

DRAFT FINAL

Summary of Current Water Quality Monitoring Programs in the Delta



Prepared for
Central Valley Regional Water Quality Control Board
State Water Resources Control Board
November 2009

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the total mercury to TSS ratio for Sacramento River tributaries shows that Natomas East Main Drain, Putah Creek (tributary to the Yolo Bypass), Cache Creek Settling Basin, and the Feather River have the highest ratios while the upper Sacramento River above Colusa (0.10 mg/kg) has one of the lowest ratios.

An elevated total mercury to suspended solid ratio is considered to be significant because more mercury is associated with particulates as this ratio increases. Higher ratios are associated with mercury enriched source areas and load reduction can be more efficiently carried out by capturing solids than by attempting to treat aqueous mercury. In addition, the San Francisco Bay TMDL identifies a mercury in sediment objective of 0.2 mg/kg (the method used to estimate the total mercury to TSS ratio yields units of mg/kg). A total mercury to suspended solids ratio above 0.2 mg/kg indicates that suspended solids also exceed the TMDL sediment objective. The regression equation derived from Figure 2-3 suggests that sediment with a total mercury concentration above 0.16 mg/kg in the less than 63-micrometer fraction is related to total mercury to TSS ratios above 0.2 mg/kg. Alternatively, the regression equation suggests that sediment with a total mercury concentration of 0.2 mg/kg in the less than 0.63-micrometer fraction is associated with a total mercury to TSS ratio of approximately 0.24 mg/kg.

This information supports a conclusion that mercury sources located in the Putah Creek, Cache Creek, Feather River watershed (including the Yuba River and Bear River watersheds) continue to contribute significant mercury loads to the Delta. Cache Creek contributes approximately 28 percent of the total annual Sacramento Basin mercury load. The Feather River watershed contributes approximately 18 percent of the total annual Sacramento Basin mercury load. This information also shows that the upper Sacramento River transports a large mass of mercury that is dispersed within a large mass of sediment. The upper Sacramento River watershed contributes more than 35 percent of the total annual Sacramento Basin mercury load.

2.3.2 San Joaquin River

The San Joaquin River contributes approximately 7.6 percent of the total mercury load to the Delta. The total mercury to TSS ratio for the San Joaquin River is 0.13, well below the San Francisco Bay TMDL sediment objective. The estimated total mercury load of 30 kg/yr from the San Joaquin River appears to be dispersed within the suspended sediment and does not appear to reflect a significant effect from ongoing mercury sources.

2.3.3 Direct Delta Tributaries

Direct Delta tributaries are a set of rivers and creeks that discharge directly to the Delta and are not included in the Sacramento Basin or San Joaquin River watersheds. The direct Delta tributaries include

water records began to be collected (about 100 years). Assessment of loading during a typical distribution of wet and dry WYs is necessary because sediment and mercury transport is a function of water velocity and volume.

The loads presented in Table 2-1 were estimated by evaluating the relationship between flow and total mercury concentration, and flow and TSS concentration (Regional Board 2008). For water bodies with a significant relationship as determined by linear regression, the total mercury and TSS loads were calculated based on the mathematical relationship determined by the regression. For water bodies that did not exhibit a significant relationship, the average mercury and TSS concentrations were multiplied by the annual flow volume for the water body to estimate the annual load.

The information about annual total mercury and TSS loads presented in Table 2-1 shows that the Sacramento River and its tributaries are the most significant source for mercury to the Delta. For this reason, a more detailed discussion of the Sacramento River watershed is provided below.

2.3.1 Sacramento Basin Tributaries

The Sacramento River watershed is the major source of water, mercury, and sediment to the Delta. The Sacramento Basin alone (Sacramento River at Freeport and the Yolo Bypass) contributed more than 80 percent of all mercury and TSS loads entering the Delta. Export of total mercury from the Sacramento Basin is strongly related to the amount of precipitation received during the WY. The lowest mercury export rate (94.8 kg/yr) occurred during the driest study period (Foe 2003), while the highest (801 kg/yr) was during a very wet period (Foe and Croyle 1998). Most annual loading rate estimates fall between 200 and 500 kilograms (kg) of mercury per year. The WY1984-2003 average annual mercury loading rate of 345 kg/yr is midway between these values.

Sediment transport is also strongly a function of WY type. The smallest export rate (568 Mkg/yr) occurred during the driest period studied (Foe 2002), while the highest rate (3,900 Mkg/yr) happened during a wet year (Foe and Croyle 1998). The WY1984-2003 average annual sediment export rate of 2,056 Mkg/yr is among the higher water years reported. The influence of the Yolo Bypass, similar to its influence on mercury transport, is strongly a function of flow. The Yolo Bypass only exports a small amount of sediment during dry periods, but TSS loads increase and equal or exceed those of the Sacramento River during wet periods.

Table 2-2 compares the estimated total mercury load with the mercury to TSS ratio for each tributary to the Sacramento Basin. The information in Table 2-2 shows that the largest mass of mercury is from the Sacramento River above Colusa. The Cache Creek Settling Basin and Feather River contribute the second and third largest mercury mass to the Sacramento Basin, respectively. However, consideration of