Mercury Monitoring in California Sport Fish: A Historical Review and Recommendations for the Future

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Abstract (revised)

California is burdened with unusually severe and widespread mercury contamination due to extensive mercury and gold mining in the 1800s. Mercury monitoring in California sport fish began in 1969. Since that time, a substantial amount of mercury monitoring has been conducted, but generally in an uncoordinated fashion. In spite of many shortcomings, historic data have been used to establish consumption advice in some areas and provide some information on statewide spatial patterns and very limited information on long-term trends. Mercury concentrations across large areas of the State are above thresholds for concern for human health. In general, mercury concentrations over the past 30 years have not declined, as might be expected due to the long residence time of mercury in the San Francisco Estuary watershed and the absence of significant watershed-scale cleanup activities. In fact, there is present concern that large-scale wetland restoration in the watershed could result in increased mercury in fish.

A shift is presently underway toward improved mercury monitoring in the State. The Fish Mercury Project is a 3-year effort that began in 2005 to quantify mercury concentrations in fish and to provide a scientific foundation for developing fish consumption advice in the watershed and for detecting spatial and long-term temporal trends. Sport fish will be sampled at about 120 locations in California's Central Valley to support the development of fish-consumption advice for water bodies in a large portion of the State. Stakeholder involvement in the Project is helping to focus the monitoring on popular species and fishing locations and to guide risk communication. Information will be communicated to increase public awareness of the health risks of methylmercury exposure, steps that can be taken to reduce exposure, the health benefits of eating relatively "clean" fish, high mercury species and locations, and low mercury species and locations. In the short term, risk communication linked to a well-designed monitoring program is the most realistic approach for reducing human exposure to methylmercury in this contaminated ecosystem. The Fish Mercury Project provides a good model for a program that integrates mercury monitoring in sport fish with risk communication.

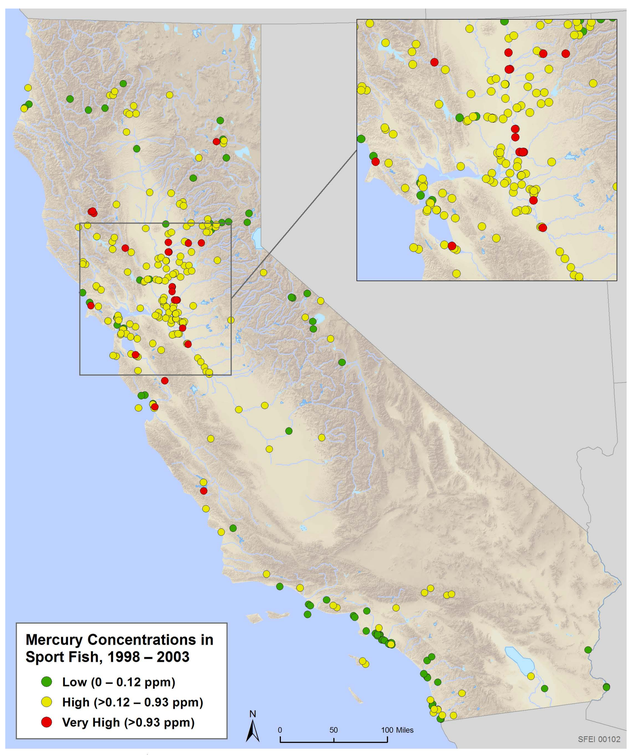

Figure 1. Mercury Concentrations in California Sport Fish, 1998 – 2003. Based on mercury measurements in edible tissue from a variety of fish species from 1998 – 2003. Size limits for each species were applied. Dots represent sampling locations. Dots represent sampling locations. Dot colors correspond to safe levels of consumption based on comparison of concentrations to thresholds from Klasing and Brodberg (2006). For example, green dots indicate locations where up to 8 meals per month can be safely consumed.

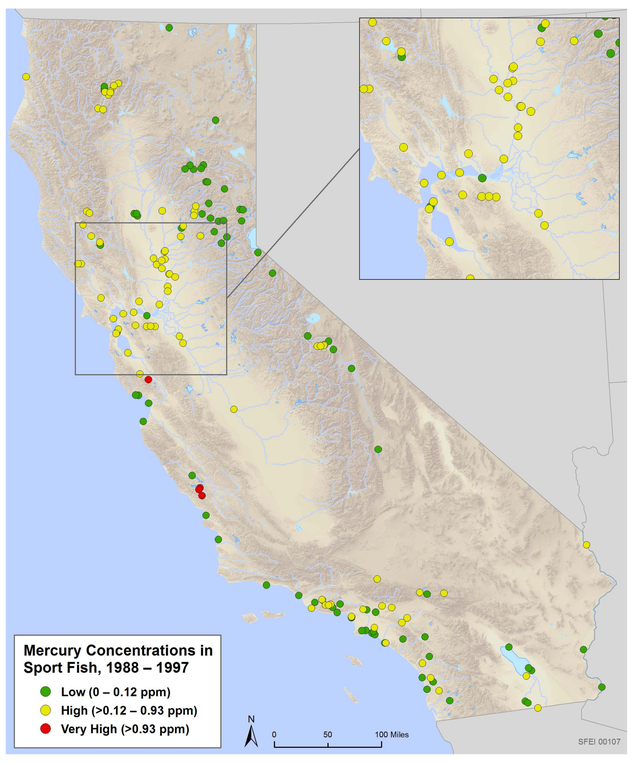

Figure 2. Mercury Concentrations in California Sport Fish, 1988 – 1997. Details same as for Figure 1.

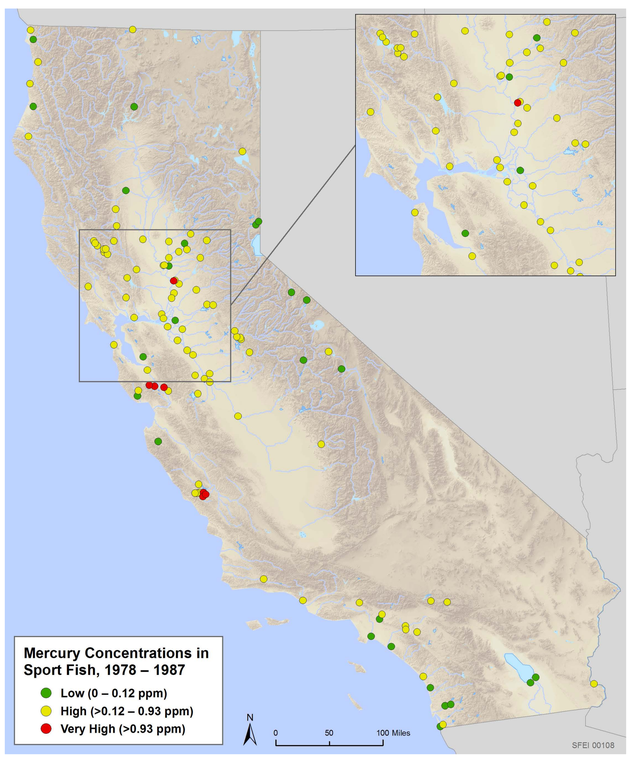

Figure 3. Mercury Concentrations in California Sport Fish, 1978 – 1987. Details same as for Figure 1.

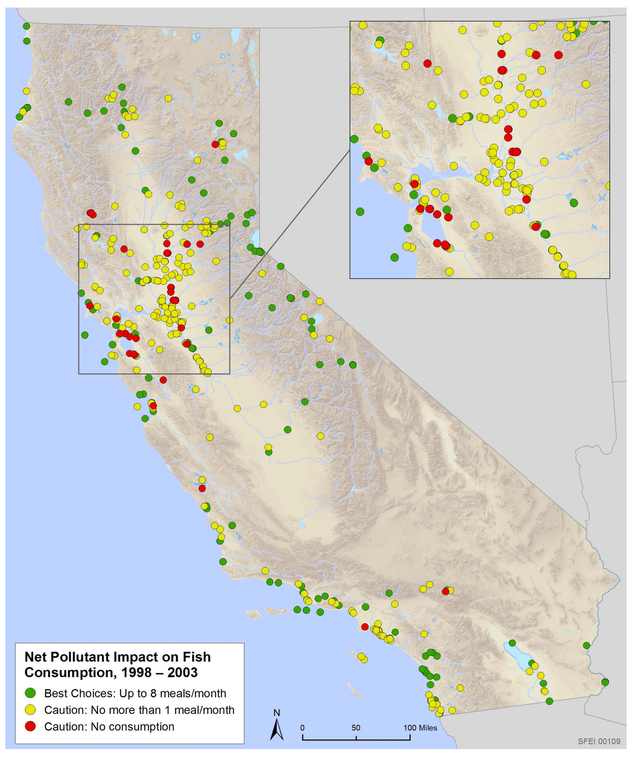

Figure 4. Current status of net pollutant impact on the fishing beneficial use in California. Based on concentrations of several chemicals (mercury, PCBs, DDTs, dieldrin, and chlordanes) from analysis of edible tissue in a variety of species from 1998 – 2003. Size limits were applied for evaluation of mercury data. Dot color coding as described for Figure 1.

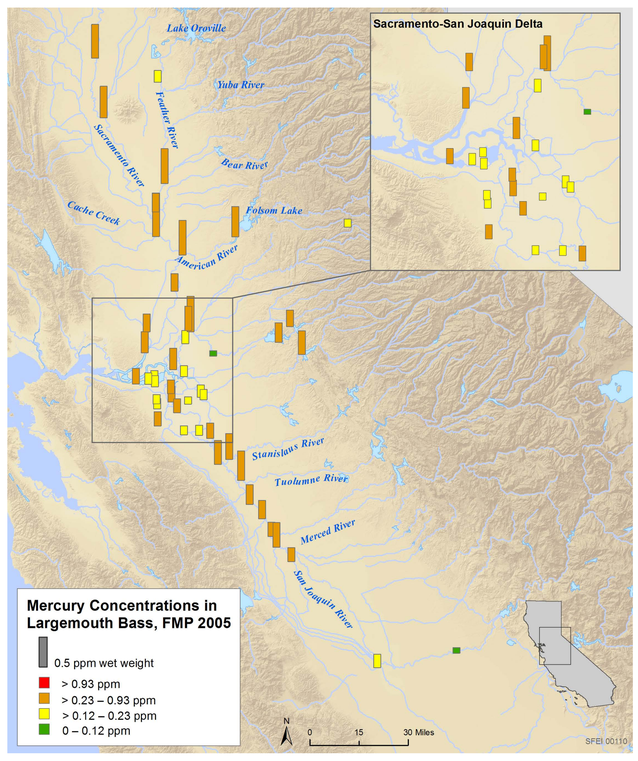

Figure 5. Fish Mercury Project data on spatial patterns in largemouth bass, 2005 (part 1). Mean mercury concentrations in largemouth bass at 2005 FMP sampling locations. Size limits were applied.

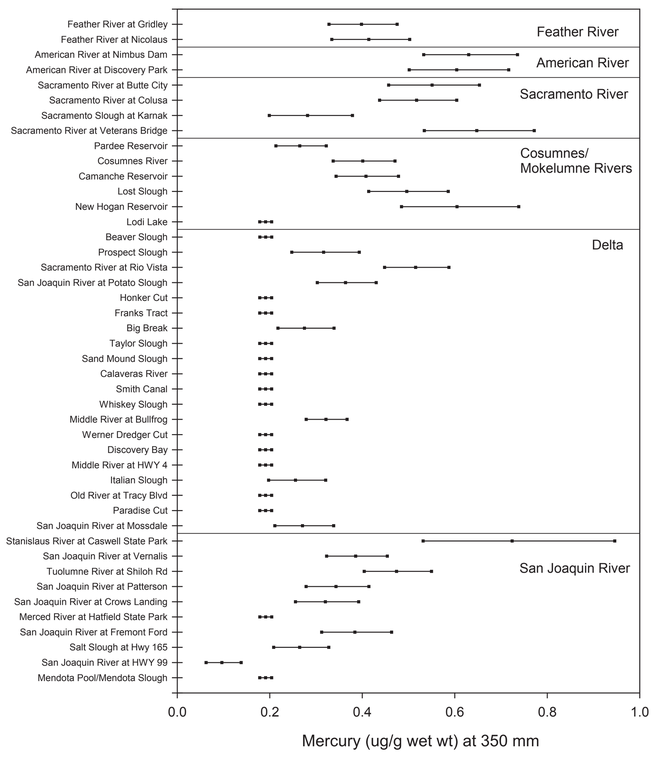

Figure 6. Fish Mercury Project data on spatial patterns in largemouth bass, 2005 (part 2). Spatial comparison of largemouth bass mercury concentrations estimated at standard length of 350 mm (mean and 95% confidence interval). Locations are listed in geographic order from north (top) to south (bottom).

References

Klasing, S. and R. Brodberg. 2006. DRAFT Report: Development of Guidance Tissue Levels and Screening Values for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene. California Office of Environmental Health Hazard Assessment, Sacramento, CA.

For more information

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Acknowledgments

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