In this presentation, we will discuss important new findings of this three year, Delta-wide mercury study. We will also discuss approaches for assessing the mercury methylation question throughout this highly variable system. Methyl mercury efflux from standard sediment cores, as measured in laboratory experiments, was found to generally occur at relatively low levels, prohibiting the meaningful quantitation of this parameter across the system with standard techniques. A viable laboratory approach, however, was developed to assess the potential for various Delta sediments to methylate new mercury. This parameter varied spatially. Methylation of new mercury was found to peak at 2-6 days, with apparent demethylation subsequently ramping up in some sediments. Methylation potential was 4 to 30-fold greater in organic-rich depositional wetland areas, as compared to adjacent channels and flats. Sediment mercury and related parameters were analyzed from 75 sites. Naturally occurring biota provided the strongest measure of relative in-situ mercury exposure throughout the varied locales and habitats of the Delta. We focused on organisms exhibiting high levels of site fidelity, low intra-site variability in mercury uptake, and presence throughout the system. *Corbicula* clams and inland silversides were sampled consistently at over 60 diverse sites. Data from these and other samples provide a new picture of mercury dynamics in the Delta. Individual mercury uptake was quite variable in some species and at certain size ranges, but consistent in others. Benthic clams and planktonic silversides exhibited somewhat different mercury spatial patterns. Seasonal and inter-annual shifts in mercury bioavailability may be significant. Central Delta flooded tracts were among the lowest mercury bioaccumulation regions, despite elevated methylation potential. Bioaccumulation was greatest in general proximity to Coast Range and Sierra Nevada mining sources, with an important additional elevated zone in the West Delta, possibly linked to the entrapment zone and fresh/saline mixing region.