

HEALTH ADVISORY AND SAFE EATING GUIDELINES FOR FISH FROM MAGIC JOHNSON LAKES (Los Angeles County, CA)

June 2010

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**Health Advisory
and
Safe Eating Guidelines
for Fish from
Magic Johnson Lakes
(Los Angeles County, CA)**

June 2010

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FOREWORD

This report provides guidelines for consumption of various fish species taken from Magic Johnson Lakes in Willowbrook, California (Los Angeles County). These guidelines were developed as a result of studies of methylmercury and PCB concentrations in fish tested from these water bodies, and are provided to fish consumers to assist them in making choices about the types of fish and frequency of consumption considered safe to eat. Some fish tested from these water bodies showed high contaminant levels and guidelines are provided to protect against possible adverse health effects from consuming contaminated fish. Additionally, the guidelines provide information to aid consumers in selecting fish that are lower in contaminants. This report provides background information and a description of the data and criteria used to develop the guidelines.

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Table of Contents

LIST OF CONTRIBUTORS	i
ACKNOWLEDGMENTS.....	i
FOREWORD.....	ii
EXECUTIVE SUMMARY	1
INTRODUCTION.....	4
DATA COLLECTION	5
DATA EVALUATION	6
GUIDELINES FOR EATING FISH CAUGHT FROM EARVIN “MAGIC” JOHNSON LAKES.....	8
Recommendations for women 18-45 years, including pregnant and breastfeeding women, and children 1-17 years for eating fish from Magic Johnson Lakes.....	9
Recommendations for women over 45 years and men for eating fish from Magic Johnson Lakes.....	10
Figure 1. Map of Earvin Magic Johnson Recreation Area	11
Table 1. Mean Methylmercury and PCB Concentrations and Lengths of Fish from Magic Johnson Lakes.....	12
Table 2. Advisory Tissue Levels (ATLs) for PCBs and Methylmercury Based on Cancer or Non-Cancer Risk Using an 8-Ounce Serving Size	13
References	14

EXECUTIVE SUMMARY

Methylmercury, PCBs (polychlorinated biphenyls) and several other chemicals were analyzed in edible tissues of five fish species caught from Magic Johnson Lakes, Los Angeles, California. The contaminant data were evaluated by the Office of Environmental Health Hazard Assessment (OEHHA) to determine whether there may be potential adverse health effects associated with the consumption of certain sport fish from these water bodies. OEHHA determined that PCBs and methylmercury were the two chemicals of concern for fish caught in this lake.

Mercury is a trace metal that can be toxic to humans, especially the fetus, in sufficiently high doses. Mercury occurs naturally in the environment and is also redistributed as a result of human activities such as mining and the burning of fossil fuels. In aquatic systems, it undergoes chemical transformation to the more toxic organic form, methylmercury, which accumulates in fish and other organisms. PCBs are man-made chemicals used mainly in electrical equipment and plastics. They were banned in the 1970s but do not break down easily in the environment and can accumulate in fish. PCBs may cause cancer or other health effects in humans. Based on this evaluation, OEHHA developed a health advisory and safe eating guidelines for these chemicals only for fish from this area, as described in this report.

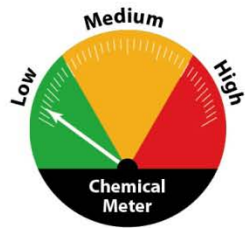
The advisory warns fishers against eating specific species. The safe eating guidelines identify fish species with low contaminant levels that are safe to eat frequently (once a week or more). Evaluating contaminants that may be found in fish is OEHHA's primary concern, but OEHHA's advisories are also intended to reflect the general scientific consensus that eating fish at dietary levels that are easily achievable, but well above national average consumption rates, appears to promote significant health benefits, including decreased mortality. These benefits are thought to result from unique omega-3 fatty acids found in fish and include decreased rates of cardiovascular disease and stroke, decreased inflammation, and improvements in brain and visual function. Fish consumption during pregnancy has been associated with higher cognitive scores in young children. This health advisory and safe eating guidelines give consumers information to make healthy choices in fish consumption.

Consumption advice was provided for bass, bluegill, carp, catfish, and trout at Magic Johnson Lakes. Although, in some species, there were sufficient differences in contaminant levels between the two lakes that would have resulted in different consumption advice, OEHHA determined that recommending a single consumption rate for each species was more reasonable from a risk communication perspective than having separate advisories for each lake. For fish species where the potential health effects resulting from exposure to PCBs were low relative to those from mercury, the consumption advice for women 18-45 years and children 1-17 years is more restrictive than for women over 45 years and men. This is because the fetus and children are more sensitive to the toxic effects of the form of mercury found in fish (methylmercury).

For general advice on how to limit your exposure to chemical contaminants in sport fish (e.g., eating smaller fish of legal size), and to see a factsheet on methylmercury and PCBs in sport fish, see the California Sport Fish Consumption Advisories (<http://www.oehha.ca.gov/fish/chems/index.html>). Guidelines for other California water bodies can be found online at: http://www.oehha.ca.gov/fish/so_cal/index.html. Unlike the case for PCBs, various cooking and cleaning techniques will not reduce the methylmercury content of fish. Additionally, there are no known ways to prepare fish (such as soaking in milk) that will reduce the methylmercury content of fish.

A guide to eating fish caught in Magic Johnson Lakes

Women 18 - 45, especially those who are pregnant or breastfeeding, and children 1 - 17

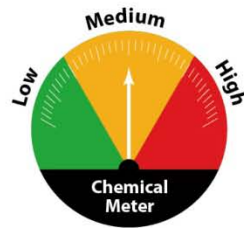


Trout ♥

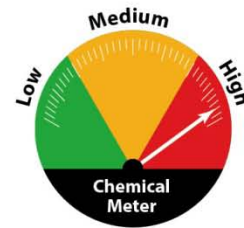


Catfish

♥ = High in Omega-3s



Bluegill or other sunfish



Largemouth bass or
smallmouth bass



Carp

Safe to eat
Trout – 5 servings per week OR
Catfish – 2 servings per week



Safe to eat
1 serving per week

Do not eat

Men over 17 and women over 45
can safely eat more fish

- **Safe to eat 7 servings per week** —
catfish OR
 - **Safe to eat 5 servings per week** —
trout OR
 - **Safe to eat 3 servings per week** —
bluegill or other sunfish OR
 - **Safe to eat 1 serving per week** —
largemouth bass or smallmouth bass
- DO NOT EAT carp

What is a serving?



For Adults For Children

The recommended serving of fish is about the size and thickness of your hand. Give children smaller servings.

♥ Why eat fish?

Eating fish is good for your health. Fish have Omega-3s that can reduce your risk for heart disease and improve how the brain develops in unborn babies and children.

What is the concern?

Some fish have high levels of mercury and PCBs. Mercury can negatively affect how the brain develops in unborn babies and children. PCBs might cause cancer. Some chemicals are in the fat and skin of the fish. Throw these parts away and eat only the fillet.

INTRODUCTION

Fish consumption advisories have been issued in all 50 states in the U.S. and they cover approximately 43 percent and 39 percent of the country's total lake acreage and river miles, respectively (U.S. EPA, 2009). Mercury contamination of fish, in particular, is a national problem: 80% of advisories in effect in 2008 were at least partially the result of mercury contamination. Polychlorinated biphenyls (PCBs) result in the second greatest number of fish consumption advisories nationwide (U.S. EPA, 2009). Mercury is a trace metal that can be toxic to humans, especially the fetus, in sufficiently high doses. Mercury occurs naturally in the environment and is also redistributed as a result of human activities such as mining and the burning of fossil fuels. In aquatic systems, it undergoes chemical transformation to the more toxic organic form, methylmercury, which accumulates in fish and other organisms. PCBs are man-made chemicals used mainly in electrical equipment and plastics. They were banned in the 1970s but do not break down easily in the environment and can still accumulate in fish. PCBs may cause cancer or other health effects in humans.

Fish consumption advisories based on mercury contamination have been issued by the Office of Environmental Health Hazard Assessment (OEHHA) for various water bodies in at least 30 California counties, including some coastal areas of southern California. Advisories based on PCBs have been issued for the San Francisco Bay, several reservoirs in the San Francisco Bay area and coastal regions of Ventura, Los Angeles and Orange counties.

Earvin "Magic" Johnson Recreation Area is a 94-acre park located in the Willowbrook area of Los Angeles County (Figure 1). The urban park contains two man-made lakes (referred to herein as "Magic Johnson Lakes"), approximately five to seven acres each, connected by a small stream. The park was previously the location of the Athens Tank Farm, which was developed by General Petroleum and later owned by ExxonMobile (Questa, 2009). A 2008 site assessment found elevated levels of methylmercury, PCBs and some pesticides in fish samples from the two lakes. As a result of those findings, the Los Angeles County Department of Public Health posted warning signs advising the public not to eat fish caught from the lakes (Questa, 2009). A larger study was then planned with input on sampling and analysis from OEHHA. The results of that study were reported in Questa (2009) and are the basis of this advisory.

OEHHA is the agency responsible for evaluating potential public health risks from chemical contamination of sport fish. This includes issuing 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, and Section 59011, to advise local health authorities, and the California Water Code Section 13177.5, to issue health advisories. Fish advisories developed by OEHHA are published in the California

Sport Fishing Regulations of the California Department of Fish and Game (CDFG). OEHHA now emphasizes “safe eating guidelines” as part of health advisories in an effort to inform consumers of healthy choices in fish consumption as well as those that should be avoided or restricted.

Although evaluating contaminants that may be found in fish must be of primary concern, OEHHA has also determined that there is a significant body of evidence and general scientific consensus that eating fish at dietary levels that are easily achievable, but well above national average consumption rates, appears to promote significant health benefits, including decreased mortality. These potential beneficial effects are thought to stem largely from unique omega-3 fatty acids found in fish (docosahexaenoic acid or DHA and eicosapentaenoic acid or EPA) and include reduced rates of cardiovascular disease and stroke, decreased inflammation, and improvements in cognitive and visual function. Fish consumption during pregnancy, in particular, has been associated with higher cognitive scores in young children. In order to take these benefits into account and best promote the overall health of the fish consumer, OEHHA has expanded the advisory process beyond a simple risk paradigm (see Klasing and Brodberg [2008] for more discussion). OEHHA encourages people of all ages, especially women of childbearing age (18-45 years) and children, to select and eat fish that are low in mercury and other contaminants and high in omega-3 fatty acids (DHA and EPA).

DATA COLLECTION

As noted above, data used for this evaluation were obtained from a fish sampling and contamination study prepared by Questa Environmental Consulting, LLC, for the Los Angeles County Chief Executive Office (Questa, 2010), which is summarized below.

In brief, fish were collected from May 4, 2009 to May 19, 2009, using seine nets, gill nets, dip nets, fishing rods, or a backpack electrofisher (to temporarily stun fish), depending on species. A total of 83 fish comprising five species were collected from the northern and southern lakes, combined, and analyzed for total mercury, methylmercury, PCBs, arsenic, selenium, chlordane, dieldrin, DDTs, and toxaphene. OEHHA determined that PCBs and methylmercury were the two chemicals of concern in fish caught in this lake; results for other chemicals are not included in this report. Species collected included bass, bluegill, carp, catfish, and trout. Twelve of the bass were not used to develop safe eating guidelines because they were below legal size for consumption. Additionally, several samples of hatchery catfish and trout were collected and analyzed. Hatchery fish are also not included in this advisory.

Fish were skinned/scaled, filleted and homogenized. Some samples were analyzed as individuals while others were composited. All fish (with the exception of the bass noted below) met legal/edible size restrictions as defined

by OEHHA or CDFG. Composited fish were combined in such a way as to maintain fish lengths within 75 percent of each other within a given composite. Total mercury was analyzed by EPA method 7471b; however, because of the high method reporting limit (140 ppb), total mercury was not used for developing advisories. Methylmercury was analyzed by EPA method 1630, with a method reporting limit of approximately 13 ppb. For the purpose of this advisory, OEHHA relied upon the analyses of PCB congeners using EPA method 1668, with a method reporting limit of <0.005 ppb. Total PCBs were calculated as the sum of 209 congeners analyzed; congeners quantified as less than the method reporting limit were assumed to have a value of zero.

Mean methylmercury and PCB concentrations, fish lengths, number of samples (including composites) analyzed, and number of fish per composite are presented for each lake and for both lakes, combined, in Table 1. Chemical concentrations are reported in wet weight. Arithmetic means, rather than geometric means, were used to represent the central tendency (average) of mercury concentrations for all species in this report. In general, arithmetic means for environmental chemical exposures are more health-protective than geometric means, and are commonly used in human health risk assessments. Grand means for each chemical were calculated as the unweighted average of composite and individual means.

DATA EVALUATION

As a first step in interpreting contaminant levels in fish, OEHHA has developed advisory tissue levels (ATLs) for PCBs, methylmercury and other contaminants found in fish (Klasing and Brodberg, 2008) similar to risk-based consumption limits recommended by U.S. EPA (2000). ATLs relate the number and size of recommended fish meals to contaminant concentrations found in fish (Table 2). These values were designed so that individuals consuming no more than a preset number of meals should not exceed the reference dose (RfD) for non-cancer hazards associated with chemical contaminants, on average, or a risk level of 1×10^{-4} for carcinogens (no more than one additional case of cancer for every 10,000 people exposed over a lifetime). ATLs for methylmercury for women over 45 years and men are approximately three times higher than for sensitive populations because of the three-fold higher RfD used for this population group. The sensitive population is defined as women of childbearing age (18-45 years), including women who are pregnant or breastfeeding, and children aged 1-17 years. Meal sizes were based on a standard eight-ounce (227 grams) portion of uncooked fish, which is approximately six ounces after cooking, for adults who weigh roughly 70 kilograms (equivalent to 154 pounds). OEHHA recommends that people who weigh less than 70 kilograms eat smaller portions of fish and, in particular, children up to age 12 eat about half as much. A description of the process of developing ATLs, including toxicological information on PCBs and methylmercury, can be found in Klasing and Brodberg (2008). For

each species, the potential effects of multiple chemical exposures were considered before consumption advice was finalized.

Although, in some species, there were sufficient differences in contaminant levels between the two lakes that would have resulted in different consumption advice, OEHHA determined that recommending a single consumption rate for each species was more reasonable from a risk communication perspective than having separate advisories for each lake.

Bass:

Most bass analyzed in the study were obtained from local fishers who had been observed catching the fish by Questa field staff. The majority of bass caught in the southern lake were not of minimum legal size (305 mm); however, it was reported that fishers keep and eat bass greater than approximately 200 mm from this water body. Thus, Questa analyzed all bass collected from the southern lake that were larger than 200 mm. However, OEHHA did not use bass under 305 mm (with one exception, see table 1) to develop this advisory; analytical results for 12 undersized bass are not included in this report. It is important to note that methylmercury levels in the undersized bass were also elevated and these fish would have received the same consumption advice as the larger bass, had they been included.

Four legal-sized (≥ 305 mm) bass were collected from the southern lake and analyzed in one composite. Methylmercury and PCB concentrations in that sample were 1,200 and 18 ppb, respectively. Eight legal-sized bass plus one 300 mm bass were collected from the northern lake and analyzed in three composites, yielding mean methylmercury and PCB concentrations of 730 and 6 ppb, respectively. The mean methylmercury and PCB concentrations for the two lakes combined were 845 and 9 ppb, respectively. Based on methylmercury concentrations, OEHHA advises that women 18-45 years old and children 1-17 years should not eat bass from these lakes. It is safe for women over 45 years and men to eat one serving a week of this species.

Bluegill:

Fifteen edible-sized (≥ 100 mm) bluegill were collected from each lake and analyzed as five composites per lake. Mean methylmercury and PCB concentrations for the southern lake were 156 and 23 ppb, respectively, and 246 and 7 ppb for the northern lake, respectively. For the two lakes combined, the mean methylmercury and PCB concentrations were 201 and 15 ppb, respectively. Based on methylmercury concentrations, OEHHA recommends that women 18-45 years old and children 1-17 years may safely eat one meal per week of bluegill from these lakes. Although the consumption rate for women over 45 years and men would be three meals a week for the two lakes combined, the consumption rate for each lake individually would be two meals a week,

based on a higher concentration of methylmercury in bluegill in one lake and a higher concentration of PCBs in bluegill in the other. In this case, OEHHA recommends consumption advice based on the two lakes individually. It is thus safe for women over 45 years and men to eat two servings a week of this species.

Carp:

Two individual carp were analyzed from the southern lake. Mean methylmercury and PCB concentrations were 135 and 209 ppb, respectively. Two individual carp and one composite of three carp were analyzed from the northern lake, with mean methylmercury and PCB concentrations of 57 and 33, ppb, respectively. For the two lakes combined, the mean methylmercury and PCB concentrations were 88 and 103 ppb, respectively. Because of the very high concentration of PCBs in carp in the southern lake (supported by the clear trend of higher PCB concentrations in most species in the southern lake compared to the northern lake), and the desire not to have separate consumption advice for each lake, OEHHA recommends that no one consume carp from either lake.

Catfish:

One catfish was collected and analyzed from the southern lake. It contained 10 ppb methylmercury and 6 ppb PCBs. Eleven catfish from the northern lake were analyzed in two composites of three fish and one composite of five fish. Methylmercury and PCB means for catfish from the northern lake were 83 and 7 ppb, respectively. Because only a single catfish was collected from the southern lake, OEHHA chose the more health protective approach of recommending consumption base solely on catfish collected and analyzed from the northern lake where the methylmercury concentration was higher. Based on methylmercury concentrations, OEHHA advises women 18-45 years old and children 1-17 years that it is safe to eat two meals a week from these lakes. It is safe for women over 45 years and men to eat seven servings a week of this species.

Trout:

Nine trout in three composites of three fish each were collected and analyzed from the southern lake. The mean methylmercury and PCB concentrations were 40 and 13 ppb, respectively. No trout were collected from the northern lake. Based on PCB concentrations, OEHHA advises all populations that it is safe to eat five servings a week of this species.

GUIDELINES FOR EATING FISH CAUGHT FROM MAGIC JOHNSON LAKES

OEHHA generally issues consumption advice beginning at a consumption frequency of one eight-ounce serving per week (a total of six ounces of cooked fish per week), which is equivalent to two, three-ounces servings or the minimum

weekly fish consumption rate recommended by the American Heart Association (AHA, 2008). Fish that can be eaten at this frequency represent fish with relatively low levels of mercury, PCBs and/or other contaminants. If, based on very low contaminant concentrations, fish can be consumed even more frequently than a total of six ounces (after cooking) per week, advice for consumption of two or three meals per week, or more, as appropriate, may also be provided. ATLs for four, five, six, and seven servings per week can be calculated, as in Klasing and Brodberg (2008), using consumption rates of 128, 160, 192, and 224 g/d, respectively. In addition, because of the potential beneficial effects from regular fish consumption, thought to stem largely from unique omega-3 fatty acids in fish, OEHHA encourages people of all ages, especially women 18-45 years and children, to eat fish that are low in mercury or other contaminants and high in omega-3 fatty acids. OEHHA recommends that consumers avoid regular consumption of fish that cannot safely be eaten at a minimum of six ounces (after cooking) a week.

In all cases, **consumption advice should not be combined.** Fishers can choose one fish from the “1 serving a week” category to eat that week. Then they should not eat any other fish until the next week. If they choose fish that can be eaten 2 servings a week, for example, they can combine fish species from that group for a total of 2 servings in that week. Then they should not eat any other fish until the next week.

Recommendations for women 18-45 years, including pregnant and breastfeeding women, and children 1-17 years for eating fish from Magic Johnson Lakes

- Women 18-45 years and children 1-17 years **should not eat** bass (of any size) or carp.
- Women 18-45 years and children 1-17 years can eat a total of **one serving a week** of bluegill.
- Women 18-45 years and children 1-17 years can eat a total of **two servings a week** of catfish.
- Women 18-45 years and children 1-17 years can eat a total of **five servings a week** of trout.
- Serving size for women is six ounces of fish after cooking (equal to eight ounces before cooking). Serving size can be adjusted to add one ounce of fish for every 20 pounds of body weight above, or subtract one ounce of fish for every 20 pounds of body weight below, the average weight of 160 pounds. Serving size for children up to age 12 is about half as much as adults (3 ounces of cooked fish).
- Eat only the fillet portion. Skin and trim all visible fat. Thoroughly cook before eating, preferably using a method that allows the juices to drain away.

Recommendations for women over 45 years and men for eating fish from Magic Johnson Lakes

- Women over 45 years and men **should not eat** carp.
- Women over 45 years and men can eat a total of **one serving a week** of bass. Smaller, sub-legal-sized bass also have elevated mercury levels.
- Women over 45 years and men can eat a total of **three servings a week** of bluegill.
- Women over 45 years and men can eat a total of **five servings a week** of trout.
- Women over 45 years and men can eat a total of **seven servings a week** of catfish.
- Serving size is six ounces of fish after cooking (equal to eight ounces before cooking). Serving size can be adjusted to add one ounce of fish for every 20 pounds of body weight above, or subtract one ounce of fish for every 20 pounds of body weight below, the average weight of 160 pounds.
- Eat only the fillet portion. Skin and trim all visible fat. Thoroughly cook before eating, preferably using a method that allows the juices to drain away.

**Figure 1. Map of Earvin Magic Johnson Recreation Area
(from Questa, 2009)**

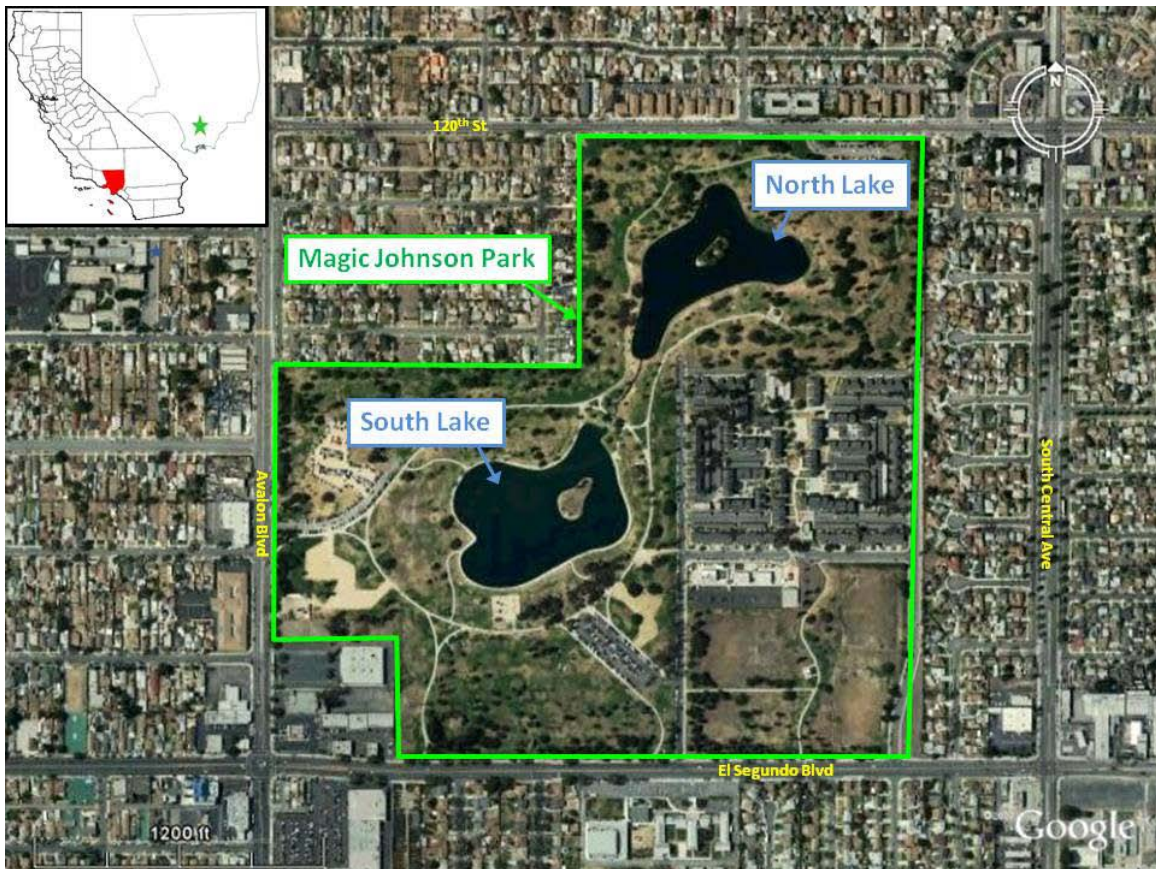


Table 1. Mean¹ Methylmercury and PCB² Concentrations (ppb, wet weight) and Lengths³ (mm) of Fish from Magic Johnson Lakes					
	Bass	Bluegill	Carp	Catfish	Trout
<i>South Lake</i>					
Mercury	1,200	156	135	10	40
PCBs	18	23	209	6	13
Length	401	139	538	490	290
# Samples	1	5	2	1	3
# Fish	4	15	2	1	9
<i>North Lake</i>					
Mercury	730	246	57	83	-
PCBs	6	7	33	7	-
Length	354	155	519	328	-
# Samples	3	5	3	3	-
# Fish	9	15	5	11	-
<i>Lakes, Combined</i>					
Mercury	845	201	88	65	40
PCBs	9	15	103	7	13
Length	366	147	527	368	290
# Samples	4	10	5	4	3
# Fish	13	30	7	12	9

¹Mean of composites and individuals combined; means not weighted by number of individuals per composite. All fish were legal and/or edible size with the exception of one 300 mm bass.

²PCBs = the sum of 209 congeners. Non-detected values were not included in the sum.

³Length is presented as total length (the longest length from the tip of the tail fin to the tip of the nose/mouth.)

**Table 2. Advisory Tissue Levels (ATLs) for PCBs and Methylmercury Based on Cancer or Non-Cancer Risk Using an 8-Ounce Serving Size (Prior to Cooking)
(ppb, wet weight)**

Contaminant	Three 8-ounce Servings* a Week	Two 8-ounce Servings* a Week	One 8-ounce Servings* a Week	No Consumption
Methylmercury (Women aged 18-45 years and children aged 1-17 years)	≤70	>70-150	>150-440	>440
Methylmercury (Women over 45 years and men)	≤220	>220-440	>440-1,310	>1,310
PCBs	≤21	>21-42	>42-120	>120

For each chemical, ATLs were calculated separately for cancer and non-cancer risk, if appropriate, for consumption frequency categories of one, two, and three 8-ounce servings per week. Values for cancer and non-cancer risk were then compared to determine whether the cancer or non-cancer value was the most health-protective. For the chemicals listed, non-cancer risk determined the ATL for each consumption frequency category.

*Serving sizes are based on an average 160 pound person. Individuals weighing less than 160 pounds should eat proportionately smaller amounts (for example, individuals weighing 80 pounds should eat one 4-ounce serving a week when the table recommends eating one 8-ounce serving a week).

Tabled values are rounded based on laboratory reporting of three significant digits in results, where the third reported digit is uncertain (estimated). Tabled values are rounded to the second digit, which is certain. When data are compared to this table they should also first be rounded to the second significant digit as in this table.

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