# Source Identification and Delineation

– Tracer and gradient studies

– Forensic laboratory methods for PCBs, PAHs, and metals

– Overview of statistical and non-statistical source ID methods

# Source ID and Delineation
## Tracer and gradient studies

- Dye studies, chemical tracers (e.g., LABs, organo-tins, chemical ratios)

- Spatial contouring (e.g., kreiging, probability densities)

- Statistical regression methods (e.g., linear, logistic); ANOVA with contrasts



Total PCBs (ng·g$^{-1}$)
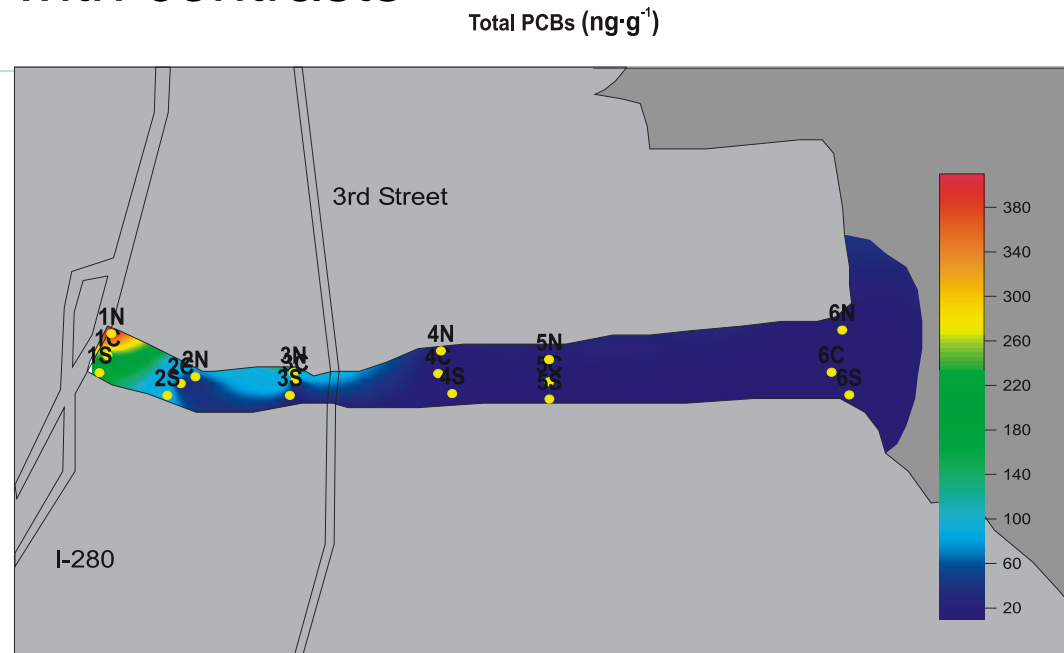
# Gradient Analysis in a Boat Channel
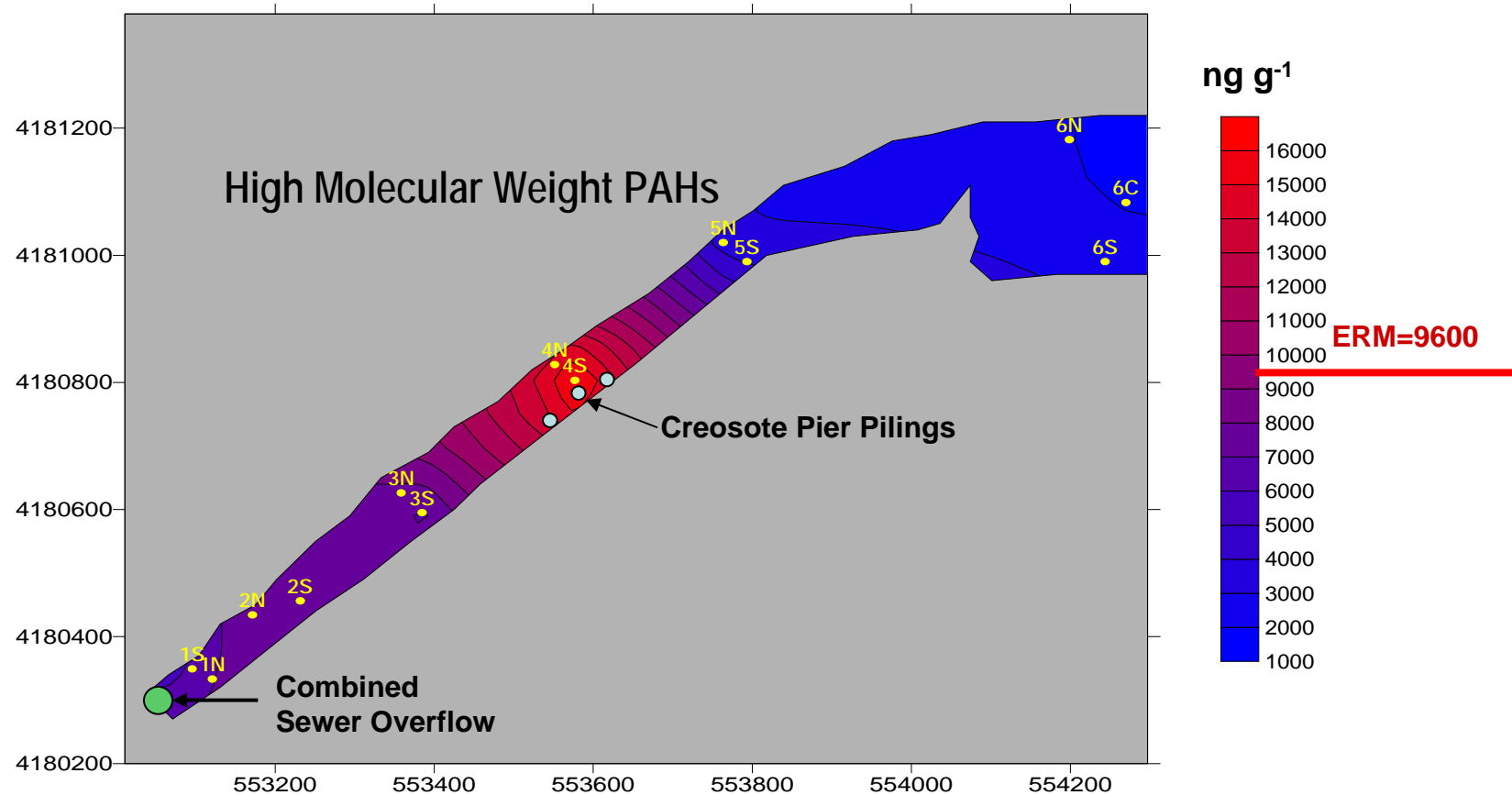


- Results from an EPA & State Agency study indicated that the entire channel was "toxic" due to high PAH sediment concentrations (>9600 ppb)

- CSO was the presumed source of PAHs

- Simple gradient analysis (contour plot & statistical tests) indicated another source
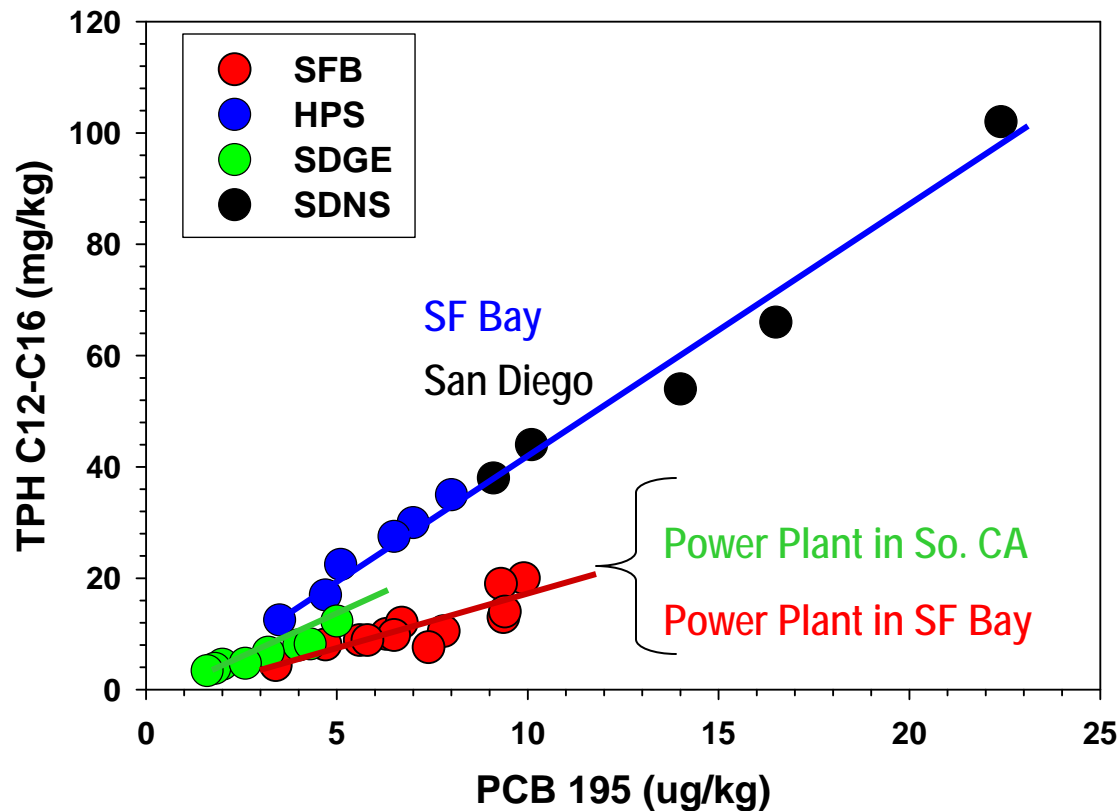
# Source ID and Delineation
## Forensic laboratory methods for PCBs, PAHs, and metals

- Address potential matrix interferences from salt, TOC, humic material, lipids
- Usually non-CLP to obtain lower detection limits, greater certainty in identifying target analytes
- PCBs:  NOAA congener method, GC/MS with SIM
- PAHs: Modified EPA 8270; GC/MS with SIM, 41-46 analytes
- TPH: Modified EPA 8015; GC/FID; $nC_6$-$nC_{44}$ with isoprenoids
- Metals: EPA 6020 (for most); ICP with MS

# Source ID and Delineation
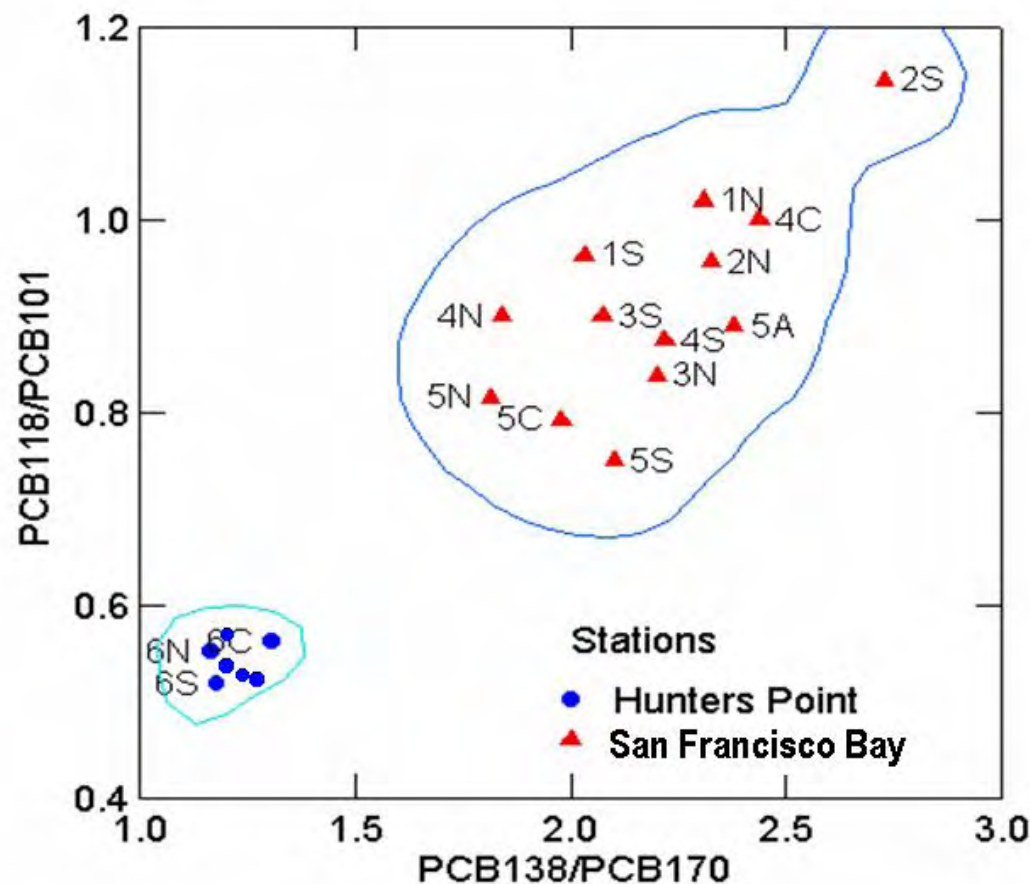## Statistical Methods

- Statistical regression methods (e.g., linear, logistic)
- Source ID using selected PCB & carrier oil analytes

# Source ID and Delineation
## Non-Statistical Methods

- Double Ratio Plots – indicates degree of weathering and PCB source

# Source ID and Delineation
## Statistical Methods

- Multivariate techniques (PCA, discriminant analysis)
- PCA results for N. Island NAS showing sources of PAHs