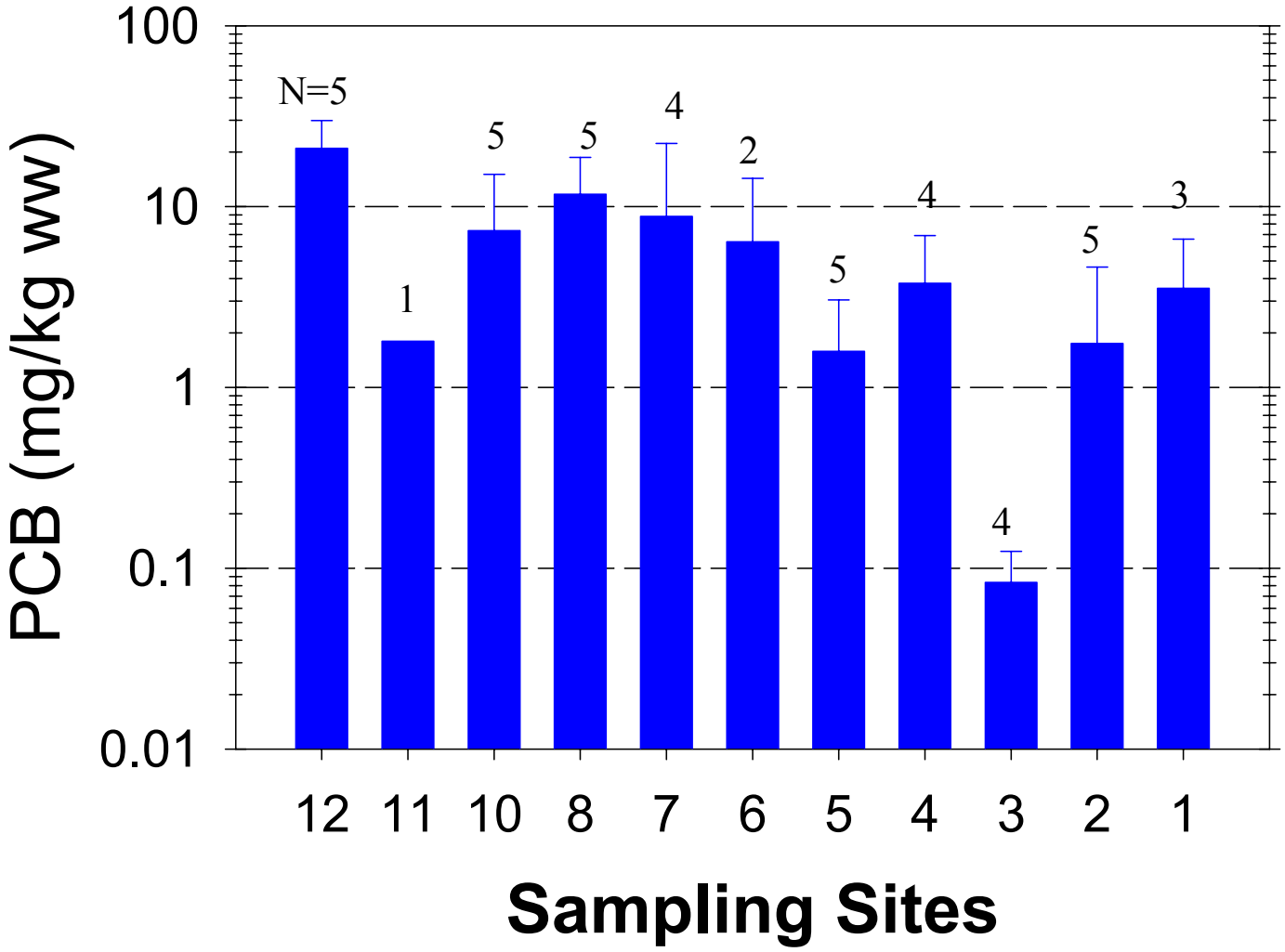


Total PCB Soil Depth Profile

Opposite Coveville (Site 5, RM 178.5)

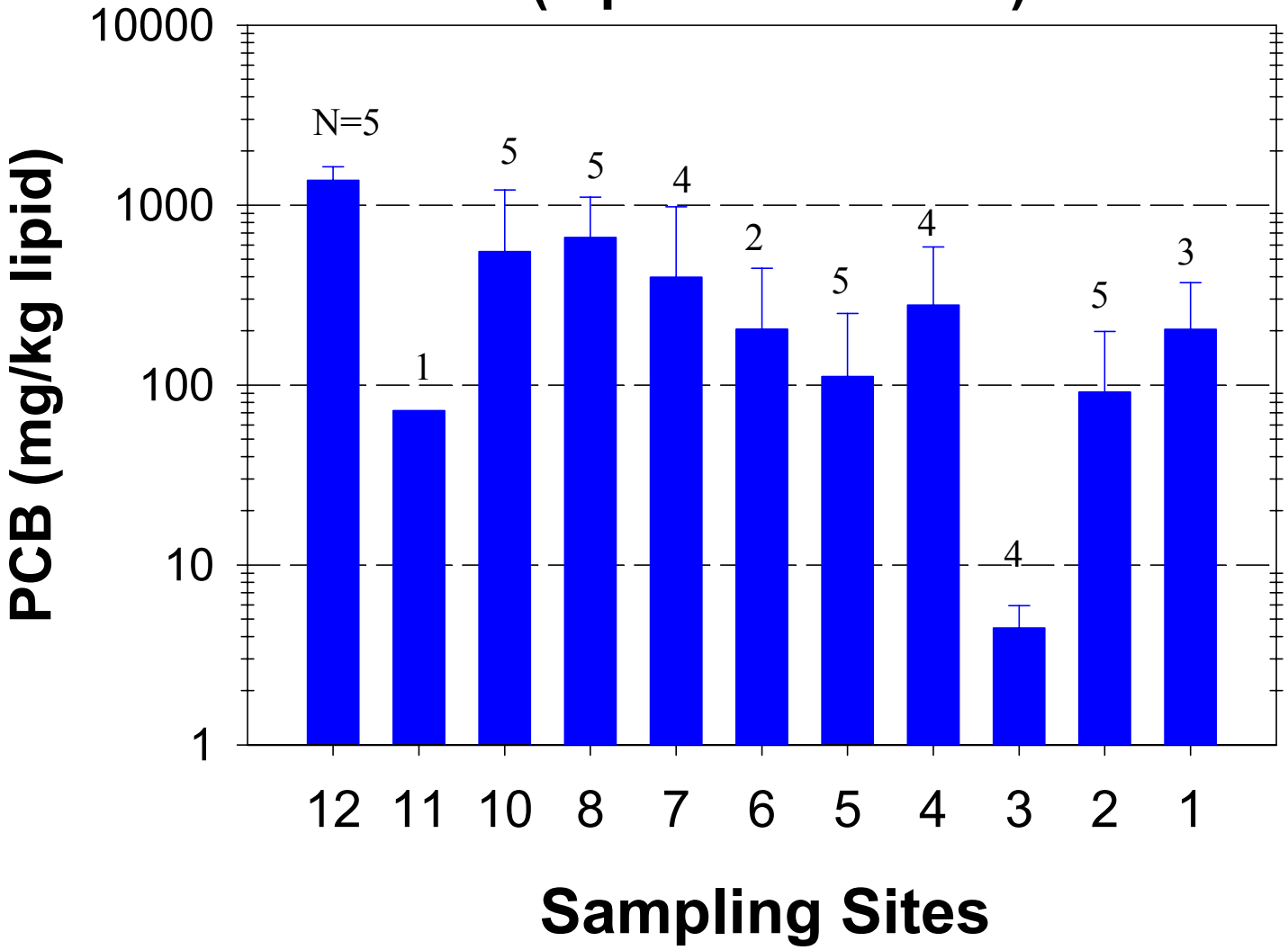


PCBs in Shrews vs Sampling Sites
(Wet Weight)



PCBs in Shrews vs Sampling Sites

(Lipid Normalized)



Summary

- Screening level assessment: 179 soil samples, 43 shrews collected along 20 miles below Ft. Edward
- Most soil and all shrew samples collected were contaminated with PCBs
- Soil concentrations tend to decrease moving downstream and away from the river
- Surface concentrations tended to be highest in the top 25 cm
- 53% of surface soil samples and 28% of samples at depth >= 1 mg/kg
- Shrew PCB concentrations tend to decrease going downstream

Summary (cont.)

- Results are consistent w/a hypothesis that:
- 1. PCBs from the river are contaminating Hudson River floodplains, and
- 2. Floodplain PCBs are bioavailable to terrestrial biota.

Acknowledgements

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