

SECTION A

The San Francisco Bay-Estuary Toxics Study: Sustained Progress in a Unique Estuarine Laboratory

Like all major urbanized estuaries in the world, San Francisco Bay receives toxic substances from a variety of natural and anthropogenic sources. Once in the estuary, a network of interdependent physical, chemical and biological processes affect the transport and transformation of these substances over a wide range of spatial and temporal scales (Kuwabara and others, 1999). Inherent hydrodynamic complexities of estuaries coupled with chemical gradients and dynamics in benthic and planktonic communities generate a formidable interaction of processes relevant to the transport, transformation and potential biological effects of toxic chemical species. The San Francisco Bay-Estuary Toxic Substances Hydrology (Toxics) Study is therefore unique among estuarine studies in its long-term approach to quantitatively defining that process interdependence. In this study, the estuary is conceptualized as three interacting “sub-ecosystems” (the Delta, North Bay and South Bay; fig. 1), that operate differently, are controlled by different processes, and hence have environmental concerns that may be prioritized differently.



Figure 1. The San Francisco Bay-Estuary Toxics Study examines the inherent complexities of interacting estuarine subecosystems that affect the distribution, fate and toxicity of organic and inorganic contaminants (Landsat Thematic Mapper image taken on September 16, 1993, and processed by Pat Chavez and his group, USGS, Flagstaff, AZ).

Subsequent reports are presented to give the reader a sense of the necessarily wide scope of research activities within this study. These collaborative studies continue to strengthen the scientific foundation that has kept the agency uniquely positioned for three decades to respond to specific problems related to imminent water-quality management decisions.

References

Kuwabara, J.S., Nichols, F.H., Kuivila, K.M., and DiLeo, J.S., 1999, Understanding the Human Influence on the San Francisco Bay-Delta Estuary Ecosystem - The Toxic Substances Hydrology Program and USGS Place-based Studies Program Provide Complimentary Approaches and Results: Morganwalp, D.W., and Buxton, H.T., eds., U.S. Geological Survey Toxic Substances Hydrology Program-- Proceedings of the Technical Meeting, Charleston, South Carolina, March 8-12, 1999-- Volume 2-- Contamination of Hydrologic Systems and Related Ecosystems: U.S. Geological Survey Water-Resources Investigations Report 99-4018B, this volume.

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