Science support for improved management of sediment in Bay Area watersheds, creeks, and San Francisco Bay

Lester J McKee and Sarah A Pearce

San Francisco Estuary Institute, Richmond, California

San Francisco Bay watershed, with an area of 162,000 km² (about 40% of the area of the State of California) is home to around 13.5 million people. San Francisco Bay, the "urbanized estuary" and its watershed supports five major ports ($20 billion worth of cargo annually), five oil refineries, water supply for tens of millions of people, and irrigation water supply for millions of acres of farmland. The watershed of the nine counties directly around the Bay supports a population of 7.2 million, a thriving agricultural community of winegrowers, rangeland beef farming, and all the parks and open spaces area that we know and celebrate. The Bay itself is home to a range of wildlife and fisheries resources of importance. Annually, approximately three million cubic meters of sediment is removed to maintain navigation channels and harbors. Geology, slope, and climatic factors in addition to human factors play a strong role in the erosion and transport of sediment from our watersheds and drainage systems and thus sediment mass load that ultimately enters the Bay. Our research focuses on answering sediment related management questions associated with anadromous fish, flood control, pollutants carried on fine sediment, and regional scale sediment supply to San Francisco Bay. We have used a variety of project specific standard geomorphological field techniques, Geographic Information Systems (GIS), aerial photograph interpretation, and sediment transport equations to provide managers with vital information that can be directly applied to create a desired outcome. In some cases, this information has led to successful restoration of creeks and wetlands, and in other cases it has supported specific language in government policy and regulation documents. In this presentation, we will provide an overview of some of the more interesting examples of our work over the past 15 years on geological and land use controls on erosional characteristics of our Bay Area watersheds and sediment supply to San Francisco Bay.

Biographies

Dr. Lester James McKee received a B.Sc, with Honors, in Geology from the University of Canterbury in New Zealand, and a Ph.D. in Resource Management from Southern Cross University in Australia focusing on hydrology and nutrient biogeochemistry in wet-dry subtropical climatic regimes. Since 2000 he has been a Senior Scientist with the Clean Water Program at the San Francisco Estuary Institute (SFBI). He is the Lead Scientist with the Sources Pathways and Loading Workgroup (SPLWG), and the Regional Monitoring Program for Water Quality (RMP). He has 19 years of experience working on design and implementation of studies to provide knowledge about whole system mass balance in systems impacted by agricultural, urban, and industrial pollution; flow of water, and transport of sediments and pollutants into receiving water bodies; pollutant identification, prioritization, and source tracking in urban and agricultural landscapes; and performance analysis of best management practices (BMPs) and low impact design (LID). He provides mentorship and supervision to a group of five energetic multidisciplinary scientists mainly in the areas of geomorphology and hydrogeochemistry. He is the recipient of $7M+ in competitive grants and funding awards from local, state, and federal US sources. In addition, he collaborates on a further $4M+ of grants and funding awarded to the Institute.

Sarah A Pearce received a B.S. in Geosciences from Trinity University, San Antonio, TX, and an an MS in Geomorphology from Lehigh University, Bethlehem, PA, focusing on hydraulic geometry of ephemeral channels that cross thrust faults, North Flank of the San Bernardino Mountains, California. She has been a Geomorphologist with the San Francisco Estuary Institute since 2001. She has conducted many field-based studies on watersheds around the Bay focusing on sediment budgets, sediment source assessment, watershed assessments, and creek condition in support of beneficial uses. She is lead practitioner and trainer at SFEI for the California Rapid Assessment Method (CRAM) for wetlands, a statewide method for rapidly determining the condition of wetlands.