AWRA 2007 SUMMER SPECIALTY CONFERENCE
Vail, Colorado
June 25-27, 2007

ESTUARY SEDIMENT AND SUSPENDED SOLIDS BACTERIA: IMPLICATIONS FOR MICROBIAL POLLUTION SOURCES AND MONITORING

David Lewis, E. R. Atwill, M.D.G. Pereira, Ronald F. Bond, Miguel Huerta*

ABSTRACT: California estuaries are valued for beneficial uses including recreation and shellfish harvesting. Regulatory efforts to safeguard these beneficial uses are hampered by a lack of understanding of significant environmental reservoirs of bacteria. Recognizing this need and the potential for resuspended estuarine sediment to influence levels of measured waterborne bacteria, we sampled water and sediment in five northern California estuaries ten times over one year. The five studied estuaries are the terminuses for watersheds ranging in size 91 to 3,885 square kilometers. We employed a sampling network consisting of five transects distributed across the saltwater freshwater interface in each estuary. Each transect contained three sampling locations at which we sampled water from three depths and collected estuarine sediment. A total of 2,200 water samples and 750 sediment samples were collected. Water samples were segregated into their respective water and Total Suspended Solids (TSS) fractions. Each water and TSS fraction and estuarine sediment sample was analyzed for fecal coliform and E. coli by membrane filtration. Mean concentrations for fecal coliform in water ranged from 61 to 955 cfu/100ml and for E. coli from 48 to 869 cfu/100ml across the five study systems. Similarly, values in TSS were 5 to 48 cfu/100ml for fecal coliform and 4 to 25 cfu/100ml for E coli. Sediment values ranged from 7.3 to 11.6 cfu/gm for fecal coliform and from 5 to 13.1 cfu/gm for E. coli. On a per gram basis, the TSS fraction contains the greatest amount of fecal coliform and E coli. The percent contribution to the total water sample that TSS provides ranged from 5 to 12 percent depending upon the estuary and the season. Both fecal coliform and E. coli were present in sediment within all five estuaries during each sample event. This presentation will discuss the role that estuary sediment and TSS have in generating water column bacteria values and the implications that these relationships have for monitoring and regulation of microbial pollution.

***** Respectively, Adivsor, University of California Coopertive Extension, 133 Aviation Blvd., Ste. 109, Santa Rosa, CA 95403, USA, Phone: 707-565-2621, Fax: 707-565-2623, Email: djllewis@ucdavis.edu; Professor, School of Veterinary Medicine University of California-Davis; Research Assistant, School of Veterinary Medicine University of California-Davis; Research Technician, School of Veterinary Medicine Univeristy of California-Davis; Research Technician, University of California Cooperative Extension