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HEALTH ADVISORY:

**GUIDELINES FOR CONSUMPTION OF FISH AND
SHELLFISH FROM CLEAR LAKE, CACHE CREEK,
AND BEAR CREEK (LAKE, YOLO, AND COLUSA
COUNTIES)**

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EXECUTIVE SUMMARY

The Office of Environmental Health Hazard Assessment (OEHHA), formerly part of the Department of Health Services (DHS) but now in the California Environmental Protection Agency, issued a health advisory in 1987 for sport fish from Clear Lake (Lake County) based on mercury contamination in edible fish tissue collected from the lake (Appendix I). Since the advisory was issued, additional data have been collected for Clear Lake fishes as well as for fish from surrounding water bodies, including Cache Creek and Bear Creek. The Central Valley Regional Water Quality Control Board (CVRWQCB) compiled a large dataset comprised of historical and more recently collected fish tissue data principally for Clear Lake but including data from the nearby water bodies. The CVRWQCB used this dataset to develop a Total Daily Maximum Load (TMDL) for mercury for Clear Lake to lower mercury levels in the watershed such that human and wildlife health are protected (Cooke, 2002). This dataset was reviewed by OEHHA, and data suitable for issuing fish consumption advisories were selected and used to update the advisory for Clear Lake and to determine whether there may be potential adverse health effects associated with consuming sport fish from Cache Creek and Bear Creek.

Mercury is a trace metal that can be toxic to humans and other organisms. Mercury occurs naturally in the environment, and is also redistributed in the environment as a result of human activities such as mining and the burning of fossil fuels. Once mercury is released into the environment, it cycles through land, air, and water. In aquatic systems, it undergoes chemical transformation to the more toxic organic form, methylmercury, which accumulates in fish and other organisms. More than 95 percent of the mercury found in fish occurs as methylmercury, which is a highly toxic form of the element. Consumption of fish is the major route of exposure to methylmercury in the United States. For more information on mercury, see Appendix II.

The critical target of methylmercury toxicity is the nervous system, particularly in developing organisms such as the fetus and young children. Significant methylmercury toxicity can occur to the fetus during pregnancy even in the absence of symptoms in the mother. In 1985, the United States Environmental Protection Agency (U.S. EPA) set a reference dose (RfD, that is the daily exposure likely to be without significant risks of deleterious effects during a lifetime) for methylmercury of 3×10^{-4} milligrams per kilogram of body weight per day (mg/kg-day), based on central nervous system effects (ataxia, or loss of muscular coordination; and paresthesia, a sensation of numbness and tingling) in adults. This RfD was lowered to 1×10^{-4} mg/kg-day in 1995 (and confirmed in 2001), based on developmental neurologic abnormalities in infants exposed *in utero*. Because OEHHA finds convincing evidence that the fetus is more sensitive than adults to the neurotoxic effects of mercury, but also recognizes that fish can play an important role in a healthy diet, OEHHA chooses to use both the current and previous U.S. EPA reference doses for two distinct population groups. In this advisory, the current RfD based on effects in infants will be used for women of childbearing age and children aged 17 years and younger. The previous RfD, based on effects in adults, will be used for women beyond their childbearing years and men.

Sufficient data were available to characterize the concentrations of mercury for the following species and locations: largemouth bass, smallmouth bass, channel catfish, white catfish, brown bullhead, carp, black crappie, white crappie, Sacramento blackfish, and hitch in Clear Lake; and bluegill, sucker, Sacramento pikeminnow, and hardhead in Cache Creek. The data for each species from each of these locations were combined to set consumption guidelines. Fish from each species can be found in both water bodies, and there was no evidence indicating that the mean mercury concentrations were significantly different. Additionally, data for crayfish from Clear Lake were evaluated and used to develop consumption guidelines for these shellfish.

In Bear Creek, sufficient samples were limited to two species: Sacramento sucker and Sacramento pikeminnow. In this case, mean mercury concentrations in fish from Bear Creek were considerably higher than concentrations for the same species in Cache Creek, and consequently, advice was developed independently for Bear Creek. Results from other studies conducted in the Cache Creek watershed supported this decision.

Mercury concentrations were compared to guidance tissue levels for methylmercury, which are designed so that individuals consuming no more than a preset number of meals should not exceed the RfD for this chemical. Evaluation of data and comparison with guidance tissue levels for methylmercury indicated that fish consumption advisories were appropriate for Clear Lake, Cache Creek, and Bear Creek. Consumers should be informed of the potential hazards from eating fish from these water bodies, particularly those hazards relating to the developing fetus and children. All individuals, especially women of childbearing age and children aged 17 years and younger, are advised to limit their fish consumption to reduce methylmercury ingestion to a level as close to the reference dose as possible. To help sport fish consumers achieve this goal, OEHHA has developed the advisories contained in this report. Meal sizes should be adjusted to body weight as described in the advisory table.

For general advice on how to limit your exposure to chemical contaminants in sport fish (*e.g.*, eating smaller fish of legal size), see the California Sport Fish Consumption Advisories (<http://www.oehha.ca.gov/fish.html>) or Appendix III. Site-specific advice for other California water bodies can be found online at: http://www.oehha.ca.gov/fish/so_cal/index.html. It should be noted that, unlike the case for many organic contaminants, various cooking and cleaning techniques will not reduce the methylmercury content of fish.

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FISH AND SHELLFISH CONSUMPTION GUIDELINES FOR CLEAR LAKE AND CACHE CREEK

Fish are nutritious, providing a good source of protein and other nutrients, and are recommended as part of a healthy, balanced diet. As with many other kinds of food, however, it is prudent to eat fish in moderation and to make informed choices about which fish are safe to eat. OEHHA provides this consumption advice so that people can continue to eat fish without putting their health at risk.

Women of childbearing age and children 17 years and younger may eat:	
Once a month	Largemouth bass, smallmouth bass, channel catfish, white catfish, brown bullhead, green sunfish, black crappie, white crappie, Sacramento blackfish, Sacramento pikeminnow, hardhead, or Sacramento sucker OR:
Once a week	Bluegill, hitch, carp, trout, or crayfish
Women beyond childbearing age and men may eat:	
Once a week	Largemouth bass, smallmouth bass, channel catfish, white catfish, brown bullhead, green sunfish, black crappie, white crappie, Sacramento blackfish, Sacramento pikeminnow, hardhead, or Sacramento sucker OR:
3 times a week	Bluegill, hitch, carp, trout, or crayfish
<p>EAT SMALLER FISH OF LEGAL SIZE. Fish accumulate mercury as they grow.</p> <p>DO NOT COMBINE FISH CONSUMPTION ADVICE. If you eat multiple species or catch fish from more than one area, the recommended guidelines for different species and locations should not be combined. For example, if you eat a meal of fish from the one meal per month category, you should not eat another fish species containing mercury for at least one month.</p> <p>Meal size is assumed to be eight ounces for a 150-pound adult. If you weigh more or less than 150 pounds, add or subtract one ounce to your meal size, respectively, for each 20-pound difference.</p>	

CONSIDER YOUR TOTAL FISH CONSUMPTION. Fish from many sources (including stores and restaurants) can contain elevated levels of mercury and other contaminants. **IF YOU EAT FISH WITH LOWER CONTAMINANT LEVELS (INCLUDING COMMERCIAL FISH) YOU CAN SAFELY EAT MORE FISH.** The American Heart Association recommends that healthy adults eat at least two servings of fish per week. Shrimp, king crab, scallops, farmed catfish, wild salmon, oysters, tilapia, flounder, and sole generally contain some of the lowest levels of mercury.

FISH AND SHELLFISH CONSUMPTION GUIDELINES FOR BEAR CREEK

DO NOT EAT	No one should eat any fish or shellfish from Bear Creek
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