

## Two-Year Lakes Study (2007, 2008): Frequently Asked Questions

### 1) Q: Why was this study conducted?

**A:** This study is the first part of a long-term strategy to provide information to water quality managers about the conditions of the waters of the state, including potential risks to human and ecosystem health from bioaccumulation of chemicals in aquatic organisms. The fish chosen for this study are common targets for fishermen, as well as primary food sources for birds and other mammals.

Water Board staff have been working closely with the Office of Environmental Health Hazard Assessment (OEHHA) staff and they receive these data as soon as they are available. Their role is to evaluate human health risks and issue advisories when necessary.

### 2) Q: How were the locations chosen?

**A:** The sampling strategy included the most popular fishing lakes throughout the state, a random sampling of an additional 50 lakes, plus 22 additional lakes added to the study through a cooperative agreement in Region 4. All together, 272 lakes have been sampled. A sub-group of the Surface Water Ambient Monitoring Program (SWAMP), the Bioaccumulation Oversight Group (BOG) is responsible for planning, sampling, and assessment of the data. The group consists of representatives from many organizations, including the State and Regional Water Boards, UC Davis, the California Department of Fish and Game, the Office of Environmental Health Hazard Assessment, and the US Environmental Protection Agency identified 222 of the most popular fishing lakes out of the 9,000 total lakes with in the state. The protocol for the random sampling is included in the report. Water Board staff work closely with OEHHA staff. Throughout the planning of this study, they have provided technical advice, and they will continue to be key partners in the planning of future sampling protocols. This partnership guarantees that their staff receives these data as soon as they are available. OEHHA's role is to evaluate human health risks and issue advisories when necessary. SWAMP provides data whenever possible to inform that role.

### 3) Q: Which fish were tested and where did they come from?

**A:** The fish collected and analyzed in this study were primarily species of bass, trout, common carp, catfish, and pikeminnow. A complete list is included in the "Contaminants in Fish from California Lakes and Reservoirs: Summary Report on a Two-Year Screening Survey" ("report"), Table 2, page 31. Fish were collected from a combination of targeted sampling at popular fishing lakes and random sampling of other lakes throughout the state. A complete list of all lakes is available in the report, Table 1a & 1b, pages 12-29.

### 4) Q: What chemicals were found in the fish tested?

**A:** The fish were analyzed for polychlorinated biphenyls (PCBs), DDT, dieldrin, chlordanes, mercury, and selenium. Mercury and PCBs are the two greatest concerns. Mercury contamination is largely a legacy of California mining, and can also reach lakes via atmospheric deposition. It is a persistent problem throughout much of the state. PCBs are persistent chemicals that were used primarily in electrical and industrial applications. Other pollutants were also found, but generally at low levels.

### 5) Q: Would it be safer to fish at water bodies without advisories or lakes not included in this study?

**A:** Water bodies not yet tested might also have some contaminated fish. More sampling is needed across the state. Meanwhile, check for existing advisories at other water bodies, and, if there are none, follow the general guidelines in the response to Question 11.

**6) Q: What are the ATLS and FCGs used in the report?**

**A:** OEHHA developed Advisory Tissue Levels (ATLs) and Fish Contaminant Goals (FCGs) for different purposes. Both of these benchmarks are expressed as concentrations of a specific chemical in fish tissue to which people could be exposed when eating sport fish. OEHHA developed ATLs and FCGs for seven chemicals: chlordane, DDTs, dieldrin, mercury, PCBs, selenium, and toxaphene.

OEHHA is responsible for issuing fish consumption advisories and safe eating guidelines. OEHHA staff developed ATLs as a starting point in our advisory process to develop consumption advice. Multiple ATLs were developed for each chemical showing a range of contaminant levels where fish consumption can be recommended. ATLs are not absolute values that always lead to the same recommendation. Other factors are considered (for example, levels of omega-3 fatty acids, the distribution of contaminant levels, and how to simplify communication) before OEHHA issues consumption advice. OEHHA's ATLs, as well as advisories and safe eating guidelines based on them, balance the risks and benefits from fish consumption.

OEHHA developed Fish Contaminant Goals (FCGs) for agencies using criteria values for management decisions, but without the same public health mandates as OEHHA. A single FCG was developed for each of the seven chemicals named above. These values are intended to be used to develop water quality criteria or cleanup levels. FCGs are risk-based and are not used to develop advisories.

In this report, the Water Boards have combined ATLs and FCGs in a series of thresholds and used them to provide a frame-of-reference for study results. These values have not formally been adopted and have not triggered additional specific actions based on them. References to specific consumption categories (e.g., a serving per week) in this report should not be used as consumption recommendations.

State Water Board staff is developing proposed methyl mercury fish tissue objectives and an implementation plan. The fish tissue objectives will be set at a level to protect both human health and wildlife. The implementation plan will include requirements for minimizing point and non-point\* discharges of mercury into California waters.

\*(Information regarding air deposition as an additional source of mercury in water and fish is available at US EPA: <http://www.epa.gov/mercury/reportover.htm>.)

**7) Q: Where the screening study found contaminant concentrations in fish that exceed OEHHA's "no consumption" levels, what actions would the Water Board recommend?**

**A:** The Water Boards do not establish consumption advice; that is the role of OEHHA, and this screening study does not provide enough data for OEHHA to develop consumption advice. These lakes would be identified as a high priority to collect and analyze enough species and fish for OEHHA to do an evaluation. This planning would be done in cooperation with OEHHA.

**8) Q: Are all fish contaminated?**

**A:** No, and even the fish found to have some of the chemicals did not have all of them. The chemicals analyzed have very specific properties and are stored in fish tissue differently. That is another reason for the types of fish chosen. Some chemicals, like mercury, are stored primarily in muscle. Others are more often stored in the fat, or "lipid" layer of the fish.

**9) Q: How do the chemicals in the fish compare throughout the state?**

**A:** In northern California, the study commonly found low concentrations in high-elevation lakes (above two thousand feet) in the Sierra Nevada and Trinity Alps. Trout were the most frequently caught species in these lakes, and tend to accumulate relatively low methylmercury concentrations. In

contrast, methylmercury concentrations in bass were higher than OEHHA's 0.44 ppm threshold in 48% of the lower elevation lakes (below two thousand feet) surveyed in northern California. Southern California had moderate methylmercury contamination, with 15% of the sampled lakes above 0.44 ppm.

PCB concentrations across the state also varied at a regional scale. Similar to the regional pattern seen for methylmercury, in northern California low concentrations were commonly observed in high elevation lakes in the Sierra Nevada and Trinity Alps. The vast majority of these lakes were below the FCG (3.6 ppb). PCB concentrations in low elevation (below 2000 ft) lakes in northern California were greater than those in the trout lakes. Of the 82 low elevation lakes sampled in northern California, 60% were below 3.6 ppb. Southern California was the region with the highest PCB concentrations. Of the 83 lakes in southern California sampled, 40% were below 3.6 ppb.

**10)Q: What are the health concerns from consuming these chemicals?**

**A:** The principal health effects of concern are potential nervous system changes in developing fetuses, infants, and small children (e.g., impaired mental and motor development), mainly associated with excessive mercury or PCB exposure, and potentially increased risks of cancer due to exposure to PCBs and the pesticides. There is some indication of greater sensitivity of nervous system of fetuses, infants, and young children. Because of this sensitivity more restrictive consumption advice is given for young children and pregnant or breast-feeding women who may pass the chemicals on to their fetus or child.

**11)Q: It sounds like fish in lakes statewide were contaminated. Should I stop eating all fish from all lakes in California?**

**A:** In many water bodies, one or two species of fish are expected to have higher levels of certain contaminants than others have, but there is no reason to stop eating all fish from all lakes in California. Fish contain beneficial proteins and omega-3 fatty acids. With comprehensive sampling at a water body, we typically find several species that have very low levels of contamination that can be safely eaten frequently as part of a healthy diet. OEHHA might also determine that one or two other species should not be eaten in the same water body, especially by sensitive populations (women 18-45 years and children 1-17 years). The "indicator" species used in this study often has higher levels of contamination. Check OEHHA's "safe eating guidelines" ([http://oehha.ca.gov/fish/so\\_cal/index.html](http://oehha.ca.gov/fish/so_cal/index.html)) for consumption advice for tested water bodies in California. Follow these general guidelines when fishing at lakes or other water bodies without advisories:

**Fishing Practices:**

- ▶ Chemical levels can vary from place to place. Your overall exposure to chemicals is likely to be lower if you fish at a variety of places, rather than at one location that might have high contamination levels.
- ▶ Catching and releasing fish is also a good practice that allows you to relax and enjoy fishing and conserve our natural resources, too.

**Fish Species:**

- ▶ Some fish species have higher chemical levels than others do in the same location. If possible, eat smaller amounts of several different types of fish rather than a large amount of one type that may be high in contaminants.

**Fish Size:**

- ▶ Smaller fish of a species will usually have lower chemical levels than larger ones in the same location because some chemicals become more concentrated in larger, older fish. It is advisable to eat smaller fish (of legal size) more often than larger fish.

### ***Fish Preparation and Consumption:***

- ▶ Eat only the fillet portions. Do not eat the guts, liver, and skin because chemicals usually concentrate in those parts.

### ***Species that generally have higher levels of contaminants:***

- ▶ Predatory fish, in particular, accumulate more mercury. In freshwater, bass species (e.g., striped bass, largemouth bass, smallmouth bass, and spotted bass) are often the top predators. Women and children are more sensitive to the harmful effects of mercury and should not eat these species regularly.

### ***Species that generally have lower levels of contaminants:***

- ▶ Rainbow trout and various sunfish (e.g., bluegill and redear sunfish) are often the least contaminated fish in water bodies. They are typically safer to eat but, always check for advisories at individual water bodies.

### **12)Q: Will I get sick if I don't stop eating fish from some lakes in this study?**

- A:** The contaminants found in this study only cause health effects after long-term exposure to high doses. Eating an occasional meal of fish from lakes where contaminants were found will not make you sick. You should follow the general guidelines in the answer to Question 11.

### **13)Q: What will OEHHA do with the data from this study?**

- A:** OEHHA included data from this study in an update of established advisories with existing adequate data. OEHHA updated 80% of our state advisories in March 2009. The updated advisories are on OEHHA's web site and in the Department of Fish and Game Sport Fishing Regulations Handbooks. OEHHA used our new advisory protocol that incorporates both risk and benefits to update advisories and put them in a consistent format. A report describing how individual advisories were updated can be found at <http://www.oehha.ca.gov/fish/pdf/DiscAdvyUpdates032309.pdf>.

OEHHA will carefully evaluate the results of the first and second year of this study; and will work with the Water Boards to develop priorities for additional sampling at individual water bodies to develop comprehensive consumption advice for fish people catch and consume.

The State Water Board is developing proposed methyl mercury fish tissue objectives and an implementation plan. The fish tissue objectives will be set at a level to protect both human health and wildlife. The implementation plan will include requirements for minimizing point and non-point\* discharges of mercury into California waters.

\*(Information regarding air deposition as an additional source of mercury in water and fish is available at US EPA: <http://www.epa.gov/mercury/reportover.htm>.)

### **14)Q: Will OEHHA develop new advisories using data from this study?**

- A:** OEHHA cannot develop new advisories based solely on data from this study. This was a screening study not meant for developing consumption advice. In some cases, only one fish species was sampled in a water body. Several popular species that people catch for consumption need to be sampled in order to develop comprehensive consumption advice.

### **15)Q: Are the chemical levels going down?**

- A:** With only one year of data available for assessment, there is not enough information yet to draw conclusions about trends in chemical levels. One of the long-term goals of this study is to collect data to begin those comparisons.

**16)Q: What are the sources of the contaminants found in the fish?**

**A: Mercury** – In general, the main source of mercury for on-stream reservoirs in mercury-contaminated watersheds, is primarily mercury-contaminated sediment transported into the reservoir, and secondarily mercury from air deposition\*. In general, the main source of mercury in natural lakes and off stream reservoirs is mercury from air deposition.

**PCBs** – These compounds are a persistent problem throughout much of the state, and are still in use. PCBs are persistent chemicals used primarily in electrical and industrial applications.

**17)Q: What is the difference between the table in the Two-Year Screening Survey Report Appendix 1 and the Excel files available on the Surface Water Ambient Monitoring Program-Data Management Team (SWAMP-DMT) online data site?**

**A:** The Appendix supports the figures in the report and provides data in summary form for results with threshold values. The data available from the SWAMP-DMT provide access to individual PCB congeners, additional analytes reported like organochlorine results and lipids as well as sample attributes like fish sex, weights and target lat/longs of the lakes.

**18)Q: I would like to obtain the raw data from the SWAMP database, is it available to me and where can I find it?**

**A:** Review the data available on the SWAMP DMT site: <http://swamp.mpsl.mlml.calstate.edu/online-data/year-1-lakes-fish-contaminant-study>.

If this is not sufficient, contact Cassandra Lamerdin, [clamerdin@mlml.calstate.edu](mailto:clamerdin@mlml.calstate.edu) for more information.

**19)Q: Whom do I contact for information about lakes in my area?**

**A:** The statewide contact would be:  
William Rukeyser, State Water Resources Control Board  
[WRukeyser@waterboards.ca.gov](mailto:WRukeyser@waterboards.ca.gov)  
(916) 341-7365