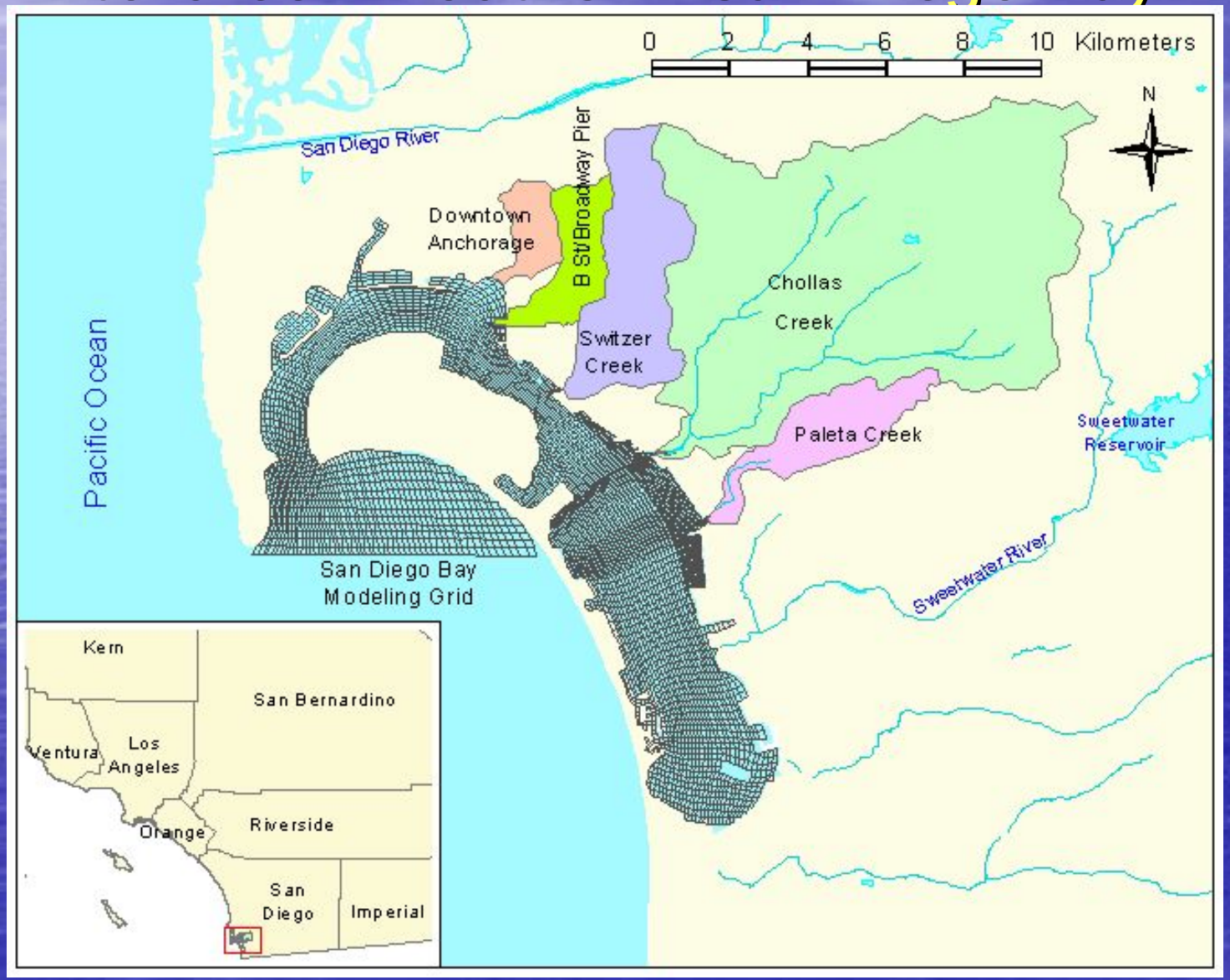
Watershed Modeling for Simulation of Loadings to San Diego Bay and Receiving Water Model Configuration and Evaluation for the San Diego Bay Toxic Pollutants TMDL

We used different models to find our answers:

- Watershed Model – LSPC
- Estuary Model – EFDC
- Water Quality Model and Toxics Model incorporated into EFDC

Watersheds Modeled for Loading to Creek Mouths in San Diego Bay



LSPC Watershed Model

USEPA's Loading Simulation Program in C++ (LSPC)

Simulates watershed hydrology and transport of sediments in the streams and storm drains.

Loads estimated for PAHs, PCBs, and chlordane.

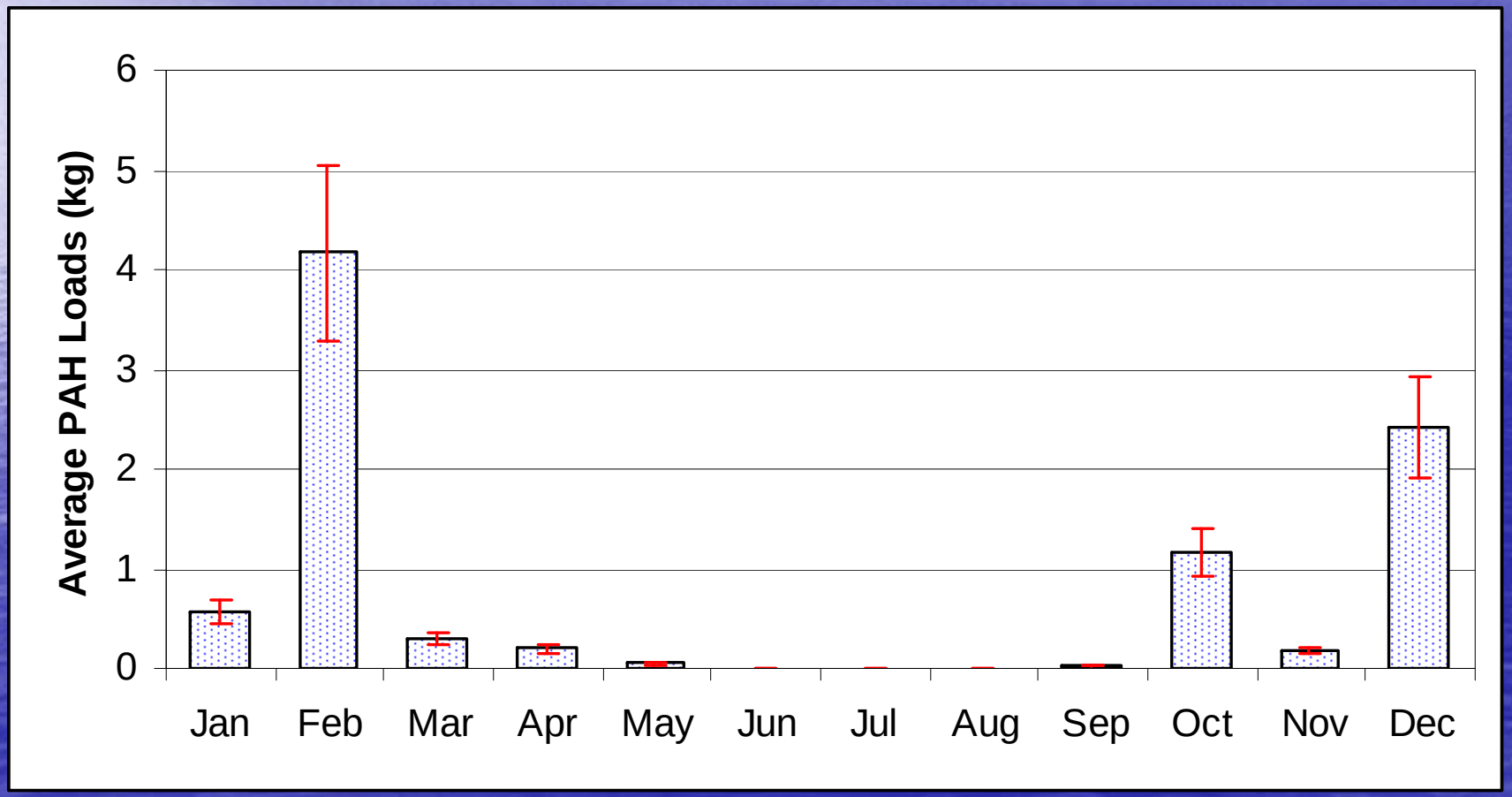
Lindane also estimated for Switzer Creek.

Predicted Pollutant Loads from Watershed Modeling Simulation using LSPC

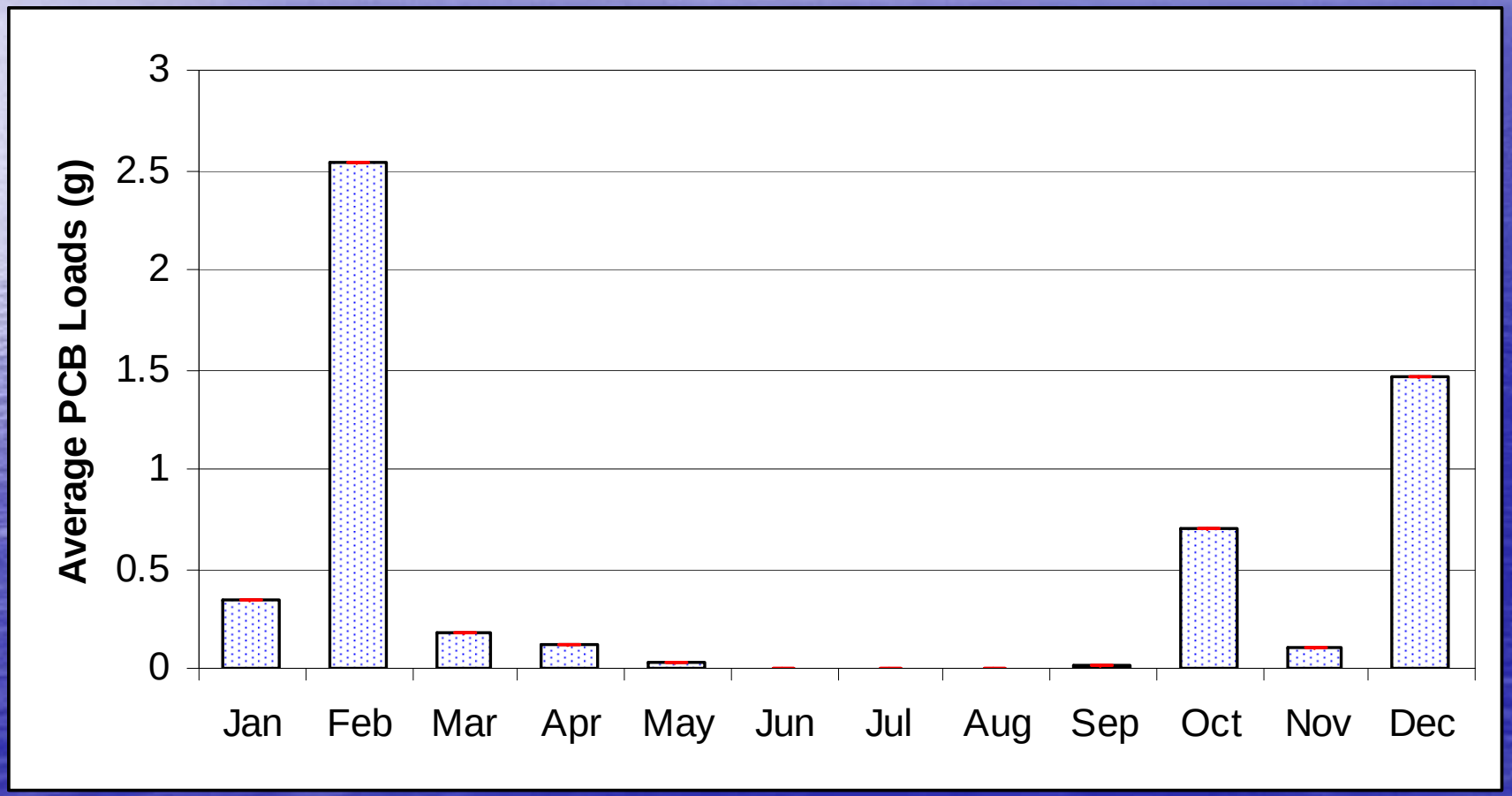
Watershed Study Assumptions

- Pollutants are associated with detachment and transport of sediment through streams and storm drains.
- Pollutant loading occurs during storm events with high sediment loads, rather than during dry weather low flows.
- Pollutants are linked to specific land use types; however, land use specific data were not available for organic compounds. Therefore, EMCs were used to determine organics loading in each watershed.

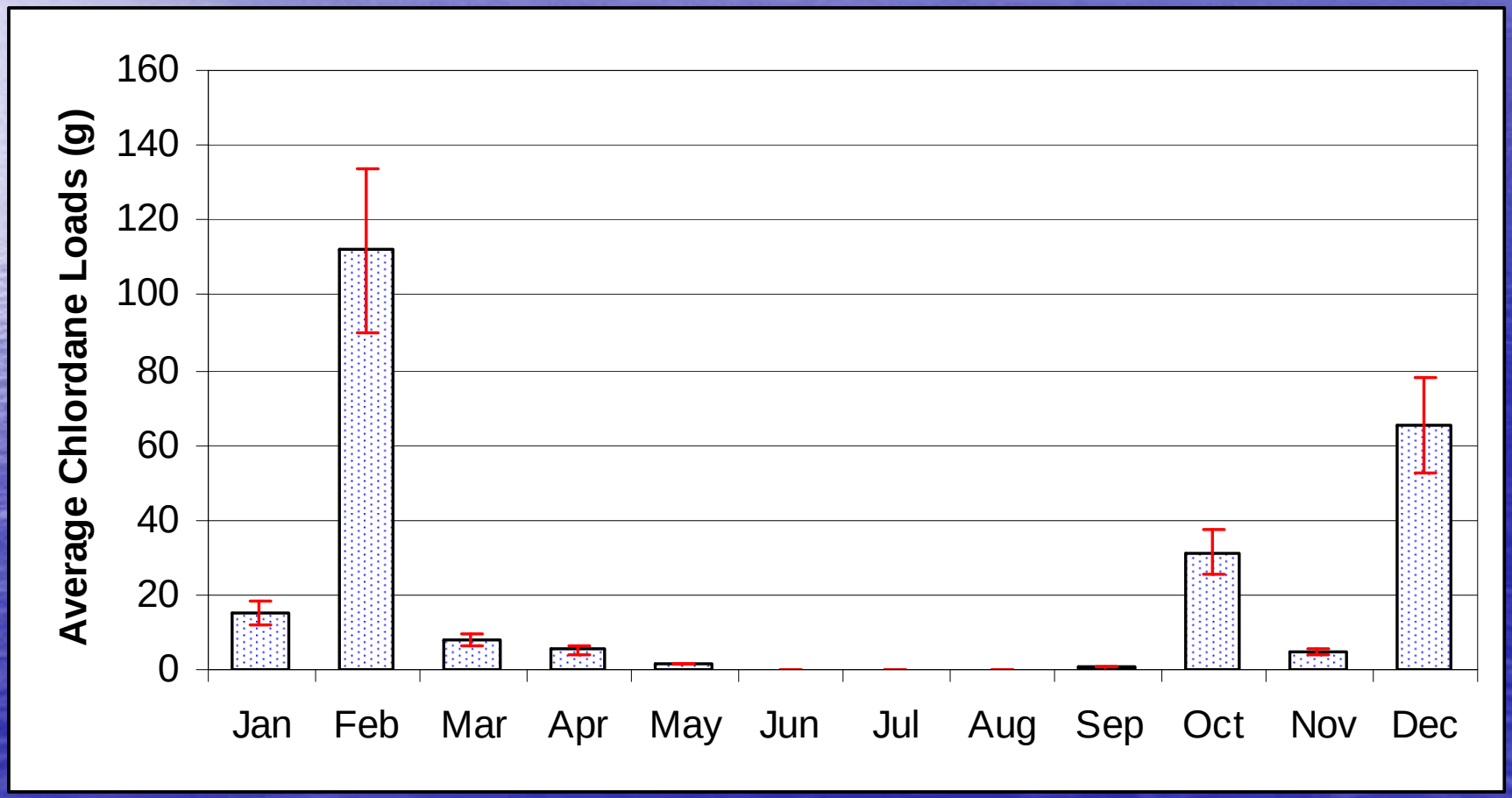
Monthly PAH Loads for Chollas Creek



Monthly PCB Loads for Chollas Creek



Monthly Chlordane Loads for Chollas Creek

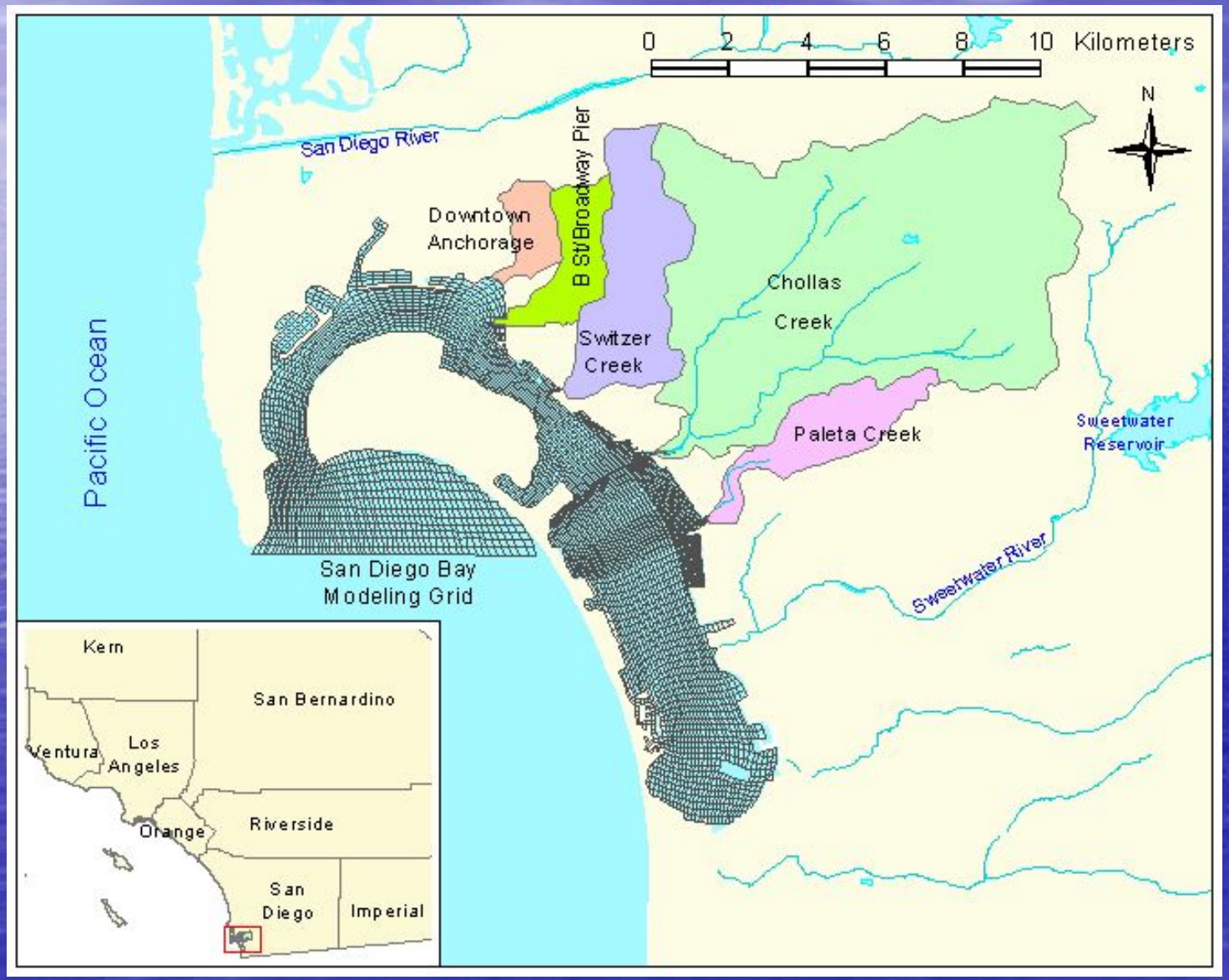


Receiving Water Model Development

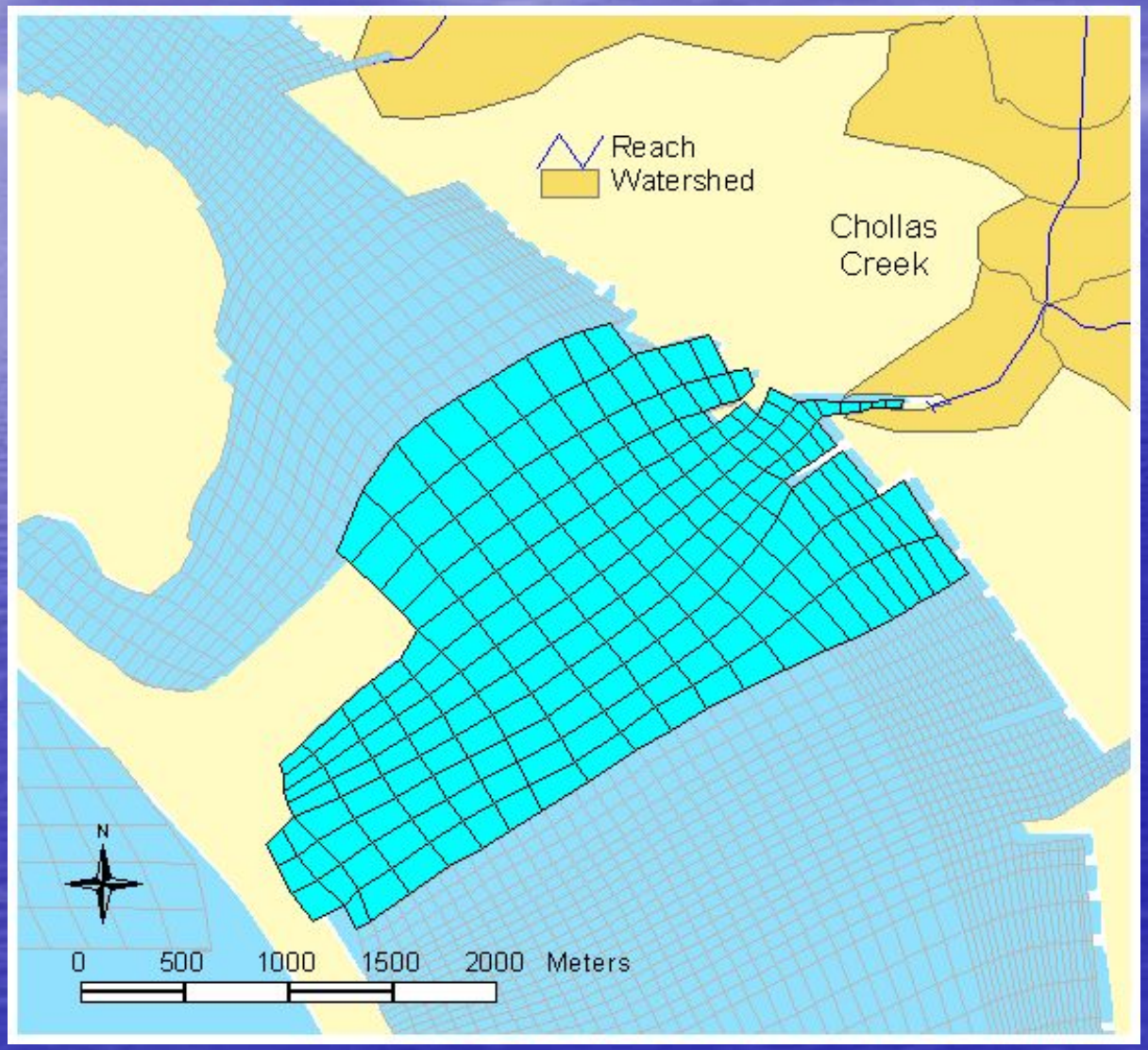
Receiving Water Model (EFDC)

Environmental Fluid Dynamics Code (EFDC) is the receiving water model used in San Diego Bay to simulate the assimilative capacity, the transport and fate of suspended sediment loading, and dynamic effects of tidal flushing.

EFDC Model Grid for San Diego Bay



EFDC Sediment Transport and Toxics Grid for the Mouth of Chollas Creek



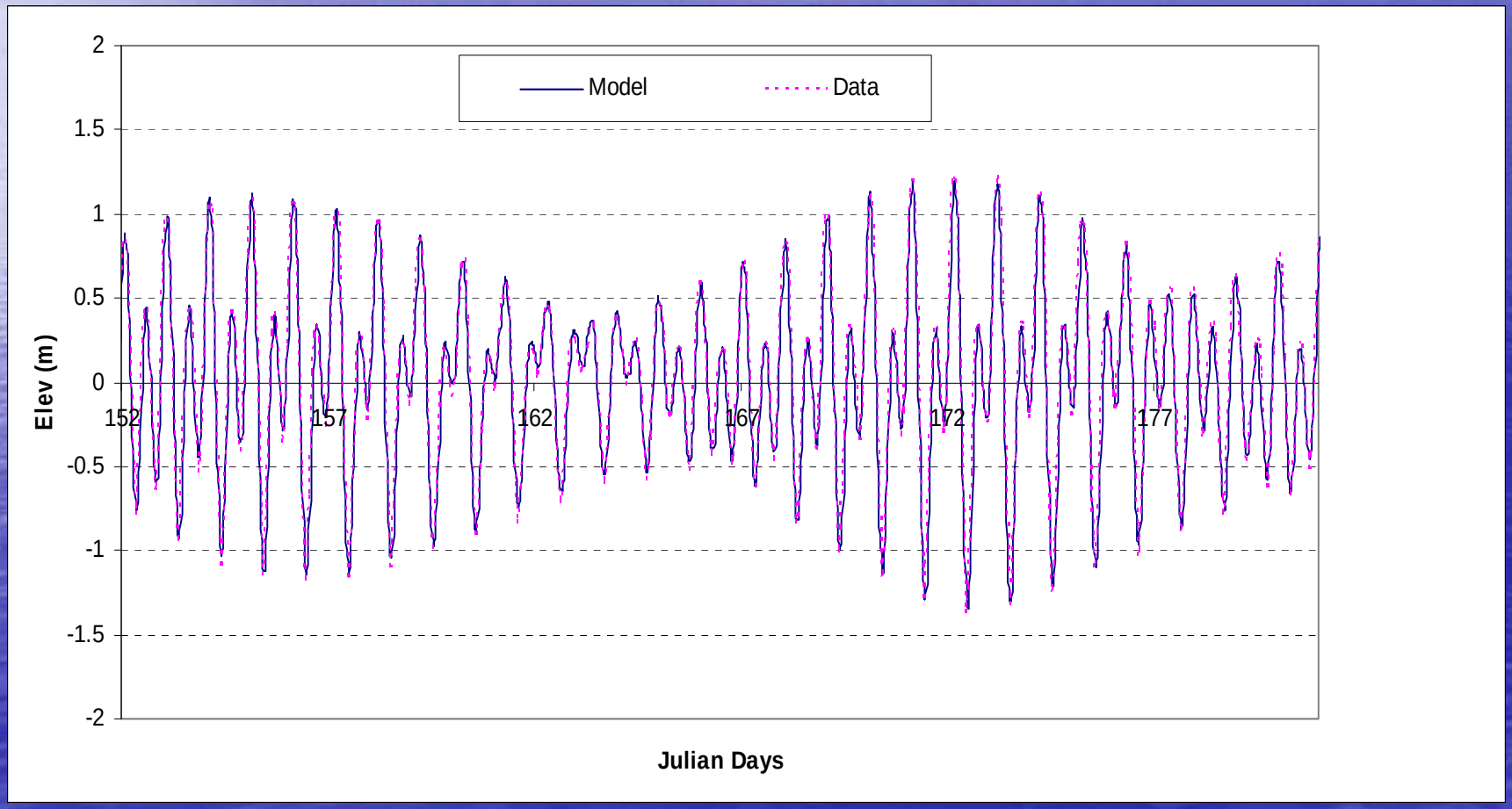
Toxic Boundary Conditions set for the model

- Total PAHs = 81.9 ng/l
- Total PCBs = 2.29 ng/l
- Total Chlordane = 0.16 ng/l
- Lindane = 0.014 ng/l

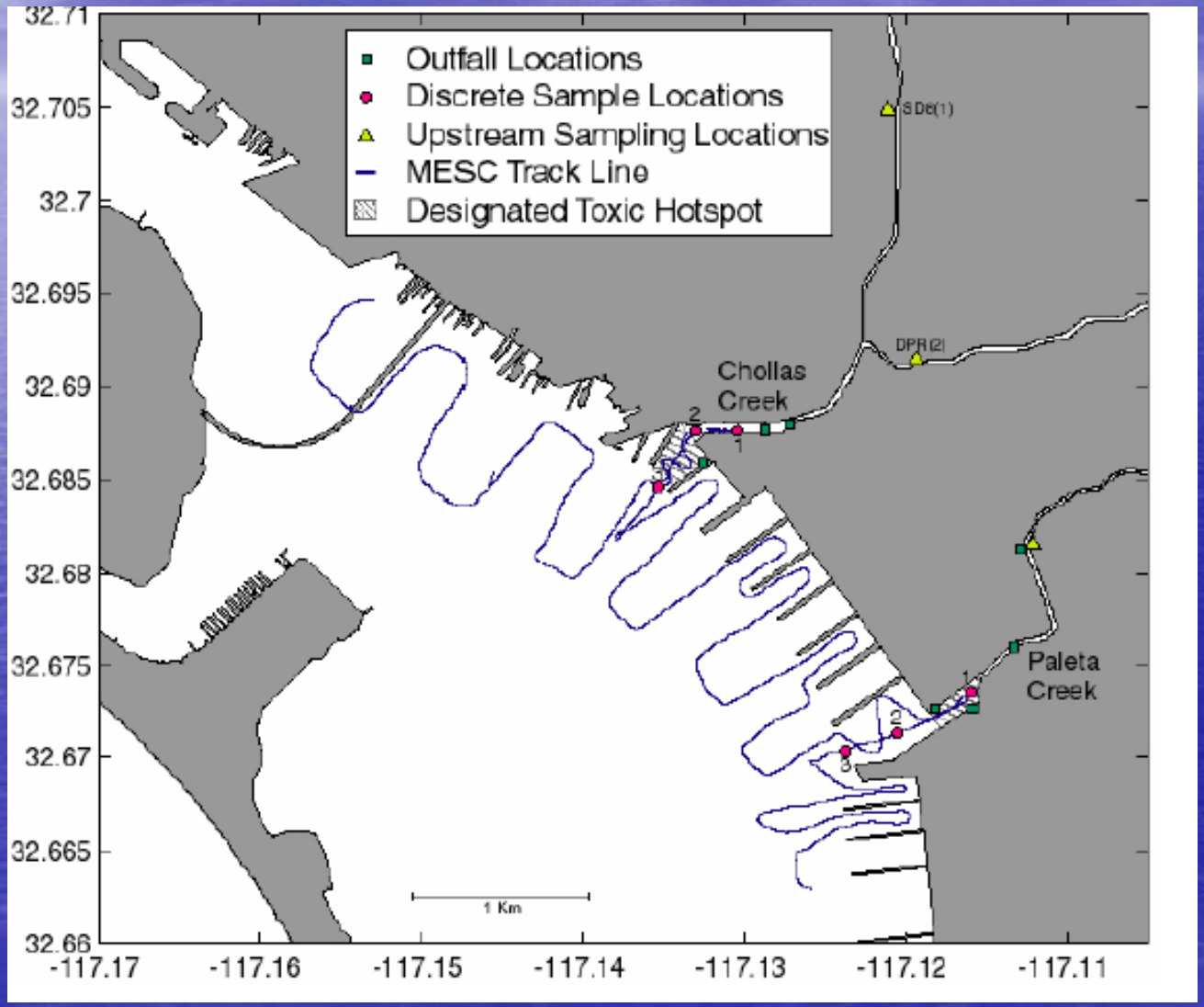
Calibration and Validation

- The hydrodynamic model was calibrated using surface water elevation data collected from February 6, 2001 to March 6, 2001.
- The model was validated with data for 2001 from the NOAA-COOPS station located near G Street. The predicted results match well with the NOAA data.

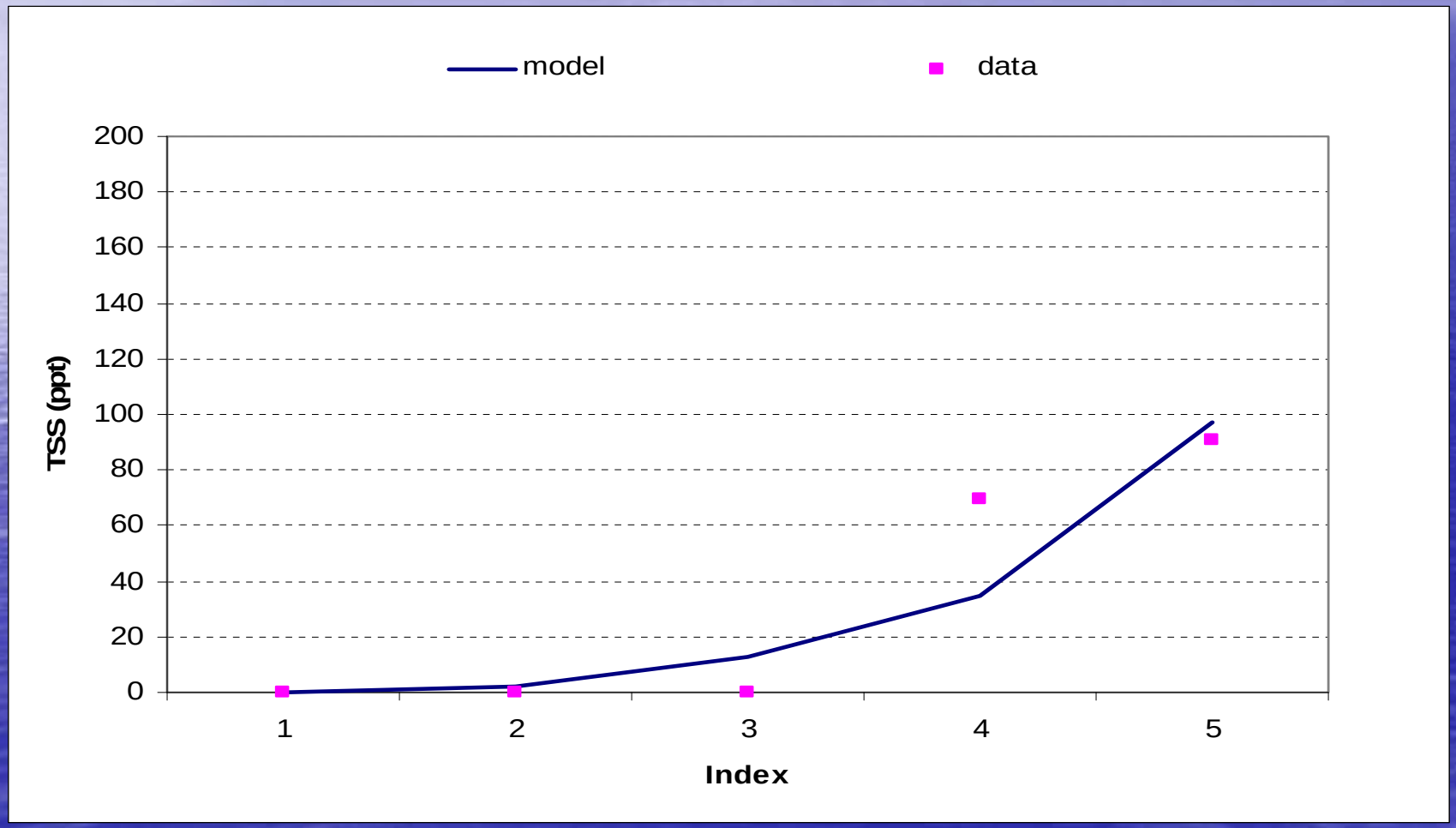
Extended comparison (validation) of the San Diego Bay hydrodynamic model results and data (June 2001).



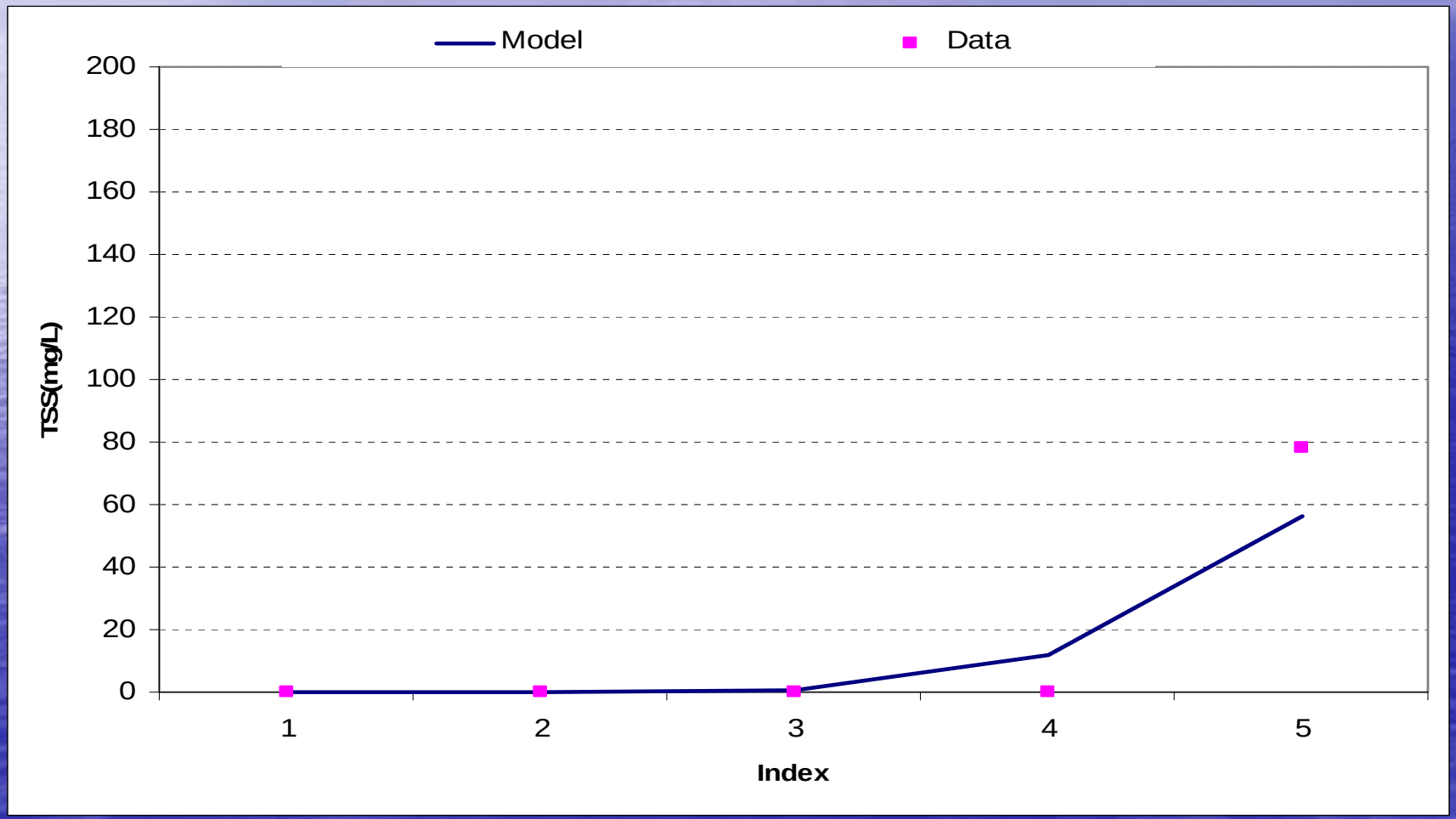
Location of trackline data collection sites.



Comparison of simulated and observed TSS concentration at the mouth of Chollas Creek, Trackline 4.

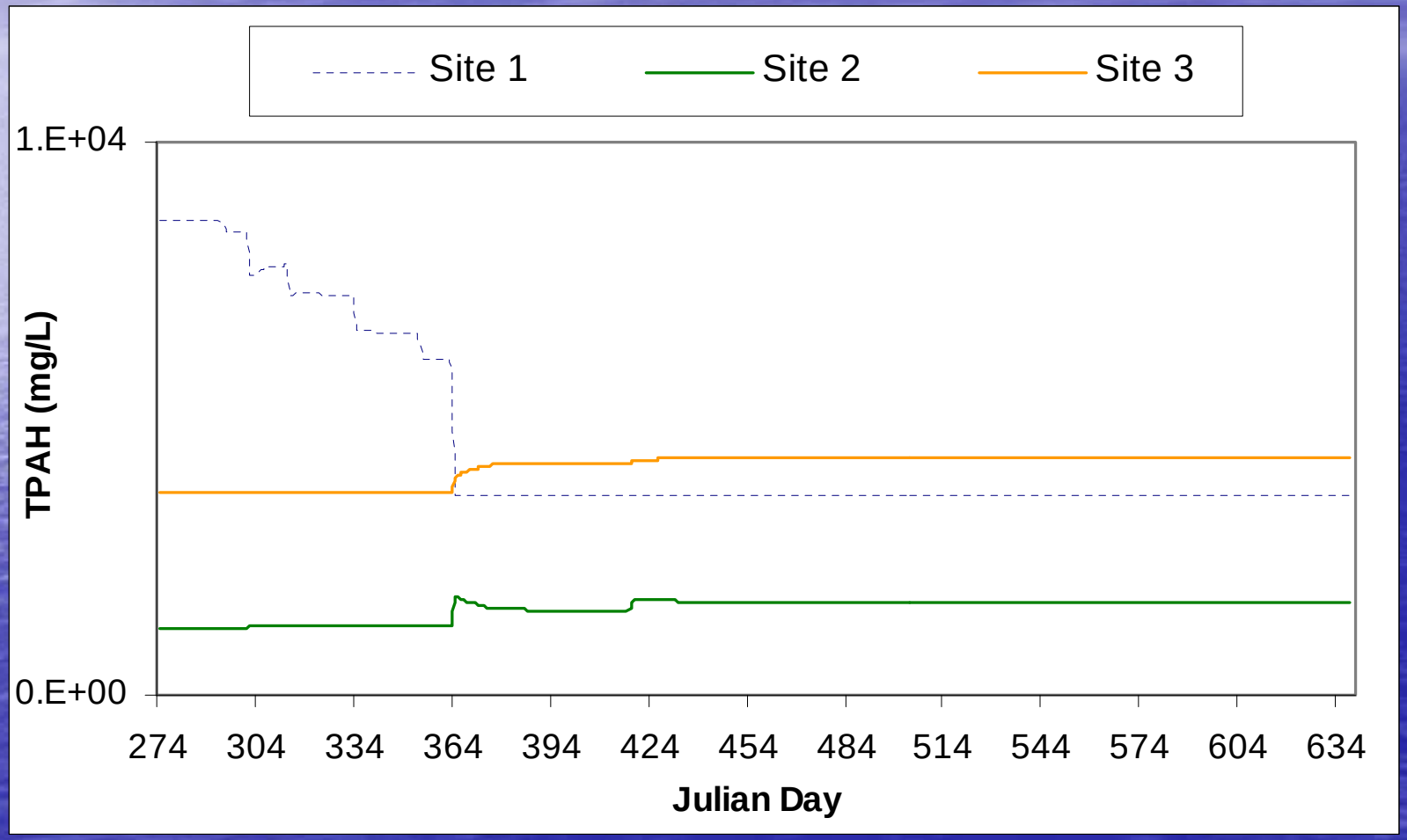


Comparison of simulated and observed TSS concentration at the mouth of Paleta Creek, Trackline 2.

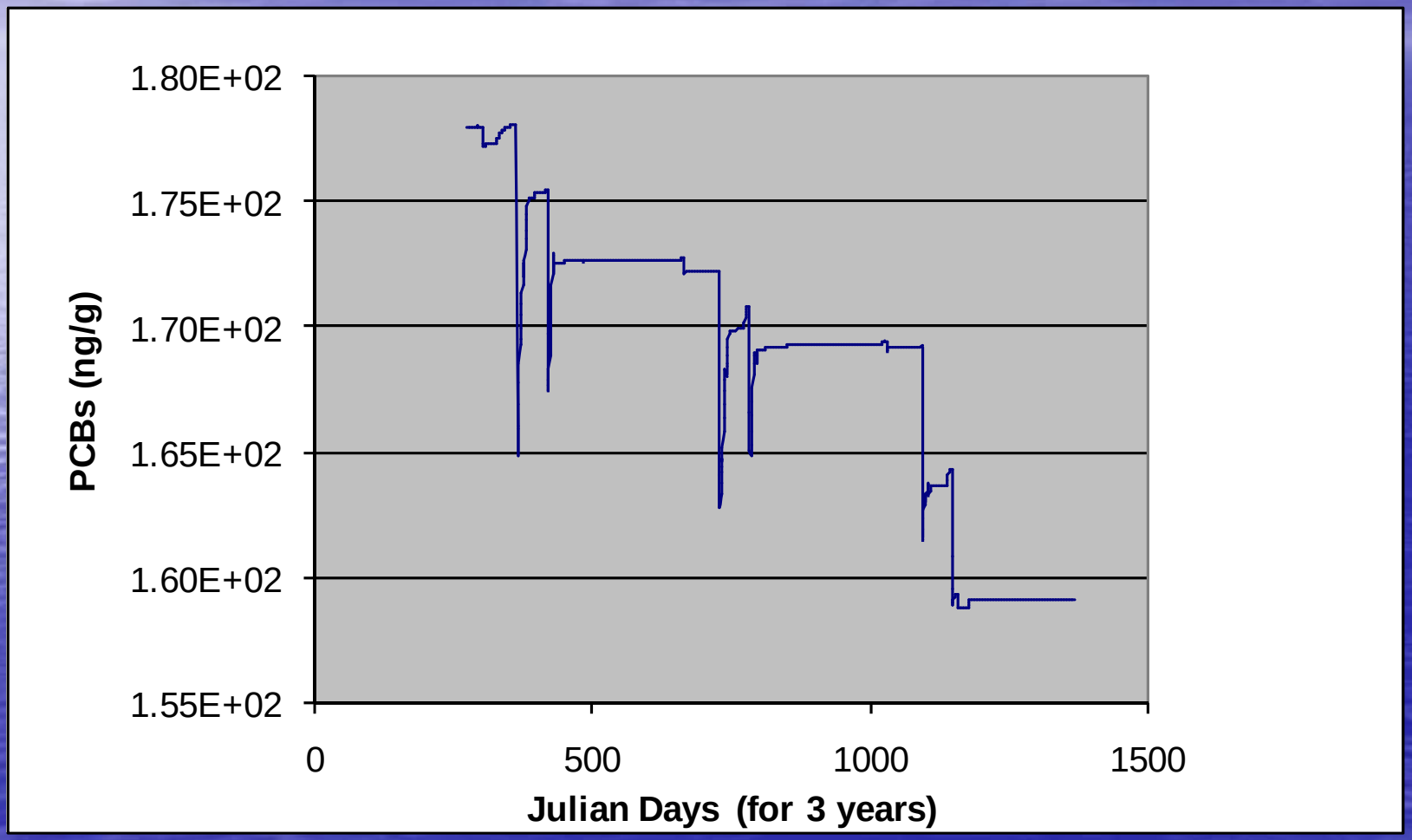


Predicted Results from EFDC Model

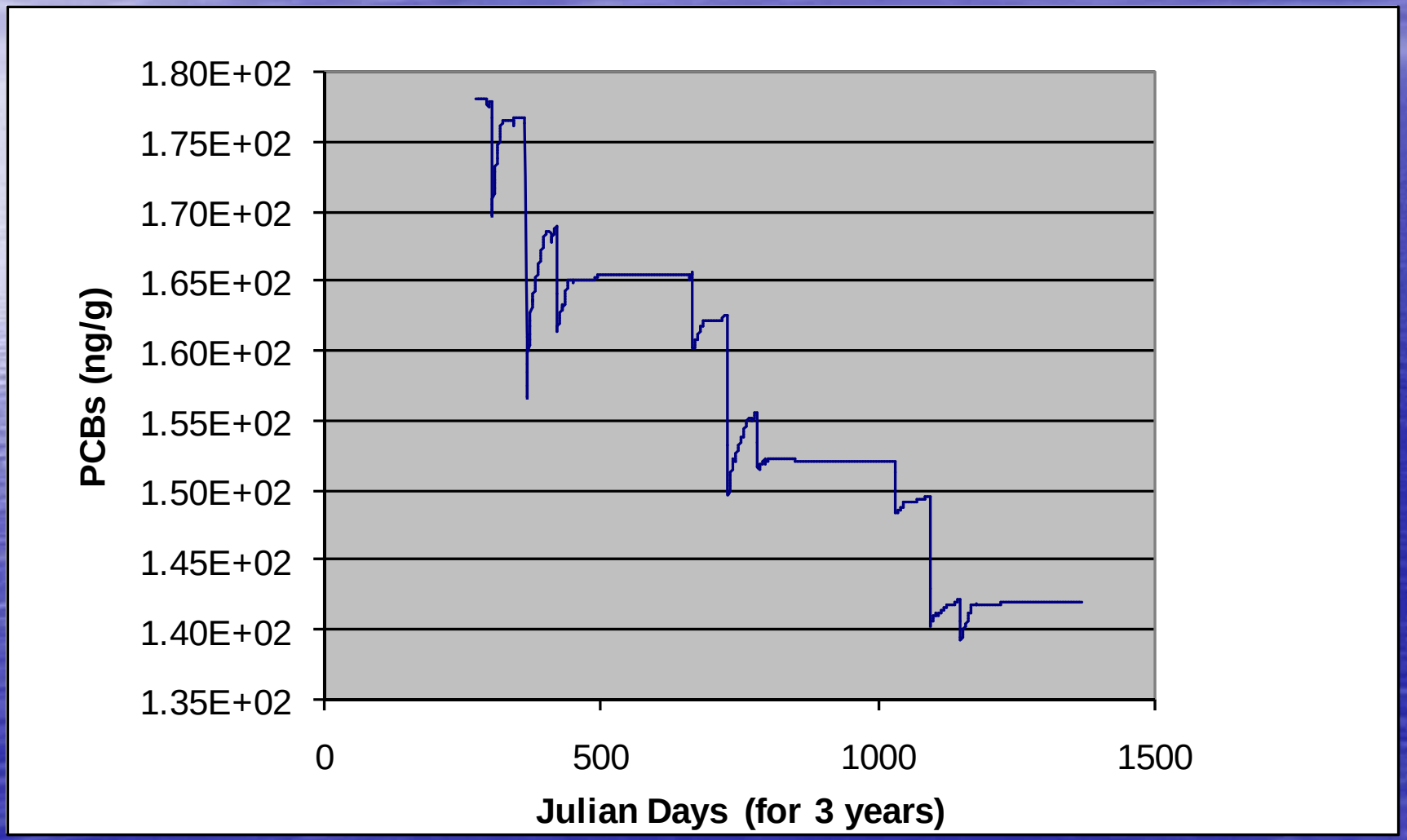
Time series of surface bed layer TPAH results at sites 1, 2, and 3 in the Paleta model.



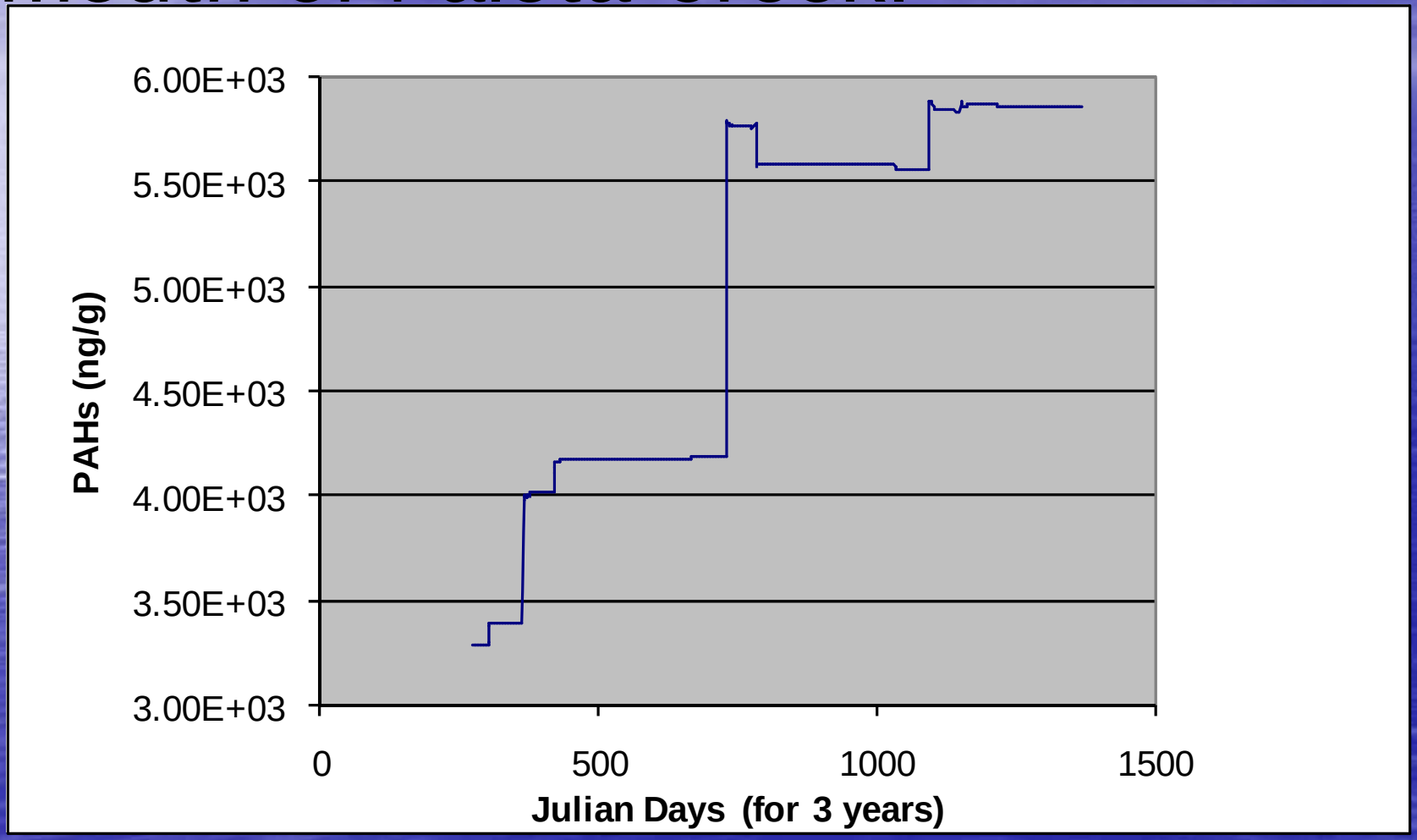
PCB results without controls at the mouth of Paleta Creek.



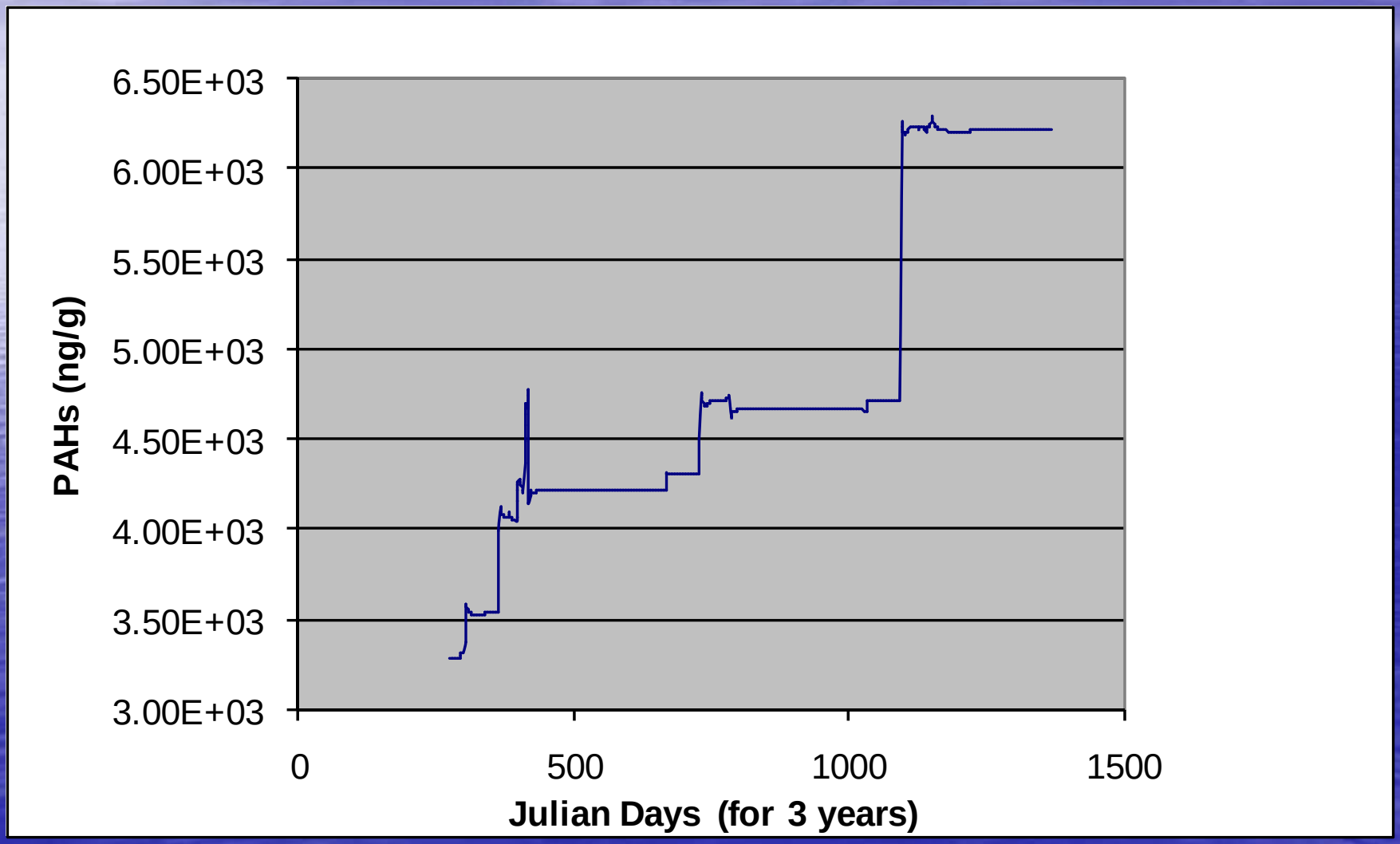
PCB results without controls at the mouth of Chollas Creek.



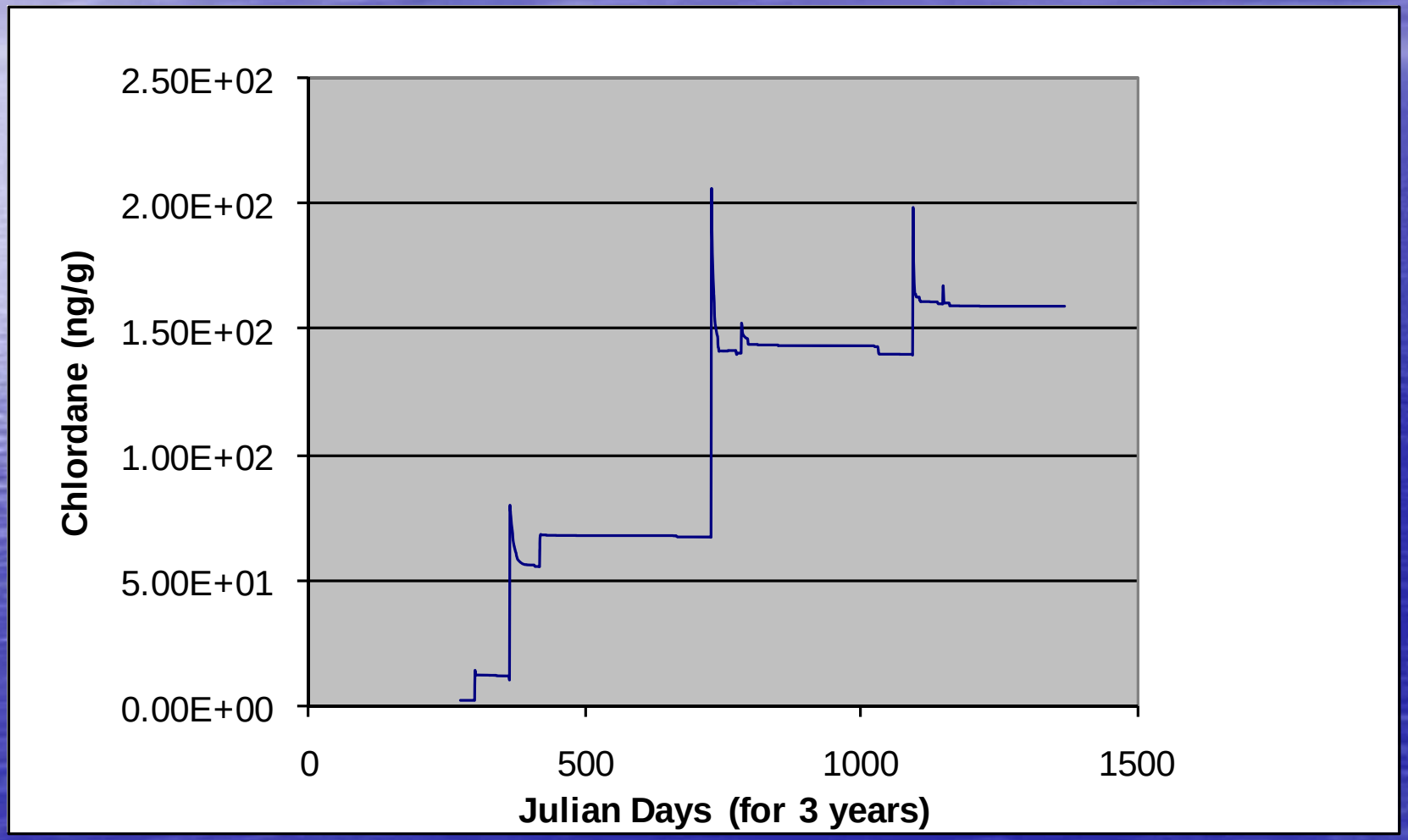
PAH results without controls at the mouth of Paleta Creek.



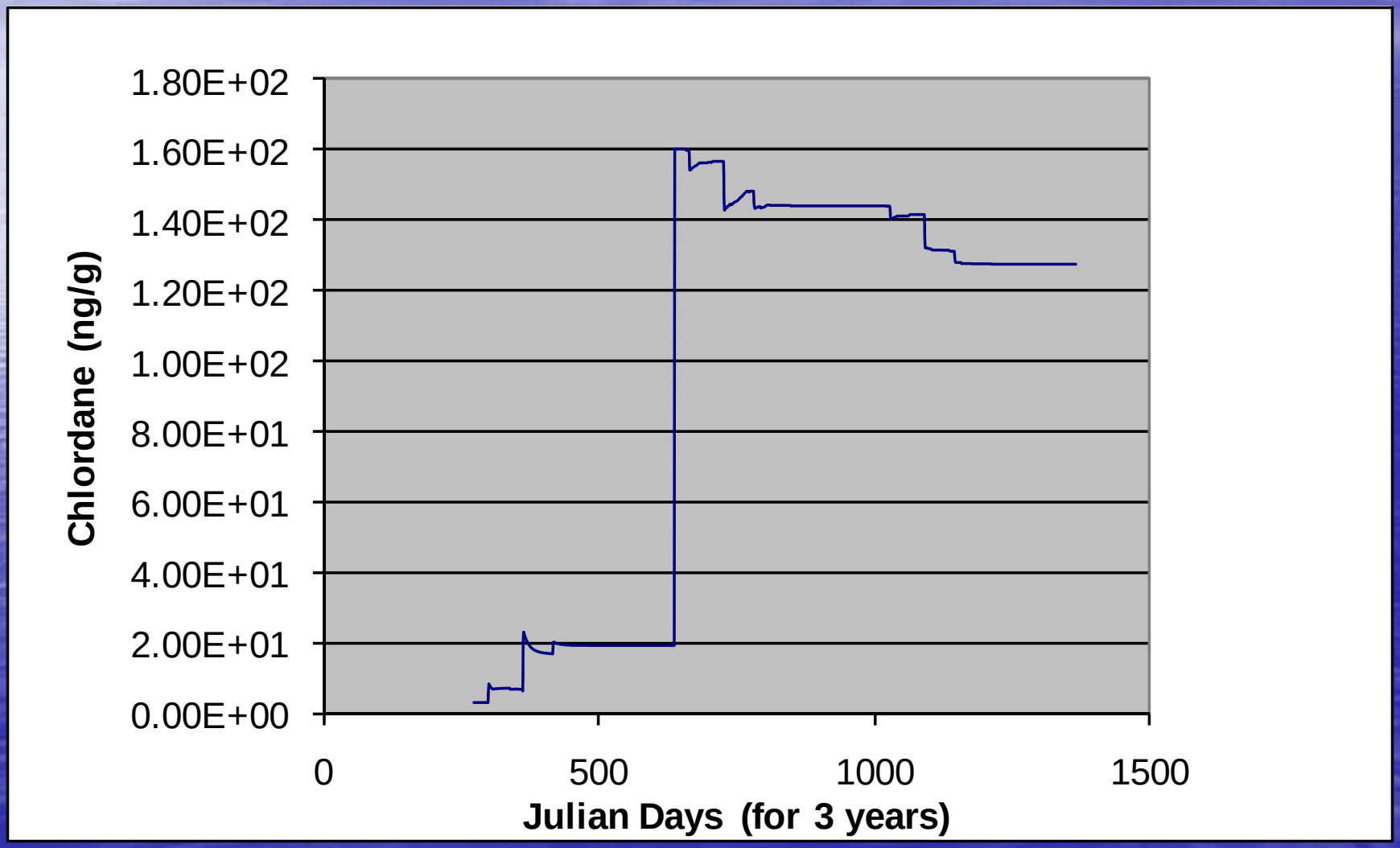
PAH results without controls at the mouth of Chollas Creek.



Chlordane results without controls at the mouth of Paleta Creek.



Chlordane results without controls at the mouth of Chollas Creek.



TMDL elements by pollutant and waterbody.

PAHs				
Waterbody	TMDL	Existing Load	Reduction Required	
	g/d	g/d	g/d	%
Paleta Creek	0.00E+00	1.08E+02	1.08E+02	100%
Chollas Creek	8.51E+01	4.07E+02	3.22E+02	80%
Switzer Creek	2.80E+01	3.50E+01	7.00E+00	20%

Chlordane				
Waterbody	TMDL	Existing Load	Reduction Required	
	g/d	g/d	g/d	%
Paleta Creek	2.23E-03	5.14E+00	5.14E+00	100%
Chollas Creek	1.37E-01	1.09E+01	1.08E+01	99%
Switzer Creek	4.50E-02	3.09E+00	3.04E+00	99%

Lindane				
Waterbody	TMDL	Existing Load	Reduction Required	
	g/d	g/d	g/d	%
Switzer Creek	7.64E-03	3.27E-02	2.50E-02	77%