OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

GOOD CATCH CALIFORNIA
Your Fish Advisor

Health Advisory and Guidelines for Eating Fish from Mammoth Creek (Mono County)

November 2025

Fish, Incident Response, Seafood Safety, and Harmful Algal Bloom Section
Pesticide and Environmental Toxicology Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

LIST OF CONTRIBUTORS

Office of Environmental Health Hazard Assessment

Project Leads

Loren Chumney, M.S.
Huyen Tran Pham, M.P.H.

Primary Reviewers

Susan A. Klasing, Ph.D., Section Chief (Retired)
Wesley Smith, Ph.D., Section Chief

Final Reviewers

Kimberly Gettmann, Ph.D., Deputy Director for Scientific Programs
David Edwards, Ph.D., Chief Deputy Director

Director

Kristina Thayer, Ph.D., Director

ACKNOWLEDGMENTS

Developing fish consumption advisories depends on sampling and analysis of fish. The Office of Environmental Health Hazard Assessment acknowledges the contribution of information from the following entities: the State Water Resources Control Board, the California Department of Fish and Wildlife, and the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories. Data were obtained from the California Environmental Data Exchange Network. The map was created using ArcMap (10.5) from Environmental Systems Resource Institute (ESRI, Redlands, California).

For further information, contact:

Pesticide and Environmental Toxicology Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

1001 I Street, P.O. Box 4010
Sacramento, CA 95812-4010
Telephone: (916) 324-7572
Email address: fish@oehha.ca.gov

1515 Clay Street, 16th Floor
Oakland, CA 94612
Telephone: (510) 622-3170

LIST OF ACRONYMS AND ABBREVIATIONS

ATL	Advisory Tissue Level
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
DDT(s)	dichlorodiphenyltrichloroethane (DDT) and its metabolites dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethylene (DDE)
DMA	direct mercury analyzer
FDA	United States Food and Drug Administration
Hg	mercury
ICP-MS	inductively coupled plasma-mass spectrometry
MDL	method detection limit
mm	millimeters
MPSL	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
OEHHA	Office of Environmental Health Hazard Assessment
PBDEs	polybrominated diphenyl ethers
PCBs	polychlorinated biphenyls
ppb	parts per billion
RL	reporting limit
Se	selenium
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TSMP	Toxic Substances Monitoring Program
USDA	United States Department of Agriculture
USDHHS	United States Department of Health and Human Services
US EPA	United States Environmental Protection Agency

PREFACE

The Office of Environmental Health Hazard Assessment (OEHHA), a department in the California Environmental Protection Agency, is responsible for evaluating potential public health risks from chemical contamination of sport fish.[1] This includes issuing fish consumption advisories, when appropriate, for the State of California. OEHHA's authorities to conduct these activities are based on mandates in the:

- California Health and Safety Code
  - Section 59009, to protect public health
  - Section 59011, to advise local health authorities
- California Water Code
  - Section 13177.5, to issue health advisories.

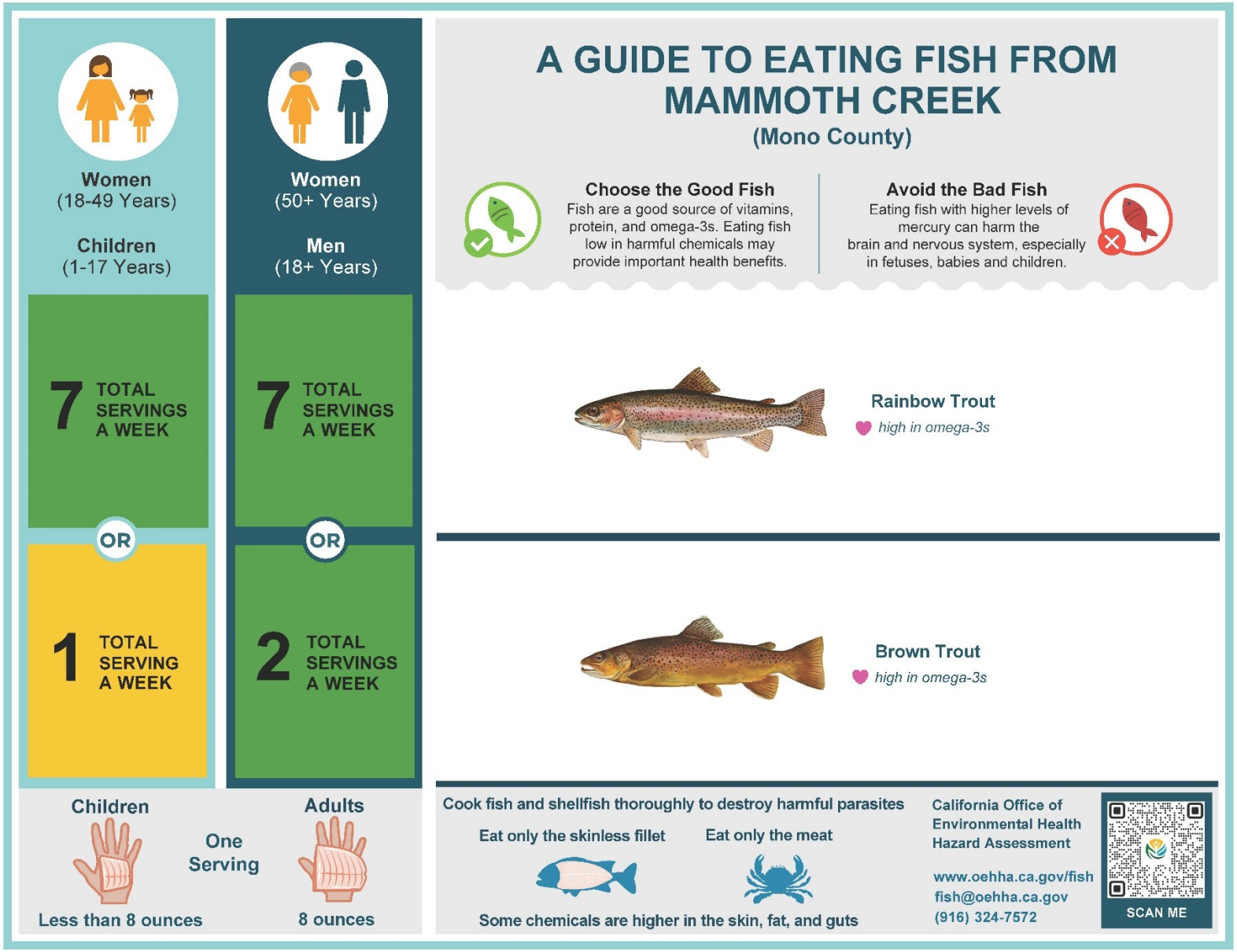
The health advisories are posted on OEHHA's website and published in the California Department of Fish and Wildlife's (CDFW) Inland and Ocean Sport Fishing Regulations in their respective sections on public health advisories.[2]

This report presents guidelines for eating fish from Mammoth Creek in Mono County. The report provides background information and a technical description of how the guidelines were developed. The resulting advice is summarized in the illustrations after the Table of Contents and the List of Figures and Tables.

[1] Sport fish includes all fish and shellfish caught from California waters for non-commercial purposes (e.g., recreational, tribal/cultural, and subsistence practices).
[2] CDFW's Inland and Ocean Sport Fishing Regulations can be found online at: https://wildlife.ca.gov/Fishing/Inland and https://wildlife.ca.gov/Fishing/Ocean, respectively.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES


Women
(18-49 Years)
Children
(1-17 Years)
7 TOTAL SERVINGS A WEEK
OR
1 TOTAL SERVING A WEEK
Women
(50+ Years)
Men
(18+ Years)
7 TOTAL SERVINGS A WEEK
OR
2 TOTAL SERVINGS A WEEK
Children
One Serving
Adults
Less than 8 ounces
8 ounces
A GUIDE TO EATING FISH FROM MAMMOTH CREEK
(Mono County)
Choose the Good Fish
Fish are a good source of vitamins, protein, and omega-3s. Eating fish low in harmful chemicals may provide important health benefits.
Avoid the Bad Fish
Eating fish with higher levels of mercury can harm the brain and nervous system, especially in fetuses, babies and children.
Rainbow Trout
high in omega-3s
Brown Trout
high in omega-3s
Cook fish and shellfish thoroughly to destroy harmful parasites
Eat only the skinless fillet
Eat only the meat
Some chemicals are higher in the skin, fat, and guts
California Office of Environmental Health Hazard Assessment
www.oehha.ca.gov/fish
fish@oehha.ca.gov
(916) 324-7572
SCAN ME

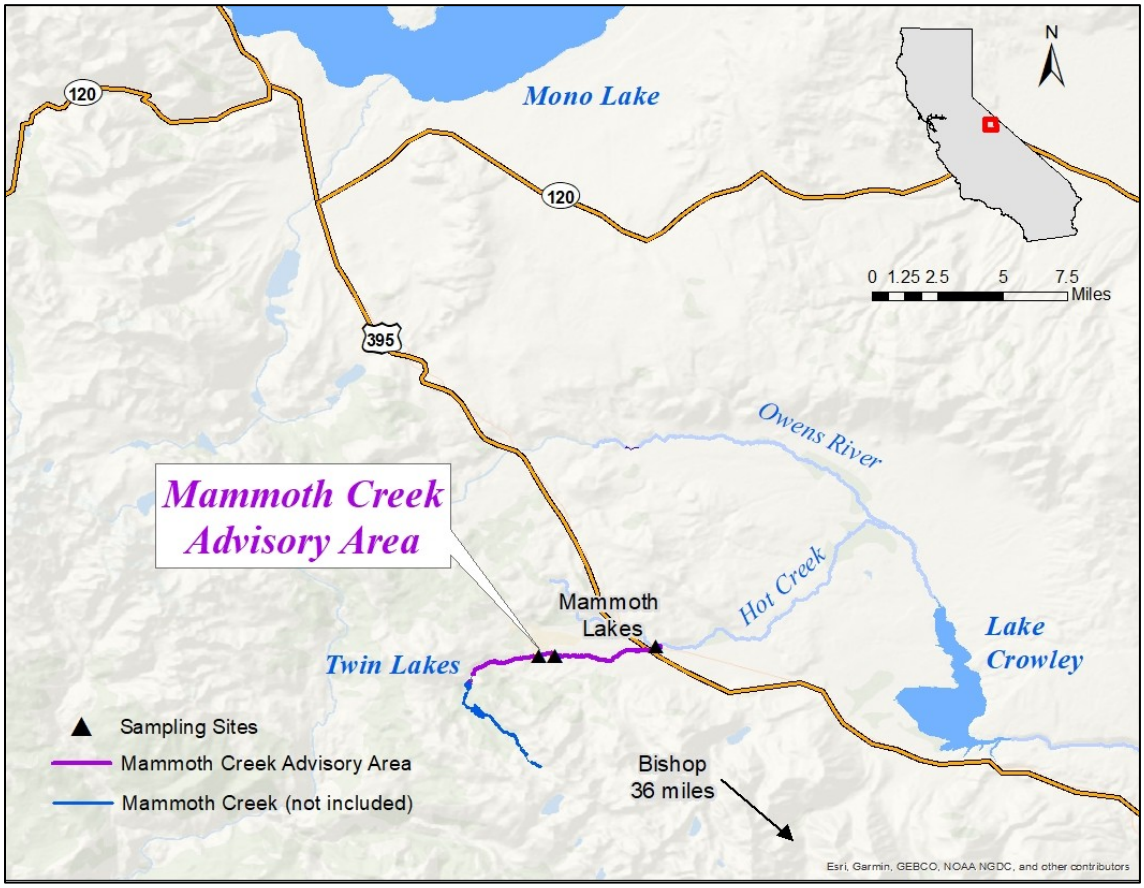
INTRODUCTION

This report presents guidelines for eating Brown Trout and Rainbow Trout from Mammoth Creek (Figure 1). Consumption advice is based on levels of mercury found in these species.

LOCATION

Mammoth Creek runs about eight miles through the western part of Mono County, approximately 36 miles northwest of the city of Bishop. The headwaters of the creek are located in the Mammoth Lakes Basin. The creek flows from the basin, through the town of Mammoth Lakes, and merges with Hot Creek before its confluence with the Upper Owens River. The California Department of Fish and Wildlife plants Rainbow Trout in Mammoth Creek. This advisory pertains to Mammoth Creek, starting at the Twin Lakes outfall and ending at Hot Creek (as shown in Figure 1).

FIGURE 1. LOCATION OF MAMMOTH CREEK



APPROACH USED

The Office of Environmental Health Hazard Assessment (OEHHA) used the results from two monitoring studies described in this report to develop the Mammoth Creek Advisory. OEHHA uses the following general process in developing consumption advice for sport fish:

1) Evaluation of all fish contaminant data available from a water body and selection of appropriate data that meet data quality criteria and sampling plan guidelines.
2) Determination of fish species for which adequate data are available to issue fish consumption advice.
3) Calculation of an appropriate measure of central tendency (often a weighted arithmetic mean)[3] and other descriptive statistics of the contaminant data, as appropriate, for a chemical of concern for the selected fish species.
4) Comparison of the chemical concentrations with the OEHHA Advisory Tissue Levels (ATLs) for each chemical of concern.
5) Development of final advice based on a thorough review of the data and best professional judgment relating to the benefits and risks of consuming a particular fish species.

The ATLs (discussed further in a subsequent section of this report) are chemical levels in fish tissue that are considered acceptable, based on chemical toxicity, for a range of consumption rates. Development of the ATLs also includes consideration of health benefits associated with including fish in the diet (OEHHA, 2008). The ATLs should not be interpreted as static “bright lines,” but as one component of a complex process of data evaluation and interpretation used by OEHHA in the assessment and communication of the benefits and risks of consuming sport fish.

CHEMICALS OF CONCERN

Certain chemicals, because of their toxicity and their ability to accumulate in fish tissue, are of concern for people who eat fish. The majority of fish consumption advisories in California are issued because of mercury, followed by polychlorinated biphenyls (PCBs) and, in a few cases, selenium, polybrominated diphenyl ethers (PBDEs), or some legacy pesticides (pesticides that are no longer used but remain in the environment).

Mercury is an element found in some rocks and soil. Human activities, such as burning coal and the historical use of mercury to mine gold, also add mercury to the environment. If mercury enters waterways, it can be converted to a more toxic form known as methylmercury, which can pass into and build up in fish. High levels of

[3] Means are an arithmetic average of individual values and/or composites weighted by number of fish. A weighted average of composites is calculated by multiplying the chemical concentration in each composite by the number of fish in that composite for each species. Products are then summed and divided by the total number of fish in all composites for that species.

methylmercury can harm the brain, especially in fetuses and children, whose brains are still developing.

PCBs are industrial chemicals previously used in electrical transformers, plastics, and lubricating oils, and were often used as flame retardants or electrical insulators. Their use was banned in the 1970s, but they can accumulate in fish because they do not break down easily and they persist in the environment. Depending on the exposure level, PCBs may cause cancer or other health effects, including neurotoxicity, in humans.

Selenium is an element and at low doses is an essential nutrient for many important human health processes, including thyroid regulation and vitamin C metabolism. Higher doses cause selenium toxicity, which can include symptoms ranging from hair loss and gastrointestinal distress to dizziness and tremors.

PBDEs are a class of flame retardants historically used in a variety of consumer products, including furniture, textiles, automotive parts, and electronics. The use of PBDEs in new products was largely phased out by 2013 but, due to their wide usage and persistence in the environment, they are still being detected in fish tissues. PBDEs may affect hormone levels, which can disrupt learning and behavior in children, among other adverse effects.

Chlordanes, dichlorodiphenyltrichloroethane (DDT), dieldrin, and toxaphene are pesticides that were banned from use in 1973 (DDT), the late 1980s (chlordanes and dieldrin) and 1990 (toxaphene), but are still found in some fish in certain California water bodies. Depending on the exposure level, these chemicals may cause cancer or adverse effects on the nervous system.

A detailed discussion of the toxicity of these chemicals is presented in “Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene” (OEHHA, 2008) and “Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Polybrominated Diphenyl Ethers (PBDEs)” (OEHHA, 2011).

Both fish species collected from Mammoth Creek and used in advisory development were analyzed for mercury, PCBs, and selenium as indicated in Table 1.

DATA SOURCES

The guidelines for eating fish from Mammoth Creek are based on the chemicals detected in fish collected for the two monitoring studies described below. These studies met OEHHA’s data quality criteria, including adequate documentation of sample collection, fish preparation methods (e.g., skinning or filleting), chemical analyses, quality assurance, and sufficiently low detection limits. “Sample,” as used in this report, refers to an individual fish or a composite of multiple fish for which contaminant data

were reported. “Sampling” or “sampled” refers to the act of collecting fish for chemical analysis. The studies or entities contributing data to this advisory are described below.

Lahontan Regional Water Quality Control Board Fish Tissue Study, 2016–2017 (RWB6)

The Surface Water Ambient Monitoring Program (SWAMP), managed by the State Water Resources Control Board (SWRCB) in cooperation with the Lahontan Regional Water Quality Control Board, monitors water quality in California’s surface waters. Brown Trout and Rainbow Trout were collected from Mammoth Creek in 2016 and 2017 to analyze for mercury, PCBs, and selenium.[4]

Toxic Substances Monitoring Program (TSMP)

The TSMP operated from 1976 to 2003 as a state water quality-monitoring program managed by the SWRCB (SWRCB, 2007 and 2013). Its objective was to provide statewide information on the occurrence of toxic substances by monitoring water bodies with known or suspected water quality impairment. The California Department of Fish and Wildlife (CDFW), then known as the California Department of Fish and Game, collected Brown Trout from Mammoth Lake in 1992, 1995, and 2002 as part of the program to analyze for mercury and selenium.

FISH SAMPLED FROM MAMMOTH CREEK

The fish sampling data used in this advisory were retrieved from the California Environmental Data Exchange Network (CEDEN),[5] the state’s repository for environmental data. Samples were excluded when the fish were not legal size to take or did not meet OEHHA’s criteria for minimum “edible” size, based on species size at maturity and professional judgment (as described in OEHHA, 2022). A summary of all fish species evaluated for this advisory is shown in Table 1, including the name of the species, number of samples collected, total number of fish, project name, year sampled, and contaminants analyzed.

[4] Information on the Lahontan Regional Water Quality Control Board can be found online at: https://www.waterboards.ca.gov/lahontan/
[5] Online at: http://ceden.waterboards.ca.gov/AdvancedQueryTool.

TABLE 1. FISH SAMPLES EVALUATED FOR THE MAMMOTH CREEK ADVISORY

Common Name	Scientific Name	Number of Samples[a]	Total Number of Fish	Project	Year Collected	Contaminants Analyzed[b,c]
Brown Trout	*Salmo trutta*	3	17	TSMP[d]	1992, 1995, 2002	Hg, Se
		19	19	RWB6	2016–2017	Hg
		1	18	RWB6	2016	PCBs
		2	18	RWB6	2016–2017	Se
Rainbow Trout	*Oncorhynchus mykiss*	18	18	RWB6	2016–2017	Hg
		1	18	RWB6	2016	PCBs
		2	18	RWB6	2016–2017	Se

[a] Samples refer to individual fish or composite of multiple fish.
[b] Data for organic chemicals (e.g., chlordanes, DDTs, dieldrin, PCBs or toxaphene) generated prior to 2000 were excluded from the analysis because data that are more recent are considered more reliable due to improved analytical methods and are likely to be more representative of fish caught today.
[c] Data for inorganic chemicals (e.g., Hg or Se) that were generated prior to 2000 were evaluated to determine if they should be included in the analysis.
[d] Study report did not specify whether skin was removed from fillets prior to tissue analysis.
Abbreviations: Hg, mercury; PCBs, polychlorinated biphenyls; Se, selenium

CHEMICAL CONCENTRATIONS

As shown in Table 1, samples were analyzed for the following: total mercury, selenium, and PCBs (59 congeners).[6] Among the chemicals analyzed in fish tissue samples from Mammoth Creek, only mercury levels impacted consumption advice.

All fish samples were prepared as skinless fillets, except for the TSMP study where the fillet preparation method for Brown Trout was not recorded. Samples were analyzed as individual fish or composites.

[6] Congeners are related compounds with similar chemical forms. Five and six congeners are typically analyzed for chlordanes and DDTs, respectively. Of the 209 possible PBDE and PCB congeners, 6–7 and 48–54 are generally analyzed, respectively. See the OEHHA (2022) sampling protocol available online at https://oehha.ca.gov/media/downloads/fish/report/fishadvisorysamplinganalysisprotocolreport2022.pdf.

For this advisory, OEHHA used the weighted (by the number of individual fish) average (arithmetic mean) of the chemical concentrations (in wet weight) for each fish species to estimate average human exposure.

Mercury

Samples were analyzed for total mercury, as either individual fish or composite samples, using a direct mercury analyzer (DMA) at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL). The laboratory used by the TSMP study was not recorded. The DMA method utilizes thermal decomposition and atomic absorption. OEHHA assumed all mercury detected was methylmercury, which is the most common form found in fish and is also the more toxic form (Bloom, 1992). Table 2 shows the averages and ranges for total length (millimeters (mm)),[7] as well as mercury concentrations in each fish species. The DMA method detection limit (MDL)[8] for total mercury was reported at 3 parts per billion (ppb), and the reporting limit (RL)[9] was 9 ppb. Although the MDL and RL were not reported in the TSMP study, mercury was detected at concentrations consistent with other studies. For this reason, these data were included in the calculation of sample means.

PCBs

PCBs in composite samples were analyzed by gas chromatography at ALS Global. Where applicable, the concentrations presented were the sum of the detected analytes (parent compound, congeners, or metabolites) for PCBs. Individual congeners or metabolites with concentrations reported as non-detects were assumed to be zero (due to relatively low MDLs or RLs). This is a standard method of handling non-detect values for PCBs and other chemicals with multiple congeners or metabolites in a given sample when detection levels are adequate (US EPA, 2000a).

Selenium

Samples were analyzed for selenium at MPSL as composite samples, using inductively coupled plasma-mass spectrometry (ICP-MS). The ICP-MS method uses desolvation, atomization, and ionization with ion separation based on a mass-to-charge ratio to detect the total selenium concentration in a sample. The laboratory used by the TSMP study was not recorded. The ICP-MS MDL for selenium was reported at 150 ppb and the RL was 400 ppb. Although the MDL and RL were not reported in the TSMP study, selenium was detected at concentrations consistent with other studies. For this reason, these data were included in the calculation of sample means.

---

[7] Total length is the maximum length of the fish, measured from the tip of the closed mouth to the tip of the pinched tail fin.
[8] The MDL is the lowest amount of a chemical that can be distinguished (as greater than zero) in a sample.
[9] The RL is the lowest amount of a chemical that can be accurately quantified in a sample.

Concentrations of PCBs and selenium were lower than the corresponding ATL threshold values for daily consumption (OEHHA, 2008 and 2011). Except for assessing multiple chemical exposures, these chemicals were not considered further for developing consumption advice and are not shown in this report.

TABLE 2. MERCURY CONCENTRATIONS IN FISH FROM MAMMOTH CREEK

Species from Mammoth Creek	Number of Samples[a]	Total Number of Fish	Mean[b] Total Length (mm)	Range[c] of Total Lengths (mm)	Mercury (ppb)	
					Mean[b]	Range[c]
Brown Trout	22	36	241	211 – 285	328	166 – 420
Rainbow Trout	18	18	291	213 – 541	17	9 – 43

Samples were analyzed as skinless fillets; the fillet preparation method for Brown Trout analyzed by the TSMP study was not recorded.

[a] Samples refer to individual fish or composite of multiple fish.

[b] Means are an arithmetic average of individual values and/or a weighted average of composites.

[c] Range of individuals and/or range of the composites.

DEVELOPMENT OF GUIDELINES FOR EATING FISH FROM MAMMOTH CREEK

The OEHHA fish advisory process considers the health benefits of fish consumption as well as the risk from exposure to the chemical contaminants found in fish. Benefits are included in the advisory process because there is considerable evidence and scientific consensus that fish should be part of a healthy well-balanced diet. Fish contain many nutrients that are important for general health and, in particular, help promote optimal growth and development of babies and young children, and may reduce the incidence of heart disease in adults (FDA/US EPA, 2017; American Heart Association, 2016; OEHHA, 2008; Institute of Medicine, 2007; Kris-Etherton et al., 2002). Fish are a significant source of the beneficial omega-3 fatty acids, docosahexaenoic acid and eicosapentaenoic acid (USDA/USDHHS, 2020; Weaver et al., 2008).

As part of a healthy US-style dietary pattern at the 2,000-calorie level, the “Dietary Guidelines for Americans, 2020 – 2025” (USDA/USDHHS, 2020) recommends consuming eight ounces of seafood[10] per week. Young children are advised to eat proportionately smaller amounts. “Women who are pregnant or lactating should consume at least eight and up to 12 ounces of a variety of seafood per week from choices that are lower in methylmercury.” Additionally, “based on FDA [US Food and Drug Administration] and EPA’s [US Environmental Protection Agency] advice,[11] depending on body weight, some women should choose seafood lowest in

[10] Seafood as used here refers to fish and shellfish from freshwater and marine environments.

[11] Online at: https://www.fda.gov/food/consumers/advice-about-eating-fish.

methylmercury or eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern" and avoid certain species (USDA/USDHHS, 2020). The species of fish that people eat is an important factor in determining the net beneficial effects of fish consumption. For example, studies have shown that children of mothers who ate low-mercury fish during pregnancy scored better on cognitive tests compared to children of mothers who did not eat fish or ate high-mercury fish (Oken et al., 2005 and 2008). Accordingly, because of the high mercury content of certain fish species, the FDA and the US EPA recommend that women who are pregnant (or might become pregnant) or breastfeeding, and young children avoid consuming shark, Swordfish, tilefish (Gulf of Mexico), Bigeye Tuna, marlin, Orange Roughy, and King Mackerel (FDA/US EPA, 2017).

To address the potential health concerns associated with exposure to contaminants in sport fish, OEHHA has established ATLs for chemicals that are known to accumulate in the edible tissues of fish. ATLs consider both the toxicity of the chemical and potential benefits of eating fish. OEHHA uses the ATLs to determine the maximum number of servings per week that consumers can eat safely, for each species and from each location, to limit their exposure to these contaminants. Consumers can use OEHHA's guidance when choosing which fish and how much to eat as part of an overall healthy diet.

There are two sets of ATLs for methylmercury in fish because of the age-related toxicity of this chemical (OEHHA, 2008). The fetus and children are more sensitive to the toxic effects of methylmercury. Thus, the ATLs for the sensitive population, including women who might become pregnant (typically 18–49 years of age) and children 1–17 years of age, are lower than those for women 50 years and older and men 18 years and older. The lower ATL values for the sensitive population provide additional protection to allow for normal growth and development of the brain and nervous system of fetuses and children. Detailed discussion about the toxicity of common fish contaminants and health benefits of fish consumption, as well as derivation of the ATLs, are provided in "Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene" (OEHHA, 2008) and "Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Polybrominated Diphenyl Ethers (PBDEs)" (OEHHA, 2011). A table of the ATLs used in this report is presented in the Appendix.

For each fish species in this advisory, OEHHA compared the mean chemical concentrations detected in the fillet to the corresponding ATLs to establish the maximum number of servings per week that can be safely consumed (see Appendix). For fish fillets, a serving size is considered to be eight ounces, prior to cooking, or about the size and thickness of a hand. Children should be given smaller servings. For smaller fish species, several individual fish may be required to yield a serving.

The consumption advice for a fish species is initially based on the chemical with the lowest allowable number of servings per week. Because some chemicals, such as

mercury and PCBs, are known to have similar adverse effects, additivity of toxicity is assumed in such cases and may be assessed using multiple chemical exposure methodology (US EPA, 1989 and 2000b). If two or more chemicals with similar adverse effects are present in fish tissue, multiple chemical exposure methodology involving hazard index calculations is employed. This may result in advising fewer servings per week than would be the case for the presence of either chemical alone, with a similar concentration. The potential effect of multiple chemical exposures (mercury and PCBs) was not assessed in Brown Trout or Rainbow Trout due to the non-detectable levels of PCBs. Advice for both species in this advisory is based solely on mercury concentrations.

OEHHA recommends that individuals strive to meet the US dietary guidelines' seafood consumption recommendations,[12] while also adhering to federal and OEHHA recommendations to limit the consumption of fish with higher contaminant levels. The advice discussed in the following section represents the maximum recommended number of servings per week for listed fish species. People should eat no more than the recommended number of servings for each fish species or species group. When noted, OEHHA's consumption advice for a particular fish species can be extended to other closely related fish species[13] known to accumulate similar levels of contaminants.

Consumption advice should not be combined. That is, if a person chooses to eat a serving of fish from the "one-serving-a-week'' category, then they should not eat any other fish from any source (including commercial) until the next week. If a person chooses to eat a serving of fish from the "two-servings-per-week" category, they can combine fish species from that category, or eat one serving of fish from that category and one from a category that recommends more than two servings per week (if available), for a total of two servings in that week. Then they should not eat any other fish from any source (including commercial) until the following week.

CONSUMPTION ADVICE FOR FISH FROM MAMMOTH CREEK

OEHHA's sampling and analysis protocol (OEHHA, 2022) requires that a minimum of nine edible-size fish of a species that may be legally caught are collected and analyzed before an advisory can be developed for the primary contaminant of concern. This is to ensure the sample dataset is representative of the fish species population in the water body. For Mammoth Creek, the sample size criterion was met for Brown Trout and Rainbow Trout. There were not sufficient data to evaluate other species that may be found in this water body. For fish species found in Mammoth Creek that are not included in this advisory, OEHHA recommends following the statewide advisory for rivers, streams, and creeks without site-specific advice.[14]

---

[12] Online at: https://www.dietaryguidelines.gov/.
[13] Fish species within the same genus are most closely related, and family is the next level of relationship.
[14] Online at: https://oehha.ca.gov/fish/advisories/statewide-advisory-eating-fish-california-rivers-streams-and-creeks-without-site-specific-advice.

The following advice is based solely on mercury concentrations in fish caught from Mammoth Creek. The sensitive population is defined as women ages 18–49 years and children ages 1–17 years, and the general population is defined as women 50 years and older and men 18 years and older.

Brown Trout

The mean mercury concentration in Brown Trout from Mammoth Creek was 328 ppb. OEHHA recommends a maximum of one serving a week of Brown Trout for the sensitive population, and a maximum of two servings a week for the general population.

Rainbow Trout

The mean mercury concentration in Rainbow Trout from Mammoth Creek was 17 ppb. OEHHA recommends a maximum of seven servings a week of Rainbow Trout for both the sensitive and general populations.

RECOMMENDED MAXIMUM NUMBER OF SERVINGS

The recommended maximum numbers of servings per week for fish from Mammoth Creek are shown in Table 3.

TABLE 3. RECOMMENDED MAXIMUM NUMBER OF SERVINGS PER WEEK FOR FISH FROM MAMMOTH CREEK

Fish Species	Women 18–49 years and Children 1–17 years		Women 50 years and older and Men 18 years and older	
	Number of Servings	Risk Driver[a]	Number of Servings	Risk Driver[a]
Brown Trout	1	Hg	2	Hg
Rainbow Trout	7	–	7	–

[a] The risk driver is the contaminant that results in the fewest recommended servings per week.
Hg, mercury
"–" denotes that all chemicals analyzed were below levels that would restrict consumption to less than seven servings a week

REFERENCES

American Heart Association. 2016. Fish and Omega-3 Fatty Acids. Online at: https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/fats/fish-and-omega-3-fatty-acids.

Bloom, N.S. 1992. On the chemical form of mercury in edible fish and marine invertebrate tissue. Can. J. Fish. Aquat. Sci. 49(5):1010–1017.

FDA/US EPA. 2017. Eating Fish: What pregnant women and parents should know. Advice by FDA and US EPA/January, 2017. Online at: https://www.fda.gov/food/consumers/advice-about-eating-fish.

Institute of Medicine. 2007. Seafood choices, balancing benefits and risks. Committee on Nutrient Relationships in Seafood: Selections to Balance Benefits and Risks. Institute of Medicine, Food and Nutrition Board. The National Academies Press, Washington, D.C.

Kris-Etherton, P.M., W.S. Harris, and L.J. Appel. 2002. Fish consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. Circ. 106:2747–2757.

OEHHA. 2008. Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento, California. Online at: http://oehha.ca.gov/media/downloads/fish/report/atlmhgandothers2008c.pdf.

OEHHA. 2011. Development of Fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Polybrominated diphenyl ethers (PBDEs). Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento, California. Online at: http://oehha.ca.gov/media/downloads/fish/report/pbdes052311.pdf.

OEHHA. 2022. General Protocol for Sport Fish Sampling and Analysis. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento, California. Online at: https://oehha.ca.gov/media/downloads/fish/report/fishadvisorysamplinganalysisprotocolreport2022.pdf.

Oken, E., R.O. Wright, K.P. Kleinman, D. Bellinger, C.J. Amarasiriwardena, H. Hu, J.W. Rich-Edwards, and M.W. Gillman. 2005. Maternal fish consumption, hair mercury, and infant cognition in a U.S. cohort. Environ. Health Perspect. 113(10):1376–1380.

Oken, E., J.S. Radesky, R.O. Wright, D. Bellinger, C.J. Amarasiriwardena, K.P. Kleinman, H. Hu, J.W. Rich-Edwards, and M.W. Gillman. 2008. Maternal fish intake

during pregnancy, blood mercury levels, and infant cognition at age 3 years in a U.S. cohort. Am. J. Epidemiol. 167(10):1171–1181.

SWRCB. 2007. Bioaccumulation of Pollutants in California Waters: A Review of Historic Data and Assessment of Impacts on Fishing and Aquatic Life. State Water Resources Control Board, California Environmental Protection Agency, Sacramento, California. Online at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/bop/cw117_swrcb_report.pdf.

SWRCB. 2013. State Mussel Watch (SMW) Program/Toxic Substances Monitoring (TSM) Program. State Water Resources Control Board, California Environmental Protection Agency, Sacramento, California. Online at: http://www.waterboards.ca.gov/water_issues/programs/swamp/mussel_watch.shtml.

USDA/USDHHS. 2020. Dietary Guidelines for Americans, 2020–2025. 9th Edition. U.S. Department of Health and Human Services and U.S. Department of Agriculture. Online at: https://www.dietaryguidelines.gov/.

US EPA. 1989. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part A) Interim Final. EPA/5401-89/002, December 1989. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. Online at: https://rais.ornl.gov/documents/HHEMA.pdf.

US EPA. 2000a. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories: Volume 1. Fish Sampling and Analysis, 3rd Edition. EPA 823-B00-007. Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

US EPA. 2000b. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories: Volume 2. Risk Assessment and Fish Consumption Limits, 3rd Edition. EPA 823-B-00-007. Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

Weaver, K.L., P. Ivester, J.A. Chilton, M.D. Wilson, P. Pandey, and F.H. Chilton. 2008. The content of favorable and unfavorable polyunsaturated fatty acids found in commonly eaten fish. J. American Dietetic Assoc. 108:1178–1185.

APPENDIX. ADVISORY TISSUE LEVELS

Advisory Tissue Levels (ATLs; OEHHA, 2008 and 2011) guide the development of advice for people eating sport fish. ATLs are levels of contaminants found in fish that correspond to the maximum numbers of recommended fish servings. OEHHA uses ATLs to provide advice to prevent consumers from being exposed to:

- More than the reference dose[15] on an average daily basis for chemicals not known to cause cancer, such as methylmercury, or
- For cancer-causing chemicals, a risk level greater than one additional cancer case in a population of 10,000 people consuming fish at the given consumption rate over a lifetime. This cancer risk level is chosen based on OEHHA's policy to balance the benefits and risks of fish consumption.

For each chemical, ATLs were determined for both cancer and non-cancer risk, if appropriate, for one to seven eight-ounce servings per week. The most health-protective ATLs for each chemical, selected from either cancer or non-cancer based risk, are shown in the table below for zero to seven servings per week. When the guidelines for eating fish from a water body are followed, exposure to chemicals in fish from that water body would be at or below the average daily reference dose or the cancer risk probability of one in 10,000.

ADVISORY TISSUE LEVELS FOR SELECTED ANALYTES

Contaminant	Consumption Frequency Categories (8-ounce servings/week)[a] and ATLs (in ppb)							
	7	6	5	4	3	2	1	0
Chlordanes	≤ 80	> 80–90	> 90–110	> 110–140	> 140–190	> 190–280	> 280–560	> 560
DDTs	≤ 220	> 220–260	> 260–310	> 310–390	> 390–520	> 520–1,000	> 1,000–2,100	> 2,100
Dieldrin	≤ 7	> 7–8	> 8–9	> 9–11	> 11–15	> 15–23	> 23–46	> 46
MeHg[b] (Women 18–49 and children 1–17)	≤ 31	> 31–36	> 36–44	> 44–55	> 55–70	> 70–150	> 150–440	> 440
MeHg (Women ≥ 50 and men ≥ 18)	≤ 94	> 94–109	> 109–130	> 130–160	> 160–220	> 220–440	> 440–1,310	> 1,310
PBDEs	≤ 45	> 45–52	> 52–63	> 63–78	> 78–100	> 100–210	> 210–630	> 630
PCBs	≤ 9	> 9–10	> 10–13	> 13–16	> 16–21	> 21–42	> 42–120	> 120
Selenium	≤ 1,000	> 1,000–1,200	> 1,200–1,400	> 1,400–1,800	> 1,800–2,500	> 2,500–4,900	> 4,900–15,000	> 15,000
Toxaphene	≤ 87	> 87–100	> 100–120	> 120–150	> 150–200	> 200–300	> 300–610	> 610

[a]Serving sizes (prior to cooking, wet weight) are based on an average 160-pound person. Individuals weighing less than 160 pounds should eat proportionately smaller amounts.
[b]All mercury detected is assumed to be methylmercury (MeHg), which is the most common form found in fish and is also the more toxic form (Bloom, 1992).

[15] The reference dose is an estimate of the maximum daily exposure to a chemical likely to be without significant risk of harmful health effects over a lifetime.