

Trends in Metal Contamination near Palo Alto Treatment Works

Samuel N. Luoma, Daniel Cain, Cynthia Brown, and Michelle Hornberger, USGS

The United States has invested billions of dollars in waste treatment facilities since the late 1960s, but little monitoring has been done to assess the effects of this investment on contaminant concentrations in receiving waters. The USGS has employed biological monitoring at one location in South San Francisco Bay that has provided one of the longest known continuous datasets on contaminant concentrations in any estuary. Samples of resident bivalves (the clam *Macoma balthica*) have been collected at near monthly intervals since 1978 from a mudflat 1 kilometer south of the discharge point of the Palo Alto waste treatment facility. Rigorous control of analytical quality, optimal sample sizes, consideration of biological processes that can confound monitoring results, and simultaneous collection of data on physical conditions and metal concentrations in sediments have assured the quality of this dataset. Metals of principal concern in South Bay (copper, silver, zinc) were monitored along with sediment characteristics since 1978. Beginning in 1990, a larger suite of elements was monitored in collaboration with the City of Palo Alto. More recently, local effects monitoring has been extended to

an intertidal site at the mouth of Coyote Creek, in collaboration with the cities of San Jose and Sunnyvale.

Waste processing in treatment facilities has improved substantially at the Palo Alto plant since 1980. The data on copper (Figure 1) clearly demonstrate the value of the investments. Concentrations of copper and silver in clam tissues have declined tenfold or more from the very high levels observed in the late 1970s. Sediment concentrations of these contaminants have also declined, although not as much. These "real-time" observations are consistent with USGS studies of contamination in sediment cores that show reductions in concentrations of several important contaminants in the bay compared to the seriously contaminated conditions in the 1970s. Both studies show that the bay remains moderately contaminated, but that exposure to the additive mixture of contaminants has probably declined since 1980. Awareness of contaminant trends offers opportunities to better understand contaminant influences on the bay ecosystem and is an important perspective to consider when assessing causes of ecological change in the bay.

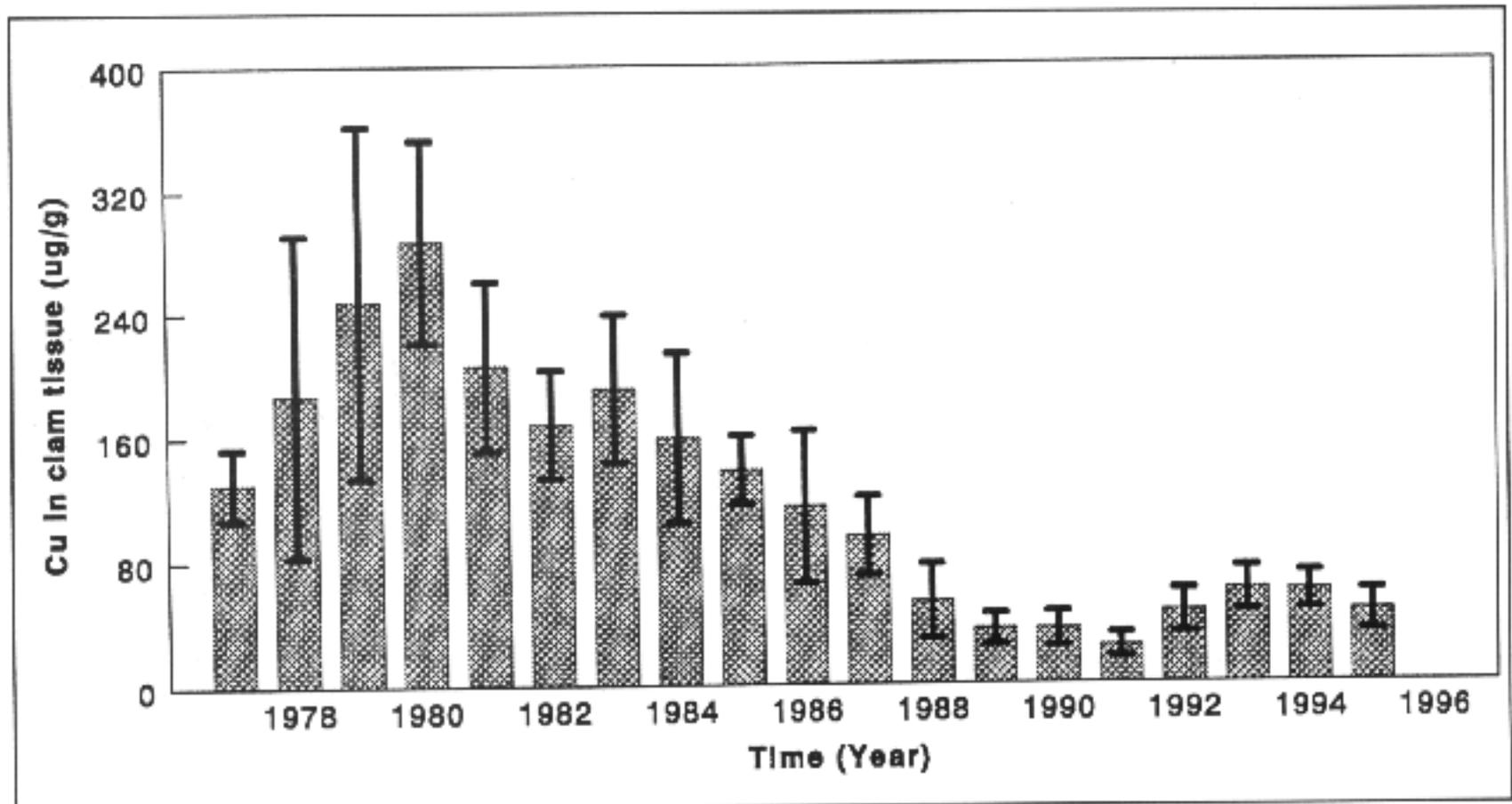


Figure 1

Annual Mean Copper Concentrations in Soft Tissues of the Resident Bivalve, *Macoma balthica*, Collected 1 km South of the Palo Alto Treatment Works Discharge Point. Each bar is the mean of 9-12 collections during the year. Vertical bars are the standard error of each annual mean.