



# CONTAMINANTS IN SPORT FISH

## Two-Year Statewide Survey Reveals High Methylmercury on California Coast

The State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP) has released findings from the largest-ever statewide survey of contaminants in sport fish on the California coast. The report, *Contaminants in Sport Fish from the California Coast, 2009-2010*, represents a major step forward in understanding the extent of chemical contamination in the coastal food web. The report presents new data from sampling that focused on the North and Central coasts in 2010; these data combine with the results from 2009 to provide a comprehensive assessment of the entire coast. The study has provided information that will be valuable in prioritizing areas in need of further study, support development of consumption guidelines and cleanup plans, and provide information the public can use to be better informed about the degree of contamination of popular fishing spots.

Information for locations included in the 2009-2010 Coast Survey and the 2007-2008 Lakes Survey can be obtained by clicking the link *Is It Safe to Eat Fish and Shellfish from Our Waters?* at the California Water Quality Monitoring Council's "My Water Quality" website at: [www.CaWaterQuality.net](http://www.CaWaterQuality.net)

## About the Survey

Sampling in the second year of the survey focused on the less urbanized regions on the North and Central coasts. Sport fish were evaluated because they provide information on human exposure and also the condition of the aquatic food web. Five species were examined at each sampling location. The array of species selected for sampling included those known to accumulate high concentrations of contaminants and therefore serve as informative indicators of potential contamination problems.

Contaminant concentrations in fish tissue were evaluated using thresholds developed by the California Office of Environmental Health Hazard Assessment (OEHHA) for methylmercury, PCBs, dieldrin, DDTs, chlordanes, and selenium, and a U.S. Environmental Protection Agency threshold for methylmercury that is being used by the State Water Resources Control Board to identify impaired water bodies.



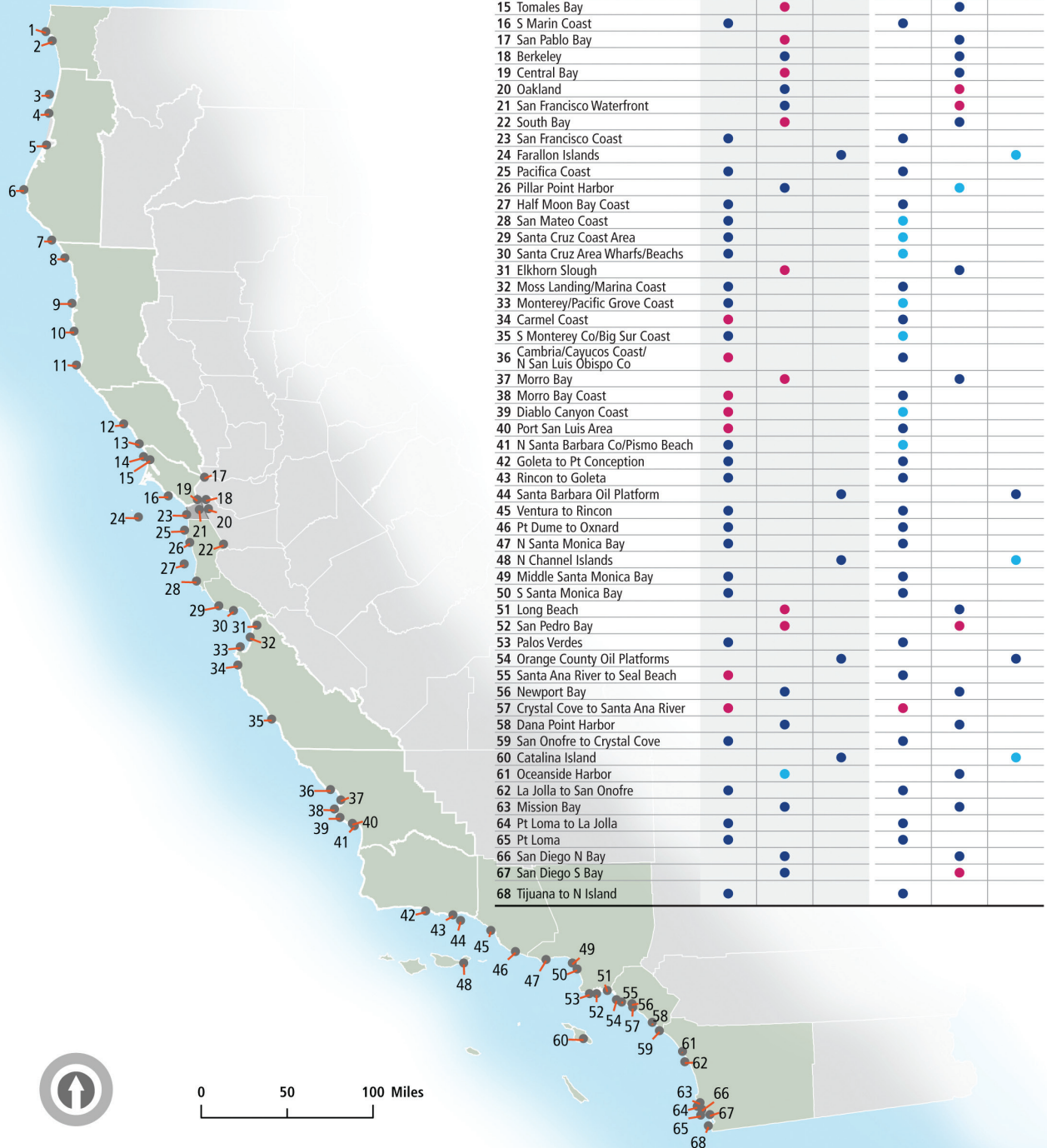
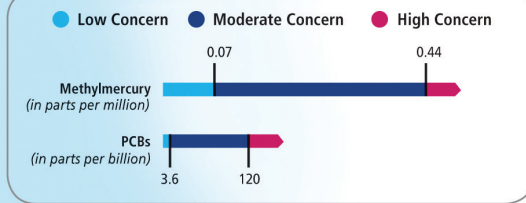
**Methylmercury accumulation in fish is of high concern along much of the California coast, especially in the North and Central coast regions**

## Overview

In this two-year statewide screening study, 3,483 fish representing 46 species were collected from 68 locations on the California coast. The survey results indicate that methylmercury accumulation in sport fish is of high concern along much of the California coast, especially in the North and Central coast regions. PCBs also reached levels of moderate concern, and were the only other contaminant with problematic concentrations.

## COAST SURVEY 2009 and 2010

Levels of Concern for Methylmercury and PCBs  
for Most Contaminated Species at Each Location





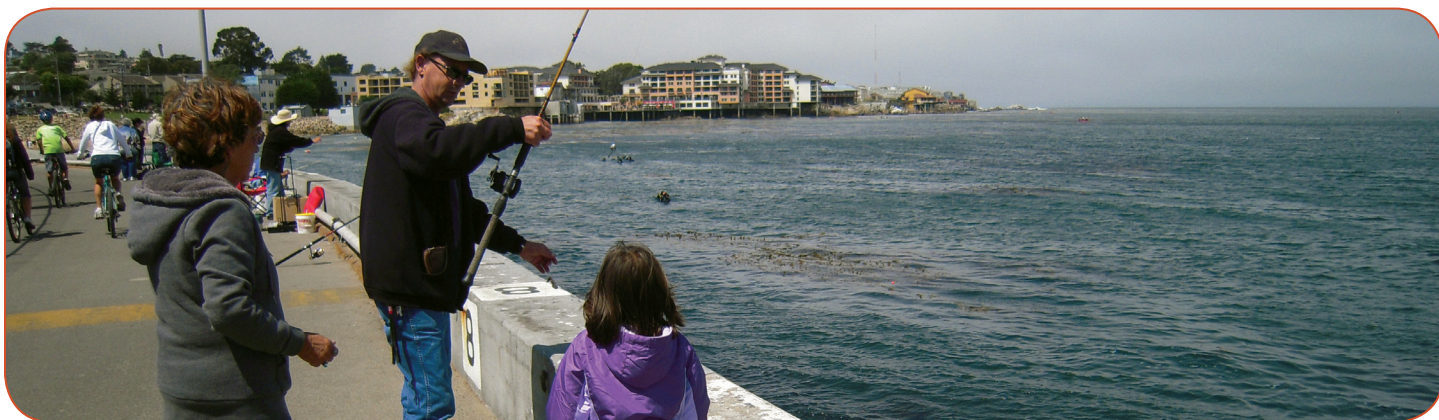
## High Methylmercury Concentrations

Methylmercury can affect the developing nervous system in children and adolescents, potentially leading to learning disabilities. Overall, 43 of 68 (63%) locations had a most highly contaminated species below 0.44 ppm – this represents an estimate of the percentage of locations where frequent consumption of all species, at a number of servings per week to be determined in the future by OEHHA when sufficient data are available for evaluation, is likely to be safe. Many locations, 25 of the 68 sampled (37%), were in the high contamination category, with an average for the most contaminated species exceeding 0.44 ppm. More than half of the locations (37 of 68, or 54%) had a most highly contaminated species with an average above the 0.30 ppm threshold used by the State Water Board to identify impaired water bodies.

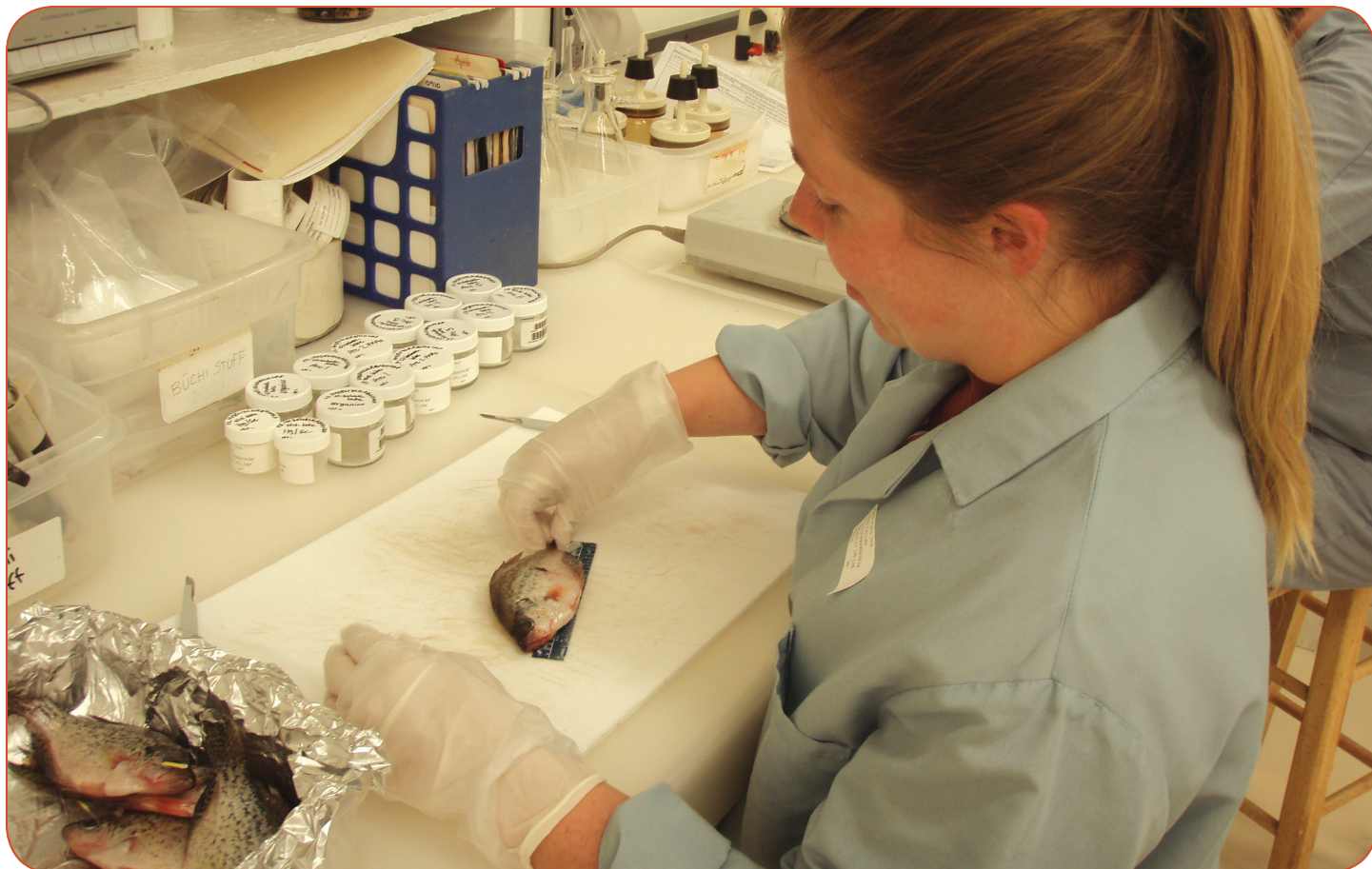
The North Coast (from the Oregon border to Point Reyes) had the highest percentage of locations with at least one species above 0.44 ppm (11 of 15, or 73%). The Central Coast (from Point Reyes south to Point Conception) had the second highest percentage of locations (10 of 26, or 38%) above 0.44 ppm. The South Coast (from Point Conception south to the Mexican border) had a markedly lower proportion of locations above 0.44 ppm (4 of 27, 15%).

Regional variation in the species sampled was an important factor driving the spatial patterns observed. For example, the cleaner status of the South Coast is primarily due to the different suite of species sampled compared to the North and Central coasts. In contrast to the various rockfish species, cabezon, and lingcod that predominated to the north, the species most commonly sampled on the South Coast were kelp bass, barred sand bass, chub mackerel, black perch, and white croaker.

Methylmercury body burdens in fish increase as fish age. The rockfish and shark samples that had high concentrations were generally relatively old (8 – 20 years). On the other hand, species such as chub mackerel and shiner surfperch that were sampled at a young age (1 or 2 years) generally had low concentrations. Methylmercury concentrations also increase with each step up the food chain. All of the species with high concentrations were high level predators. In contrast, blue rockfish, which are a step lower in the food chain, had low concentrations in many locations. Overall, the survey results indicate that the supply of mercury to coastal waters appears sufficient to lead to significant food web contamination and risks to humans wherever long-lived predator fish are caught and consumed. Even offshore locations such as the Farallon Islands were found to have long-lived predators with moderate contamination.



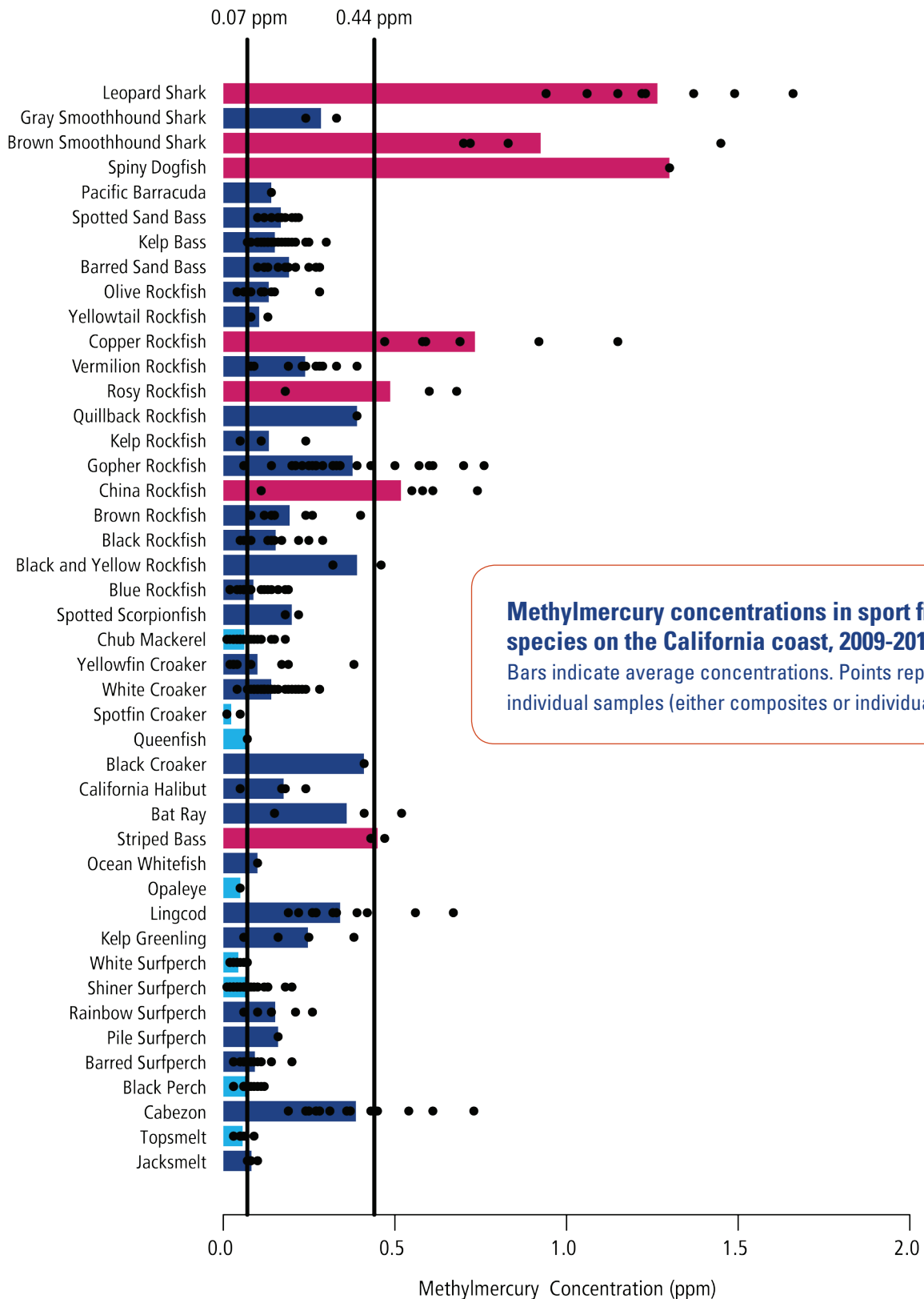
Multiple sources are likely to contribute to methylmercury contamination of California coastal waters, including global emissions to the atmosphere; upwelling from ocean sediments; historic mercury, gold, and silver mining; and urban and industrial wastewater and stormwater. The relative importance of these different sources is not well understood.



### Other Contaminants: PCBs Also A Concern

PCBs were the only other contaminant that reached concentrations in fish tissue that pose potential health concerns to consumers of fish caught from California coastal waters. PCBs may cause cancer; damage the liver, digestive tract, and nerves; and affect development, reproduction, and the immune system. Overall, 63 of 68 (93%) locations had a most highly contaminated species below 120 ppb – this represents an estimate of the percentage of locations where frequent consumption of all species, at a number of servings per week to be determined in the future by OEHHA when data are sufficient for evaluation, is likely to be safe. Five of the 68 locations (7%) were in the high contamination category, with an average for the most contaminated species exceeding 120 ppb. San Francisco Bay and San Diego Bay stood out as having elevated concentrations.

Other contaminants, including dieldrin, DDT, chlordanes, and selenium, were also analyzed, but were found at low levels.





## Clean Fish Also Present

Although species with high or moderate concentrations of methylmercury and PCBs were observed at many locations, they were usually accompanied by species with low concentrations. For example, 26 of the 68 locations (38%) had at least one species with low concentrations of both methylmercury and PCBs and eight locations (12%) had more than one species with low concentrations for both contaminants. Two locations (Dana Point Harbor and Oceanside Harbor) each had four species with low concentrations. On the North Coast, blue rockfish and olive rockfish had low concentrations at multiple locations. On the Central Coast, blue rockfish and black rockfish had low concentrations at four and three locations, respectively. On the South Coast, blue rockfish, chub mackerel, and spotfin croaker had low concentrations at more than one location. Overall, blue rockfish stood out as the most widely distributed species with low concentrations.

## Results from the Rivers and Streams Survey conducted in 2011 will be reported in May 2013

### What's Next?

SWAMP previously reported contaminant concentrations in fish tissue from California lakes and reservoirs ([www.waterboards.ca.gov/water\\_issues/programs/swamp/lakes\\_study.shtml](http://www.waterboards.ca.gov/water_issues/programs/swamp/lakes_study.shtml)). Recognizing the extent of methylmercury contamination in lakes and reservoirs throughout the state, the State Water Board is developing a statewide mercury control program for reservoirs ([www.waterboards.ca.gov/water\\_issues/programs/mercury/](http://www.waterboards.ca.gov/water_issues/programs/mercury/)).

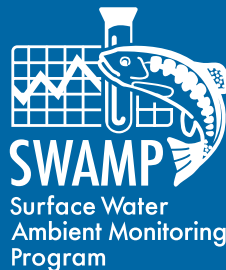
OEHHA used some of the Lakes Survey data to fill data gaps and extend advisories to additional species. OEHHA is merging these data with other studies to develop a statewide advisory for lakes and reservoirs that are not covered by water body-specific advisories. Several Regional Boards are conducting supplemental monitoring of problem lakes and reservoirs identified in this study. OEHHA has already issued an advisory for Donner Lake based on one such study. Other Regional Board studies will enable OEHHA to develop additional water body-specific advisories in the future.

Results from the Coast Survey will be used by the State and Regional Water Boards in prioritizing coastal areas in need of cleanup plans or further monitoring. OEHHA is using results from the Coast Survey to develop advisories. In 2011 OEHHA merged results from the Coast Survey and the San Francisco Bay Regional Monitoring Program to develop a comprehensive advisory for ten species in San Francisco Bay. OEHHA plans to merge data from the Coast Survey with additional data from other studies to develop an advisory for San Diego Bay.

To assess contaminants in fish in California rivers and streams, the SWAMP fish monitoring team sampled 62 locations in 2011. Results from the Rivers and Streams Survey will be reported in May 2013. In 2012, SWAMP is conducting a study assessing methylmercury exposure and risk in wildlife on California lakes and reservoirs. This study will examine methylmercury concentrations in a bird species (Western Grebes), the small fish that they eat, and sport fish consumed by humans.

## **Acknowledgments**

SWAMP bioaccumulation surveys are funded by the United States Environmental Protection Agency (USEPA) and monitoring fees collected by the State Water Board for wastewater discharge permits. The Coast Survey was performed in close collaboration with the Southern California Bight Regional Monitoring Program ([www.sccwrp.org](http://www.sccwrp.org)) and the Regional Monitoring Program for Water Quality in the San Francisco Estuary ([www.sfei.org/rmp](http://www.sfei.org/rmp)).



**For more information, please contact:**

**SWAMP Program Coordinator  
State Water Resources Control Board  
Office of Information Management and Analysis  
1001 I Street, 15th Floor  
Sacramento, CA 95814  
(916) 341-5566**