



Health Advisory and Guidelines for Eating Fish from South Lake (Inyo County)

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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)
DHA	docosahexaenoic acid
DMA	direct mercury analyzer
EPA	eicosapentaenoic acid
FDA	United States Food and Drug Administration
Hg	mercury
ICP-MS	inductively coupled plasma-mass spectrometry
MDL	method detection limit
MeHg	methylmercury
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
RWB6	Regional Water Board 6 (Lahontan)
Se	selenium
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
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 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 South Lake in Inyo 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.

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Women
(18 – 49 Years)

Children
(1 – 17 Years)

6 TOTAL SERVINGS A WEEK


OR

4 TOTAL SERVINGS A WEEK

OR

4 TOTAL SERVINGS A WEEK

Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.



Women
(50+ Years)

Men
(18+ Years)

7 TOTAL SERVINGS A WEEK


OR

7 TOTAL SERVINGS A WEEK


OR

4 TOTAL SERVINGS A WEEK

For Adults



For Children




A GUIDE TO EATING FISH

from


SOUTH LAKE

(INYO COUNTY)


Eat the Good Fish
Eating fish that are low in chemicals may provide health benefits to children and adults.




Avoid the Bad Fish
Eating fish with higher levels of chemicals like mercury or PCBs may cause health problems in children and adults.




Choose the Right Fish
Chemicals may be more harmful to unborn babies and children.




California Golden Trout
♥ high in omega-3s



Rainbow Trout
♥ high in omega-3s



Brown Trout
♥ high in omega-3s




Brook Trout
♥ high in omega-3s


California Office of Environmental Health Hazard Assessment

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Eat only the skinless fillet



Eat only the meat



Some chemicals are higher in the skin, fat, and guts.

INTRODUCTION

This report presents guidelines for eating Brook Trout, Brown Trout, California Golden Trout, and Rainbow Trout from South Lake (Figure 1). Consumption advice is based on levels of mercury (Hg) and selenium (Se) found in these species.

LOCATION

South Lake is located about 17 miles southwest of Bishop, CA, in the Inyo National Forest. South Lake is approximately 175 acres in size and sits at an elevation of almost 10,000 feet.³ It is a popular location for trout fishing, and the California Department of Fish and Wildlife (CDFW) plants Rainbow Trout throughout the summer season.⁴

FIGURE 1. LOCATION OF SOUTH LAKE



³ Information regarding South Lake was obtained from Parchers Resort, and can be found online at: <https://www.parchersresort.net/southlakeboats>.

⁴ Information on CDFW's fish planting schedule can be found online at: <https://nrm.dfg.ca.gov/FishPlants/Default.aspx>.

APPROACH USED

The Office of Environmental Health Hazard Assessment (OEHHA) used the results from the monitoring study described in this report to develop the South Lake 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)⁵ and other descriptive statistics of the contaminant data, as appropriate, for a chemical of potential concern for the selected fish species.
- 4) Comparison of the chemical concentrations with the OEHHA Advisory Tissue Levels (ATLs) for each chemical of potential 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 POTENTIAL CONCERN

Certain chemicals, because of their toxicity and their ability to accumulate in fish tissue, are of potential concern for people who eat fish. The majority of fish consumption advisories in California are issued because of Hg, followed by polychlorinated biphenyls (PCBs) and, in a few cases, Se, 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 (MeHg) – which can pass into and build up in fish. High levels

⁵ 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.

of 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 or learning and behavior in children.

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).

All fish species collected from South Lake and used in advisory development were analyzed for mercury and selenium. Brown Trout were additionally analyzed for PCBs, as indicated in Table 1. Fish species that do not typically accumulate PCBs or other organic chemicals were not analyzed for these contaminants.

DATA SOURCES

The guidelines for eating fish from South Lake are based on the chemicals detected in the fish collected for the monitoring study described below. This study 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 study contributing data to this advisory is described below.

MONITORING OF CONTAMINANTS IN FISH FROM CALIFORNIA LAKES AND RESERVOIRS, 2016

The purpose of the study was to supplement long-term monitoring data that document bioaccumulation impacts on the beneficial uses of California waters. The study focused on water bodies that provide beneficial uses through fishing and had either not been previously sampled, or were previously sampled but needed data gaps filled to determine impairment or develop consumption advisories (Davis et al., 2022). In 2016, the Surface Water Ambient Monitoring Program (SWAMP) collected Brook Trout, Brown Trout, California Golden Trout, and Rainbow Trout from South Lake, which were analyzed for mercury, selenium, and PCBs (Brown Trout only).

FISH SAMPLED FROM SOUTH LAKE

The fish sampling data used in this advisory were retrieved from the California Environmental Data Exchange Network (CEDEN),⁶ 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.

TABLE 1. FISH SAMPLES EVALUATED FOR THE SOUTH LAKE ADVISORY

Common Name	Scientific Name	Number of Samples ^a	Total Number of Fish	Project	Year Collected	Contaminants Analyzed
Brook Trout	<i>Salvelinus fontinalis</i>	6	6	SWAMP	2016	Hg
		1	3	SWAMP	2016	Se
Brown Trout	<i>Salmo trutta</i>	10	10	SWAMP	2016	Hg
		1	5	SWAMP	2016	PCBs
		2	10	SWAMP	2016	Se
California Golden Trout	<i>Oncorhynchus mykiss aguabonita</i>	5	5	SWAMP	2016	Hg
		1	5	SWAMP	2016	Se
Rainbow Trout	<i>Oncorhynchus mykiss</i>	10	10	SWAMP	2016	Hg
		1	6	SWAMP	2016	Se

^aSamples were analyzed as skinless fillets.

⁶ Online at: <http://ceden.waterboards.ca.gov/AdvancedQueryTool>.

CHEMICAL CONCENTRATIONS

As shown in Table 1, samples were analyzed for total mercury, selenium, and PCBs (51 congeners).⁷ Among the chemicals analyzed in fish tissue samples from South Lake, only mercury and selenium levels were sufficiently high to impact consumption advice.

All fish samples were prepared as skinless fillets. Samples were analyzed as individual fish or composites.

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 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,⁸ as well as mercury concentrations in each fish species. The DMA method detection limit (MDL)⁹ for total mercury was reported at 4 parts per billion (ppb). The reporting limit (RL)¹⁰ was 12 ppb.

PCBs

PCBs were analyzed by gas chromatography at the CDFW Water Pollution Control Laboratory as one composite sample. The concentration presented was the sum of the detected parent compound, congeners, or metabolites, where applicable. Because the MDLs or RLs were relatively low (≤ 5 ppb), individual congeners or metabolites with concentrations reported as non-detects were assumed to be zero. 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).

⁷ 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>.

⁸ 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.

⁹ The MDL is the lowest quantity of a chemical that can be distinguished (as greater than zero) in a sample.

¹⁰ The RL is the lowest quantity of a chemical that can be accurately quantified in a sample.

SELENIUM

The MPSL analyzed species collected from South Lake for selenium 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 MDL and the RL for total selenium were reported at 150 and 400 ppb, respectively.

Concentrations of PCBs were lower than the corresponding ATL threshold values for daily consumption (OEHHA, 2008) and were therefore not considered further for developing consumption advice and are not shown in this report.

TABLE 2. MERCURY CONCENTRATIONS IN FISH FROM SOUTH LAKE

Species from South Lake	Number of Samples ^a	Total Number of Fish	Mean ^b Total Length (mm)	Range of Total Lengths ^c (mm)	Mercury (ppb)	
					Mean ^b	Range ^c
Brook Trout	6	6	239	225 – 290	50	25 – 128
Brown Trout	10	10	271	233 – 325	50	29 – 98
Rainbow Trout Species	15	15	265	200 – 358	32	12 – 74
California Golden Trout	5	5	221	200 – 234	51	12 – 74
Rainbow Trout	10	10	287	255 – 358	23	14 – 35

^aSamples were prepared as skinless fillets.

^bMeans are an arithmetic average of individual values and/or a weighted average of composites.

^cRange of individuals and/or range of the composites.

TABLE 3. SELENIUM CONCENTRATIONS IN FISH FROM SOUTH LAKE

Species from South Lake	Number of Samples ^a	Total Number of Fish	Mean ^b Total Length (mm)	Range of Total Lengths ^c (mm)	Selenium (ppb)	
					Mean ^b	Range ^c
Brook Trout	1	3	251	230 – 290	1480	n/a
Brown Trout	2	10	271	233 – 325	475	320 – 630
Rainbow Trout Species	2	11	256	200 – 292	468	300 – 670
California Golden Trout	1	5	221	200 – 234	670	n/a
Rainbow Trout	1	6	285	280 – 292	300	n/a

^aSamples were prepared as skinless fillets.

^bMeans are an arithmetic average of individual values and/or a weighted average of composites.

^cRange of individuals and/or range of the composites.

n/a = not applicable due to a single sample

DEVELOPMENT OF GUIDELINES FOR EATING FISH FROM SOUTH LAKE

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 (DHA) and eicosapentaenoic acid (EPA) (USDA/USDHHS, 2020; Weaver et al., 2008).

The US Department of Agriculture (USDA) recommends “including at least 8 ounces of cooked seafood^[11] per week. Young children need less, depending on their age and calorie needs.”¹² According to the “Dietary Guidelines for Americans, 2020 – 2025” (USDA/USDHHS, 2020), “women who are pregnant or lactating should consume at least 8 and up to 12 ounces of a variety of seafood per week from choices that are lower in methylmercury.” Additionally, “based on FDA and EPA’s advice, depending on body weight, some women should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern” (USDA/USDHHS, 2020). For more detailed information, see USDA/USDHHS (2020) and other USDA MyPlate.gov materials. The particular 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 US Food and Drug Administration (FDA) and the US Environmental Protection Agency (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

¹¹ Seafood as used here refers to fish and shellfish from freshwater and marine environments.

¹² Online at: <https://www.myplate.gov/>.

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 unborn babies 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 list 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 8 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, in a similar concentration. The potential effect of multiple chemical exposures (mercury and PCBs) was not assessed in Brown Trout, the only species for which PCBs were analyzed, because PCB levels were non-detectable. Advice for all species in this advisory was based on mercury or selenium concentrations.

OEHHA recommends that individuals strive to meet the US dietary guidelines' seafood consumption recommendations,¹³ 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

¹³ Online at: <https://www.dietaryguidelines.gov/>.

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 species¹⁴ 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 SOUTH LAKE

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 from small- and medium-sized lakes and reservoirs before an advisory can be developed. Additional fish beyond this number will increase confidence that the sample dataset is representative of the fish species population in the water body (OEHHA, 2022). The majority of fish consumption advisories in California are based on mercury, which is typically analyzed in individual fish, rather than as composites. Mercury analysis is relatively inexpensive and mercury concentrations in fish are more likely to be positively correlated with fish size than other contaminants. Thus, individual analysis allows for advice to be based on fish size, when appropriate. Other contaminants, such as PCBs, pesticides, and selenium, may also impact advice. These contaminants are often analyzed as a composite of a smaller subset of fish (usually at least five individuals) as a cost-saving mechanism, a common practice that is considered acceptable. In some cases, an exception is made regarding the minimum sample size. This is particularly true if the advice is based on a chemical other than mercury where sample size is often limited, and/or if doing so leads to more health-protective advice than would otherwise be provided.

High elevation California "trout lakes" where various trout species predominate, such as Donner Lake,¹⁵ typically have fish with relatively lower levels of contamination versus the much higher contamination levels observed in species caught throughout the state from "bass lakes" where black bass species are typically found.¹⁶ Higher contamination lakes with a greater variety of species are often preferred locations for periodic sampling and long-term monitoring studies in comparison to low contamination lakes with mostly trout species. Infrequent sampling, combined with the mountainous geography, remote

¹⁴ Fish species within the same genus are most closely related, and family is the next level of relationship.

¹⁵ OEHHA Donner Lake Advisory available online at <https://oehha.ca.gov/advisories/donner-lake>.

¹⁶ OEHHA Statewide Advisory for California Lakes and Reservoirs without site-specific advice available online at <https://oehha.ca.gov/advisories/statewide-advisory-eating-fish-californias-lakes-and-reservoirs-without-site-specific>.

location, and dynamic fluctuation of seasonal water levels at South Lake pose accessibility and fishing challenges that may limit the feasibility of collecting the recommended minimum number of fish for developing an advisory. In rare situations, OEHHA may determine that it is health-protective to offer site-specific consumption advice based on fewer samples for a species that 1) is popular with recreational consumers, 2) has no applicable statewide advice, and 3) has contamination levels that are comparable to or higher than similar species at the same location.

For South Lake, the sample size criterion was met for mercury for Brown Trout and Rainbow Trout. Rainbow Trout were combined with a subspecies, California Golden Trout, to offer advice for a species group based on similar mercury concentrations. California Golden Trout had an insufficient sample size (five individual fish) to offer separate advice. For Brook Trout, the sample size criterion was less than OEHHA's minimum sample size for mercury (six individual fish) and selenium (one composite of three fish). South Lake is a popular fishing location for trophy-sized trout and Brook Trout, in particular, are commonly caught and consumed.¹⁷ Advice for the sensitive population for Brook Trout based on mercury or selenium is the same as that for Brown Trout (based on mercury) at four meals per week. Although a single composite sample of three individuals is less than preferred, OEHHA considers it health-protective to offer consumption advice for Brook Trout for the general population based on selenium because the number of recommended servings is reduced to four versus seven meals per week based on mercury.

The following advice is based solely on mercury or selenium concentrations. The sensitive population is defined as women ages 18 to 49 years and children ages 1 to 17 years, and the general population is defined as women 50 years and older and men 18 years and older.

BROOK TROUT

The mean mercury and selenium in Brook Trout from South Lake were 50 and 1480 ppb, respectively. OEHHA recommends a maximum of four servings a week of Brook Trout for both the sensitive (based on mercury) and general (based on selenium) populations.

BROWN TROUT

The mean mercury and selenium concentrations in Brown Trout from South Lake were 50, and 475 ppb, respectively. Based on mercury, OEHHA recommends a maximum of four servings a week of Brown Trout for the sensitive population, and a maximum of seven servings a week for the general population.

¹⁷ Information available at <https://flyfishingthesierra.com/southbc.htm> and <https://www.parchersresort.net/southlakeboats>.

RAINBOW TROUT SPECIES (CALIFORNIA GOLDEN TROUT, RAINBOW TROUT)

California Golden Trout are a subspecies of Rainbow Trout and were grouped together. They are closely related and frequently hybridize when they are co-located (Cordes et al., 2011).

The mean mercury and selenium concentrations in Rainbow Trout species from South Lake were 32 and 468 ppb, respectively. Mercury concentrations in individual species were as follows: California Golden Trout, 51 ppb; and Rainbow Trout, 23 ppb. Selenium concentrations in individual species were as follows: California Golden Trout, 670 ppb; and Rainbow Trout, 300 ppb. OEHHA recommends a maximum of six servings a week of Rainbow Trout species for the sensitive population, based on mercury, and a maximum of seven servings a week for the general population, based on selenium.

RECOMMENDED MAXIMUM NUMBER OF SERVINGS

The recommended maximum numbers of servings per week for fish from South Lake are shown in Table 4.

TABLE 4. RECOMMENDED MAXIMUM NUMBER OF SERVINGS PER WEEK FOR FISH FROM SOUTH LAKE

Fish Species	Women 18–49 years and Children 1–17 years	Women 50 years and older and Men 18 years and older
Brook Trout	4	4
Brown Trout	4	7
Rainbow Trout Species	6	7

REFERENCES

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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 dose¹⁸ 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 the maximum acceptable risk level recommended by the US EPA (2000b) for fish advisories.

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.

^bAll mercury detected is assumed to be methylmercury, which is the most common form found in fish and is also the more toxic form (Bloom, 1992)

¹⁸ 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.