A Clear the Air Report:

# Casting Doubt

## Mercury, Power Plants and the Fish We Eat

Clean Air Task Force

Revised August, 2000

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This report is also available at the Clear the Air website: www.cleartheair.org

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# Executive Summary

Across the U.S., mercury contaminates freshwater and saltwater fish populations, poses health risks to the people and wildlife consuming these fish and threatens the multi-billion dollar recreational and commercial fishing industries. State health departments in 40 states have issued advisories warning the public about consuming certain species of fish in certain water bodies. These advisories are attempts to balance the nutritional benefits of eating fish against the risk of mercury exposure.

While mercury pollution has been linked to a number of industrial sources, the only industry currently exempt from federal rules is the electric power industry. Not every mercury source is covered by EPA's rules, but the most glaring omission is the largest emitting source category: power plants. Without strict controls on power plants, we will have little chance of restoring a vital part of our food supply and of protecting the health of future generations.

## State Fish Advisories for Mercury[a]


**a** Update from EPA fish database by MSB Energy Associates, May 2000

## Summary of Findings

Mercury contamination in fish across the country is so high that health departments in 40 states have issued thousands of fish consumption advisories. These advisories recommend either limiting or avoiding consumption of certain fish from specific water bodies or from specific types of water body (e.g., all freshwater lakes or rivers).

Ten states even have issued statewide mercury fish consumption advisories, i.e., on every water body, and 13 states have advisories for certain saltwater species.

This report presents the most recent information on State advisories. Our survey found the number of States that have issued mercury advisories continues to rise steadily.

- There were 27 State advisories in 1993 and in 1997, the number had grown to 40.
- Since 1993, the number of mercury advisories has increased 128 percent (899 to 2,045).
- In 1999 alone, the number of advisories for mercury rose by 114 in 1999 to a total of 2,045, a 6 percent increase.
- For example, South Carolina has added 36 advisories since 1999.

Based on surveys of how much and what type of fish people eat, the EPA concluded:

- Four million women of childbearing age are consistently exposed to methylmercury at levels above what EPA considers safe. Of these four million women, about 380,000 are predicted to be pregnant in any given year.
- Nearly 3 million children between the ages of three and six are consistently exposed to methylmercury at levels above what EPA considers safe.
- Recreational anglers, Asian-Americans, members of some Native American Tribes, Native Alaskans and persons of Caribbean ethnicity may have methylmercury exposures two to five times higher than exposures experienced by the average population.

While an increase in advisories does not necessarily demonstrate an increase in contaminant levels, it does demonstrate increased concern on the part of State health departments and vividly illustrates how widespread the problem is.

Surveys of anglers in the Northeast, Southeast and Great Lakes region have revealed that:

- for the most part, anglers continue to fish in areas where mercury advisories have been issued.
- In general, in all parts of the country, men are more aware of advisories than women, but the extent of knowledge also depends on educational level and ethnicity of the angler.
- Non-white populations and those with lower income levels fish more often, eat more fish and are generally less aware of advisories than other anglers.
- In a survey of more than 8,000 residents of the eight Great Lakes states, only half of the people who ate sport fish were aware of the fish consumption advisory about eating Great Lakes sport fish.
- Awareness of advisories in the Great Lakes states was especially low among women, one of the populations at risk.

Mercury contamination threatens the economic viability of recreational fishing. Nationally, in 1996, saltwater and freshwater recreational fishing:

- generated a total revenue of nearly $109 billion,
- supported 1.2 million jobs, or slightly more than one percent of the country's civilian labor force, in all sectors of the economy,
- created household income (salaries and wages) totaling $28.3 billion, which is roughly equivalent to almost half of the U.S. military payroll,
- added $2.4 billion to state tax revenues, or nearly one percent of all annual state tax revenues combined, and
- generated $3.1 billion in federal income taxes, which equates to nearly one-third of the entire federal budget for agriculture.

The EPA estimated that manmade emissions in the U.S. total 158 tons of mercury each year. Of that total, coal-fired power plants are estimated to emit about 52 tons per year, or about 33 percent of all U.S. emissions.

EPA has required other industries to reduce their mercury emissions. Regulatory requirements have been issued for municipal waste combustors, medical waste incinerators and hazardous waste combustors. *Mercury emissions from these sources will be reduced by an overall 80 percent by 2003.*

A critical exception in the Clean Air Act exempts power plants from these requirements until EPA issues a specific regulatory determination finding that controls are needed. EPA is under a court-ordered deadline to issue the regulatory determination for mercury and other hazardous air pollutants by December 2000.

JEFF FISCHER

**Just In.** On July 11, 2000, the National Research Council (NRC) of the National Academy of Sciences and Engineering released a report — *Toxicological Effects of Methylmercury.* The Report affirms the science behind EPA's health benchmark for methylmercury. Moreover, it concludes that children of women who consume large amounts of fish and seafood during pregnancy face the highest risk and estimates that 60,000 children may be born each year in the U.S. with neurological problems from in utero exposure to methylmercury. Recognizing the beneficial effects of eating fish, the NRC supports reducing concentrations of methylmercury in fish rather than substituting other foods. In the meantime, the NRC recommends minimizing exposure by choosing fish with lower methylmercury concentrations.

# Introduction

Across the U.S., mercury contaminates freshwater and saltwater fish populations, poses health risks to the people and wildlife consuming these fish and threatens the multi-billion dollar recreational and commercial fishing industries. State health departments in 40 states have issued advisories warning the public about eating certain species of fish from certain water bodies.[1]

These advisories attempt to balance the nutritional benefits of eating fish against the risk of mercury exposure. While mercury pollution has been linked to a number of industrial sources, the only source currently exempt from federal rules is the electric power industry.[2]

Mercury contamination isn't a recent phenomenon. It hasn't happened overnight and reducing current levels in the environment will not be quick or easy. Because mercury never degrades in the environment, reducing the concentration of mercury in the environment will be difficult. Historical and current mercury releases into the environment will continue to affect ecosystems for a long time. Thus, even if all mercury emissions ceased today, it could still take years, possibly decades, before fish mercury concentrations decline. As a first step, all current sources of mercury emissions must be eliminated to the greatest extent possible. Second, the only way to reduce mercury exposure today is to make sure that people who eat fish are aware of contamination not only in their local rivers and streams but also in the fish they buy at the grocery store.

## What is Mercury?

Mercury is a naturally occurring metal that is found in the Earth's crust. It can be mined from geologic formations called cinnabar and is found in fossil fuels. A liquid at room temperature, mercury has been used for centuries in thousands of household and commercial products and industrial processes. Once released into the environment, mercury lasts forever. It can be converted by microorganisms to methylmercury, which is especially toxic to humans and wildlife. Methylmercury readily accumulates in organisms in the aquatic environment. Animals at the top of the food chain can accumulate high levels of methylmercury.

Once in the aquatic environment, mercury can be converted by microorganisms to another chemical form known as methylmercury. Fish absorb methylmercury from water as it passes over their gills and as they feed on other aquatic organisms. As larger fish eat smaller ones, methylmercury concentrations increase in the bigger fish, a process known as bioaccumulation. Consequently, larger predator fish usually have higher concentrations of methylmercury as a result of eating contaminated prey. Humans, birds and other wildlife that eat fish are exposed to mercury in this way.

# A Damaged National Resource

Our fresh and saltwater fish are a natural resource that provide an abundant food supply for people and wildlife, are a source of recreation enjoyed by millions of Americans and are a resource critical to the economies of many areas of the country as well as numerous industries. What has happened to this resource? Slowly but surely, we have contaminated it with the toxic pollutant, mercury. We currently are releasing three times the amount of mercury to the environment as at the onset of the industrial age.[3] Some of this pollution ends up in aquatic ecosystems where it builds up in fish tissue. People and wildlife that eat fish are exposed to mercury in this way.

## Fishing for Food

Fish are a critically important food source and health professionals urge people to eat fish as part of a

healthy, well-balanced diet. Fish are high in protein and essential nutrients as well as low in fat. Across the U.S., fish are a source of free food that contributes substantially to the diet of low-income populations. Other cultures such as some Native American tribes and Asian Americans are also highly dependent on fish as a significant part of their diet.[4] Protection and restoration of this resource must be an environmental and public health priority.

## Fishing for Fun

In addition to the degradation of fish as a food supply, there are vital economic issues at stake as well.

NANCY SHAW

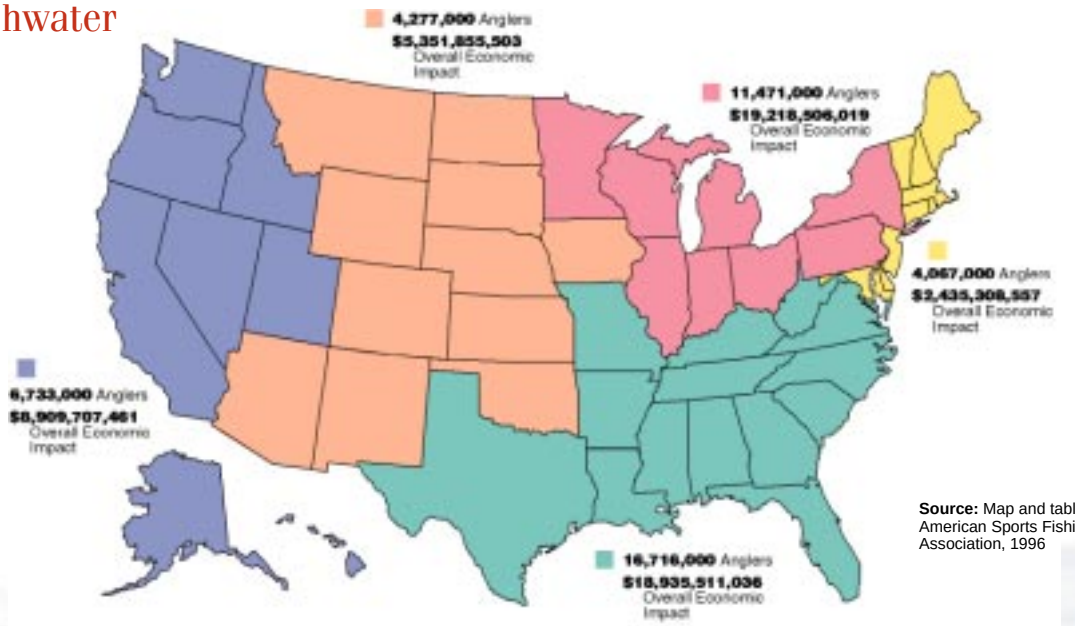
Recreational fishing is a multi-billion dollar industry. In 1996, the U.S. Fish and Wildlife Service reported that 29.7 million Americans spent a total of 515 million days fishing for freshwater fish![5] Nearly 10 million anglers spent 103 million days fishing for saltwater fish. Anglers spent an average of 18 days fishing and took an average of 14 fishing trips for a total of 507 million fishing trips in 1996. Anglers don't just spend a lot of time fishing; they spend money as well.[6] For fishing equipment alone, anglers spent more than $5 billion, plus over $500 million for fishing licenses. Nationally, in 1996, saltwater and freshwater recreational fishing:

NANCY SHAW

- generated a total revenue of nearly $109 billion,
- supported 1.2 million jobs, or slightly more than one percent of the country's civilian labor force, in all sectors of the economy,
- created household income (salaries and wages) totaling $28.3 billion, which is roughly equivalent to almost half of the U.S. military payroll,
- added $2.4 billion to state tax revenues, or nearly one percent of all annual state tax revenues combined, and
- generated $3.1 billion in federal income taxes, which equates to nearly one-third of the entire federal budget for agriculture.

## Popularity of Freshwater Sport Fishing

***Sport fishing is a multi-billion dollar industry across the United States.***




**Source:** Map and table – American Sports Fishing Association, 1996

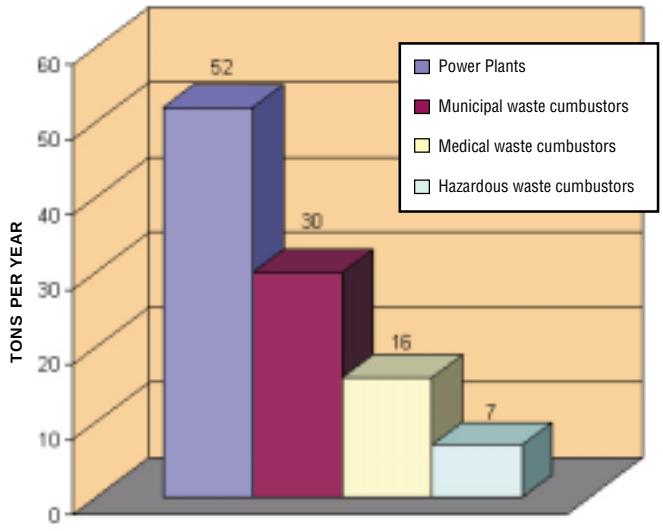
# Where Does Mercury Come From?

Mercury has many sources in the environment. As an element that is part of the Earth's crust, mercury is emitted by natural sources such as volcanoes and forest fires. It is also released into the environment by human activities.[7] Manmade emissions come from a variety of sources, including the combustion of fossil fuels which contain trace amounts of mercury, combustion of mercury-containing wastes, manufacturing processes that use mercury and processes for roasting and smelting ore. Because mercury never degrades, the total amount of mercury circulating in the environment comes from a combination of contamination from past disposal and current activities and emissions.

In 1997, the U.S. Environmental Protection Agency (EPA) published an inventory of mercury sources and the corresponding amount that each source emits to the air annually. The EPA estimated that manmade emissions in the U.S. total 158 tons of mercury each year.[8] Facilities that burn fossil fuels or wastes that contain mercury account for 87 percent of the inventory. Of these, coal-fired power plants are estimated to emit about 52 tons per year, or about 33 percent of all U.S. emissions.

Not all of the mercury released from power plants is emitted to the air. About half or about another 50 tons is mixed with the solid wastes that remain after the coal is

## Mercury Emissions of Largest Sources



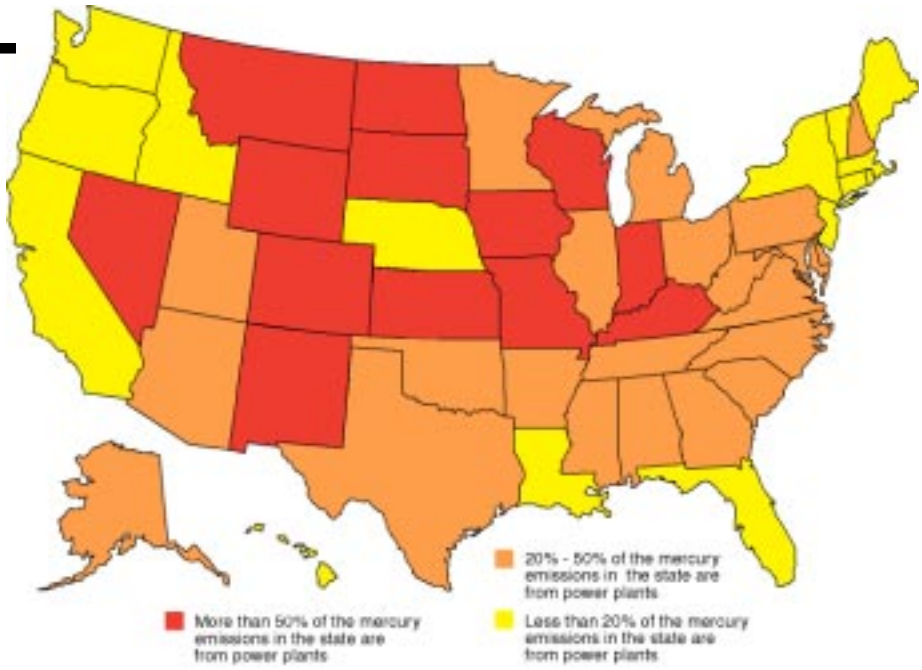

U.S. EPA 1997 Mercury Study Report to Congress, Volume 2

## Economic Impact of Fresh Water Sport Fishing in 1996

| State | Angler Expenditure | Overall Economic Impact | Number of Anglers |
|---|---|---|---|
| **Alabama** (AL) | $703,342,024 | $1,384,675,129 | 984,000 |
| **Alaska** (AK) | 287,936,535 | 503,970,257 | 463,000 |
| **Arizona** (AZ) | 358,143,614 | 662,936,279 | 512,000 |
| **Arkansas** (AR) | 301,828,952 | 584,559,776 | 764,000 |
| **California** (CA) | 2,377,748,145 | 5,011,445,460 | 2,722,000 |
| **Colorado** (CO) | 634,446,791 | 1,315,893,039 | 830,000 |
| **Connecticut** (CT) | 182,091,459 | 332,781,569 | 419,000 |
| **Delaware** (DL) | 54,997,881 | 81,155,982 | 196,000 |
| **Florida** (FL) | 766,725,074 | 1,404,509,204 | 2,864,000 |
| **Georgia** (GA) | 1,040,657,057 | 2,121,266,307 | 1,087,000 |
| **Hawaii** (HI) | 3,866,207 | 6,820,377 | 260,000 |
| **Idaho** (ID) | 279,949,546 | 461,681,805 | 483,000 |
| **Illinois** (IL) | 1,568,471,459 | 3,618,451,181 | 1,351,000 |
| **Indiana** (IN) | 799,252,121 | 1,677,490,348 | 992,000 |
| **Iowa** (IA) | 338,969,069 | 654,502,272 | 497,000 |
| **Kansas** (KS) | 180,018,571 | 356,981,576 | 364,000 |
| **Kentucky** (KY) | 517,028,663 | 1,046,748,929 | 817,000 |
| **Louisiana** (LA) | 552,534,457 | 1,031,333,307 | 1,031,000 |
| **Maine** (ME) | 194,576,278 | 319,826,084 | 356,000 |
| **Maryland** (MD) | 143,578,026 | 269,207,260 | 715,000 |
| **Massachusetts** (MA) | 274,273,777 | 506,352,641 | 704,000 |
| **Michigan** (MI) | 1,506,227,841 | 2,854,443,939 | 1,824,000 |
| **Minnesota** (MN) | 1,874,835,053 | 3,678,165,611 | 1,538,000 |
| **Mississippi** (MS) | 415,674,056 | 739,245,720 | 579,000 |
| **Missouri** (MO) | 702,977,501 | 1,445,273,434 | 1,209,000 |
| **Montana** (MT) | 243,500,824 | 447,974,606 | 335,000 |
| **Nebraska** (NE) | $235,814,547 | $426,679,493 | 269,000 |
| **Nevada** (NV) | 211,092,356 | 335,701,417 | 224,000 |
| **New Hampshire** (NH) | 184,466,503 | 326,455,861 | 267,000 |
| **New Jersey** (NJ) | 180,110,305 | 353,382,940 | 1,059,000 |
| **New Mexico** (NM) | 195,011,883 | 343,812,168 | 321,000 |
| **New York** (NY) | 1,181,289,958 | 2,033,475,366 | 1,706,000 |
| **North Carolina** (NC) | 835,881,247 | 1,584,173,399 | 1,557,000 |
| **North Dakota** (ND) | 83,415,107 | 148,467,067 | 97,000 |
| **Ohio** (OH) | 836,191,596 | 1,879,177,292 | 1,231,000 |
| **Oklahoma** (OK) | 490,767,292 | 1,012,537,832 | 924,000 |
| **Oregon** (OR) | 453,877,941 | 854,067,999 | 658,000 |
| **Pennsylvania** (PA) | 649,762,961 | 1,339,801,973 | 1,355,000 |
| **Rhode Island** (RI) | 41,038,332 | 68,085,198 | 163,000 |
| **South Carolina** (SC) | 475,855,706 | 891,191,731 | 986,000 |
| **South Dakota** (SD) | 206,431,791 | 351,939,997 | 227,000 |
| **Tennessee** (TN) | 474,724,071 | 989,463,949 | 860,000 |
| **Texas** (TX) | 1,916,488,984 | 4,228,987,664 | 2,613,000 |
| **Utah** (UT) | 231,291,509 | 468,403,271 | 406,000 |
| **Vermont** (VT) | 103,482,213 | 178,061,022 | 188,000 |
| **Virginia** (VA) | 594,541,682 | 1,175,278,360 | 1,029,000 |
| **Washington** (WA) | 313,875,451 | 604,680,596 | 1,005,000 |
| **West Virginia** (WV) | 204,922,711 | 308,804,127 | 336,000 |
| **Wisconsin** (WI) | 1,072,569,520 | 2,137,500,309 | 1,474,000 |
| **Wyoming** (WY) | 174,575,258 | 293,067,453 | 413,000 |
| **U.S. Total** | **$26,898,814,893** | **$76,919,593,071** | **35,246,000** |

## Mercury Emissions Contributed by Power Plants

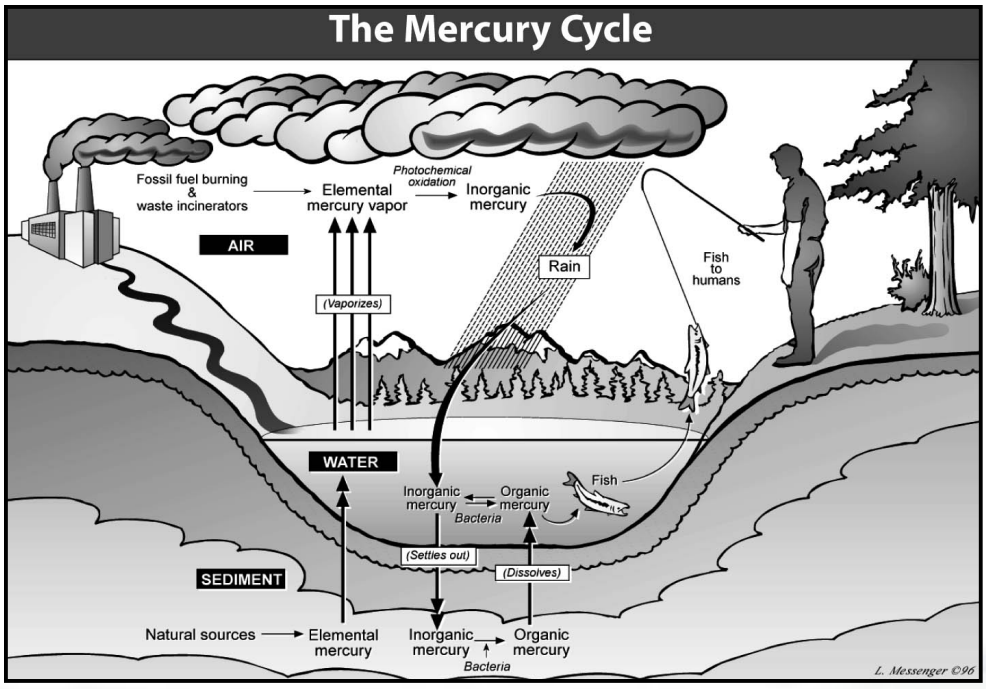
***Power plants are the largest source of mercury and are exempt from regulations.***




**Source:** U.S. EPA, National Toxics Inventory, Version 9901 January 2000

burned.[9] Coal-fired power plants produce about 100 million tons of these wastes each year! Whether mercury in these wastes is re-emitted to the air or seeps into groundwater is largely unknown. Unfortunately, the EPA recently decided that federal requirements mandating the safe disposal of coal combustion wastes are not needed.[10] This decision was made despite the fact that mercury re-emission was not evaluated. Instead, EPA is allowing the disposal of these wastes to be managed according to a hodgepodge of state policies and rules.

Mercury has several unique properties that significantly influence its fate in the environment.[11] Once emitted, mercury in its elemental chemical state can remain in the atmosphere for up to one year. When mercury in the atmosphere comes into contact with oxidizing chemicals (e.g., ozone), its chemical state changes to one that is water soluble. In this water-soluble form, mercury is deposited to earth by rain or other precipitation. Once deposited to the earth or the oceans, it can be re-emitted back to the atmosphere and deposited elsewhere. As a result, even remote areas that are thought to be pristine can be affected by mercury pollution. This continuous cycle of deposition and re-emission makes mercury pollution a local, regional and global problem.




LORI A. MESSENGER

***Mercury lasts forever in the environment, continuously cycling through ecosystems.***

# Methylmercury Accumulates in Fish

Mercury contamination affects some fish to the point where they are unsafe to eat. Many common saltwater species have high methylmercury concentrations. These include shark, swordfish, tuna, king mackerel and bluefish. The older and larger fish usually have the highest concentrations. The chart below shows the methylmercury levels that have been measured in some common saltwater fish species.[12]

NANCY SHAW

Fish sold in commerce are under the jurisdiction of the Food and Drug Administration (FDA) which issues action levels for contaminants in food. Fish with mercury concentrations greater than 1 part per million (ppm) are not supposed to be sold commercially. However, this chart shows that many kinds of fish sold commercially and/or caught by anglers may have mercury concentrations higher than FDA's action level. Regrettably, recent studies have shown that FDA does very little testing for mercury in commercially caught fish and has discontinued its monitoring program for shark, swordfish and tuna, three species known to have the highest levels of mercury in them.[13] Information about the fish that FDA has tested for mercury is not readily available to the public nor does FDA post any consumption advice where fish are sold. Thus, the consumer is usually unaware of potential mercury contamination.

Contamination of freshwater fish is commonplace all across the U.S. Concern about mercury contamination and its effects on the population has led state health departments to expand their mercury testing and monitoring programs. As a result, there is now a substantial amount of information verifying mercury levels in fish. The table above presents the results of mercury analyses of freshwater fish collected from 36 States and the District of Columbia.[14] As shown, some species have higher levels of contamination than others do, and there is a wide range between the average amount of mercury found in fish of the same species. The chemistry and depth of the water, the proximity of the water

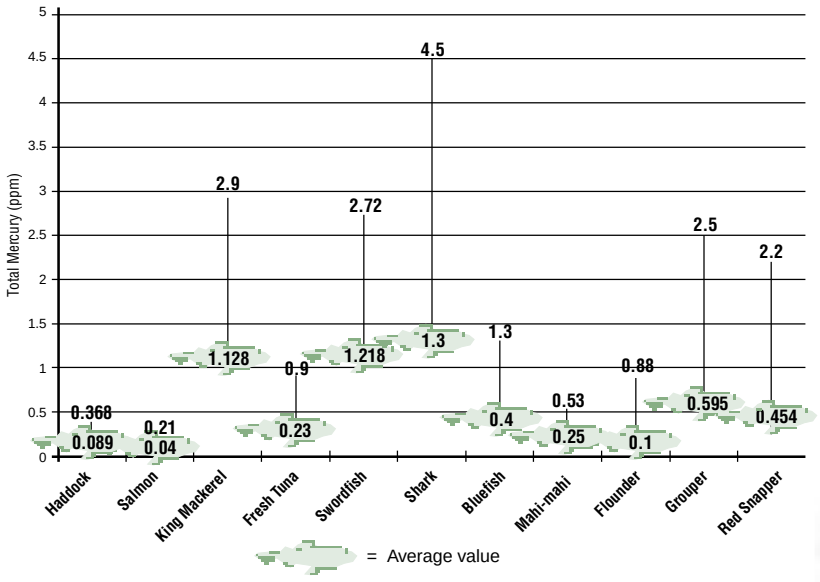
## Average Mercury Levels in Popular Freshwater Fish

| Fish Species | Range of Average Mercury Concentrations (ppm) |
|---|---|
| **Carp** | 0.061 – 0.250 |
| **Channel catfish** | 0.010 – 0.890 |
| **White sucker** | 0.042 – 0.456 |
| **Brown trout** | 0.037 – 0.418 |
| **Smallmouth bass** | 0.094 – 0.766 |
| **Largemouth bass** | 0.101 – 1.369 |
| **Walleye** | 0.040 – 1.383 |
| **Northern Pike** | 0.084 – 0.531 |

**Note:** The values in this table represent the range of average mercury concentrations measured for these species in 36 states and the District of Columbia. Mercury action levels (i.e., the level that triggers a consumption advisory) vary from state to state. 17 states use the FDA action level of 1 ppm. 10 states have action levels between 0.5 and 1 ppm, and 17 states have action levels lower than 0.5 ppm.

## Methylmercury Levels in Saltwater Fish

**Maximum and Average Measured Values**



body to a mercury source, and other factors all influence how much mercury will make its way into the food chain.[15] Consequently, fish of the same species may be safe to eat in one location while the same type of fish may not be safe to eat when caught elsewhere.

# Mercury Contamination in Fish Poses a Public Health Threat


DAVID POLITO

The principal way people are exposed to methylmercury is through the consumption of fish.[16] Methylmercury interferes with the development and function of the central nervous system. The health effects range from subtle to severe depending on how much mercury the person is exposed to and when the exposure occurs. Methylmercury passes through the placenta and poses the greatest hazard to the developing fetus. Mercury exposure prior to pregnancy is as critical as exposure during pregnancy because methylmercury is slowly excreted from the body. Since women typically do not know they are pregnant until the pregnancy is past many of the critical stages of fetal development (i.e., 6 weeks), the fetus may be exposed to methylmercury during that time. Women of childbearing age and pregnant women are therefore the most important members of the population in terms of mercury exposure.

Infants and children are also at risk. Infants may ingest methylmercury from breast milk and children are exposed through their diet. Children and infants may be more sensitive to the effects of mercury because their nervous systems continue to develop until about age 14.[17] Children also have higher mercury exposures than adults because a child eats more food relative to his or her body weight than an adult does.

Methylmercury's effects on the central nervous system are similar to the effects of lead.[18] Although the effects may not be noticeably debilitating, they are no less serious. These effects include delayed mental development, learning disabilities, and delayed development or deficits in language, motor function, attention and memory. Many of these effects are subtle and can only be detected in the older child using specially designed developmental tests.

## Who is at Risk?

Whether people are at risk from methylmercury exposure depends on how often they eat fish, how much they eat, and how much methylmercury is in those fish.[19] Because methylmercury is found in the muscle tissue or filet, it cannot be removed by trimming the skin or fat or by cooking methods (e.g., broiling).

Because people consume marine fish much more frequently than freshwater fish, consumption of marine fish contributes the most to methylmercury exposure. As discussed above, numerous species of saltwater fish contain high levels of methylmercury. There are other patterns of fish consumption that increase a person's exposure.

- *Daily fish consumption over a short period of time.* Recreational anglers, who spend their vacation fishing and over a relatively short period of time (e.g., 7 days) eat fish daily, have higher mercury exposure.[20] Mercury ingested during just this one week may persist in the body for several weeks or even months depending on the amount in the fish.
- *Relatively continuous exposure.* Subsistence fishers who rely on fish they catch as a primary food source may be continuously exposed to methylmercury depending on the type of fish and where it is caught (both factors affect the level of contamination of the fish). These populations eat far more fish than the average American does.
- *Regular and frequent consumption of fish.* People

## What About Farm-raised Fish?

The fish that accumulate the highest levels of mercury are older predator fish at the top of the aquatic food chain. Because farm-raised fish are fed a special pelleted diet and raised in a controlled environment, the typical food chain doesn't exist. Farm-raised fish are also harvested when they are relatively young. Although there is limited information about the mercury levels in farm-raised fish, it would be expected that their mercury levels would be very low.

who eat fish several times a week for dietary reasons or simply because of preference may be continuously exposed to methylmercury. Even frequent consumption of fish with low levels of mercury (e.g., canned tuna) can still add up to high exposure levels because the body excretes mercury very slowly.

Based on surveys of how much and what type of fish people eat, the EPA concluded:[21]

- Four million women of childbearing age are consistently exposed to methylmercury at levels above what EPA considers safe. Of these four million women, about 380,000 are predicted to be pregnant in any given year.
- Nearly 3 million children between the ages of three and six are consistently exposed to methylmercury at levels above what EPA considers safe.

SIMON FISCHER-BAUM

*Tuna is a popular fish for catching (below) and eating – fresh (left) as well as from the can.*

NANCY SHAW

- Recreational anglers, Asian-Americans, members of some Native American Tribes, Native Alaskans and persons of Caribbean ethnicity may have methylmercury exposures two to five times higher than exposures experienced by the average population.

### Mercury Exposure and the Recreational Angler

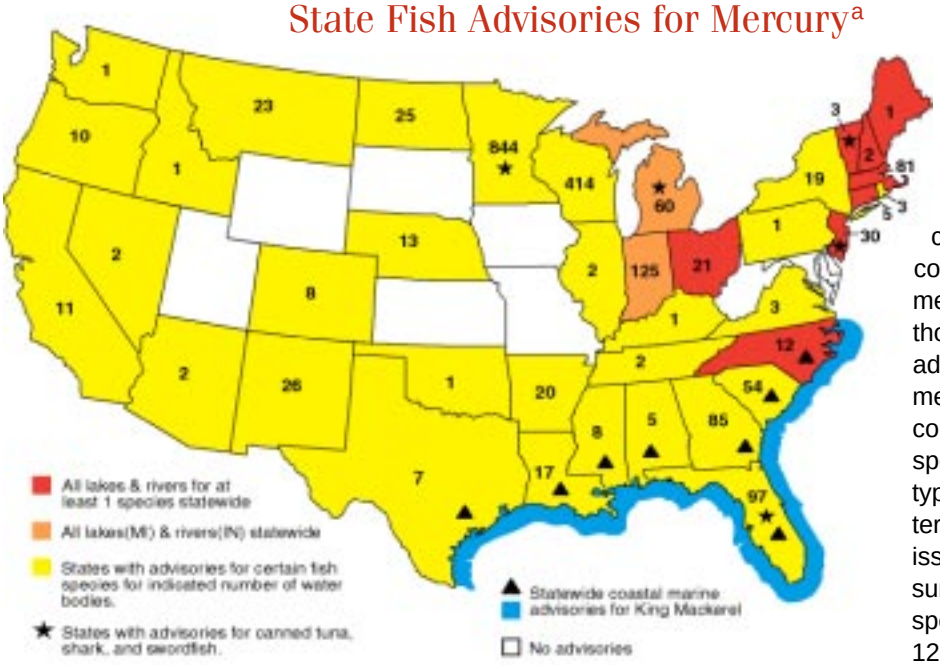
An exposure analysis of a hypothetical female angler who eats fish for 7 consecutive days during her vacation was performed to see how her body burden of mercury would compare to federal guidelines. Eating fish with average levels of mercury in them for one week only (i.e., no other fish consumption during the year), caused mercury levels in the blood to be above EPA's guidelines for 11 weeks. FDA's guideline (which is higher) was exceeded for 9 weeks.[20]

## State Response: Fish Consumption Advisories

To address this public health problem state and tribal health departments for years have issued fish consumption advisories. The purpose of fish consumption advisories is to protect citizens from the harmful effects of eating fish contaminated with pollutants, including mercury. Advisories represent a complex assessment that takes into consideration the level of contamination in fish species, how often an individual eats that particular species and the health risk posed by that consumption. With mercury, the assessment is more complicated because every water body has different ecological and chemical characteristics that influence whether, and to what extent, mercury moves into the food chain.

While states and tribes have the responsibility for issuing fish consumption advisories, they rely heavily on guidance from two federal agencies: the EPA and the FDA. EPA is responsible for reducing pollution and contamination, and FDA is responsible for ensuring the

## State Fish Advisories for Mercury[a]




**a** Update from EPA fish database by MSB Energy Associates, May 2000

safety of fish sold in interstate commerce. Because of these different mandates, the two agencies use different methods for assessing risks to public health and have come up with two different federal guidelines regarding how much mercury in fish can be ingested without causing harm. Of the two, EPA's health assessment is more conservative than FDA's (i.e., the EPA's guidelines call for consumption advisories at lower levels of contamination than FDA's).

On the state level, the effect of two different federal guidelines means that state advisories do not share a common health protection standard. For instance, a state whose advisories rely on EPA's guidance is likely to have more water bodies or species under a consumption advisory than a neighboring state using the FDA's assessment. For example, Minnesota has issued 844 mercury fish advisories based, in part, on EPA's health assessment for methylmercury. Its neighboring state, Iowa, bases its assessment of fish contamination on FDA's action level of 1 ppm and has issued no mercury fish consumption advisories for any citizens – not even pregnant women or children. Nationally, 17 states use the FDA action level of 1 ppm to trigger fish consumption advisories, 10 states have action levels between 0.5 and 1 ppm, and 17 states have action levels lower than 0.5 ppm.[22]

SIMON FISCHER-BAUM

Despite the different approaches used to estimate risk, the fact remains that mercury contamination in fish across the country is so high that health departments in 40 states have issued thousands of fish consumption advisories.[23] These advisories recommend either limiting or avoiding consumption of certain fish from specific water bodies or from specific types of water body (e.g., all freshwater lakes or rivers). Ten states have issued statewide mercury fish consumption advisories for at least one species, i.e., on all lakes or rivers, and 12 states have advisories for certain saltwater species.

## Mercury Fish Advisories Continue to Increase

This report presents the most recent information on State advisories. Our survey found that the number of States that have issued mercury advisories continues to rise steadily, from 27 in 1993 to 40 since 1997. The map above shows the current mercury fish advisories. Since 1993, the number of mercury advisories has increased 128 percent (899 to 2,045).[24, 25] In 1999 alone, the number of advisories for mercury rose by 114 to a total of 2,045, a 6 percent increase. An increase in advisories does not necessarily mean an increase in contaminant levels; it does demonstrate increased concern on the part of State health departments and vividly illustrates how widespread the problem is.

## Advisories Are Not Doing the Job

Is anybody heeding the warnings? Unfortunately this does not appear to be the case; studies have shown that fish consumption advisories are rarely effective in warning the public about mercury exposure. Advisories based on two different guidelines from two separate federal agencies are part of the problem. Another challenge involves getting the word out to those most at risk.

Surveys of anglers in the Northeast, Southeast and Great Lakes region have revealed that, for the most part, anglers continue to fish in areas where mercury advisories have been issued.[26, 27, 28, 29] Even though the anglers may have heard about advisories, they still believe the fish are safe to eat, either because the water appears clean (and therefore is uncontaminated), or they have a mistrust of information issued by government authorities. In general, in all parts of the country,

men are more aware of advisories than women, but the extent of knowledge also depends on educational level and ethnicity of the angler. Non-white populations and those with lower income levels fish more often, eat more fish and are generally less aware of advisories than other anglers. In a survey of more than 8,000 residents of the eight Great Lakes states, only half of the people who ate sport fish were aware of the fish consumption advisory about eating Great Lakes sport fish. Awareness of advisories was especially low among women, one of the populations at risk.[30]

There is also a difference among states as to how advisories are publicized.[31] Some states go to great lengths to reach their at-risk populations by printing advisories in different languages, holding community meetings, posting signs in advisory areas and working with health practitioners. Unfortunately there are also states that do little more than post an announcement in the newspapers once or twice a year. Other common practices are to list advisories in fishing regulations or mail them to anglers who have a fishing license. While these efforts are a good start, they do nothing to inform anglers who aren't required to have a license, for example those who fish in marine waters.

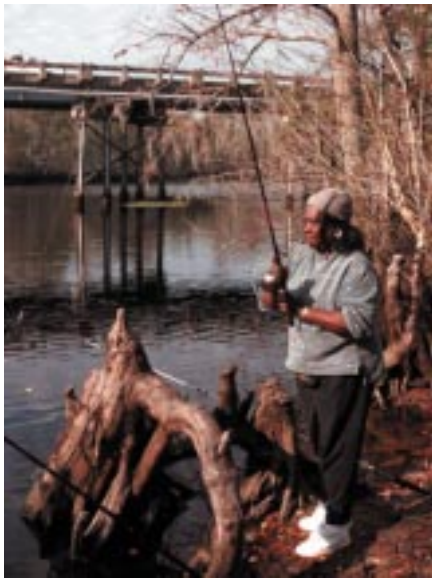
# What are Federal Agencies Doing About Mercury Contamination?

The FDA has only issued consumption advice for two species of fish – shark and swordfish, despite evidence that other commercial species also have high levels of mercury in them. The FDA advises pregnant women and women of childbearing age who may become pregnant to limit their consumption of shark and swordfish to no more than once a month.[32]

For other consumers, FDA says shark and swordfish shouldn't be consumed more than once a week. For fish averaging around 0.5 ppm, FDA says regular consumption should be limited to two servings a week. How do consumers know what fish species have levels of mercury around 0.5 ppm or higher? They don't! FDA only publishes consumption advice in FDA publications and does not make its fish monitoring data readily available to the public. (One environmental advocacy group waited a year for a response to a Freedom of Information Request for this information.)[33]

FDA also says that the general public does not need to restrict consumption of the top 10 species consumed (canned tuna, shrimp, pollock, salmon, cod, catfish, clams, flatfish, crabs and scallops), because these species have relatively low mercury levels and a member of the general public typically does not eat more than two pounds of fish per week. However, FDA does not take into consideration the fact that many individuals eat more than two pounds of fish per week or eat fish with higher mercury levels in them. Recent analyses suggest that daily consumption of fish for a short period of time (e.g., every day on a 7-day vacation), or even a single fish meal of a highly contaminated fish will cause elevated mercury levels in an individual for an extended period of time.[34, 35] FDA's advice to consumers about mercury contamination in fish falls short for many Americans.

EPA is responsible for reducing sources of contamination and pollution. The Agency also issues guidance to state public health departments on fish advisories, monitoring and risk communication. EPA also compiles all the state advisory and fish monitoring data on a central web site that can be accessed by the public.[36] However, EPA does not have jurisdiction over state programs, and a patchwork of advisories and fish monitoring programs across the country remains.



TONY BARTELME, THE POST AND COURIER (COLUMBIA, SC)

In terms of controlling mercury emission sources, EPA is required under the Clean Air Act to evaluate sources of mercury emissions (and 187 other pollutants) and determine what control technologies can achieve the greatest reductions in emissions (considering cost and other factors). However, a critical exception in the Clean Air Act exempts power plants from these requirements until EPA issues a specific regulatory determination finding that controls are needed. EPA is under a court-ordered deadline to issue the regulatory determination for mercury and other hazardous air pollutants by December 2000.

In the meantime, EPA has required other industries to reduce their mercury emissions. Regulatory requirements have been issued for municipal waste combustors, medical waste incinerators and hazardous waste combustors. Mercury emissions from these sources will be reduced by an overall 80 percent by 2003. Hospitals

and the chlorine manufacturing industry have also entered into voluntary agreements with the EPA to reduce their mercury use. (In addition to a voluntary program, EPA is expected to issue formal regulations for chlorine manufacturing.)

While not every mercury source is covered by EPA's rules, the most glaring omission is the largest emitting source category: power plants. Without strict controls on power plants, we will have little chance of restoring a vital part of our food supply and of protecting the health of future generations.

# Recommendations

1. The EPA should regulate mercury air emissions from power plants consistent with comprehensive multi-pollutant, power plant clean up.
2. EPA should ensure that power plant solid and liquid wastes do not re-emit mercury to the environment.
3. The EPA should continue to investigate sources for which there is little or no mercury emissions information.
4. Federal public health agencies should inform the public about mercury contamination in fish and issue guidance to the consumer about healthy ways to include fish in our diets. These agencies should also issue guidance to health practitioners about mercury contamination in fish.
5. State agencies must refine their efforts to warn the public about fish advisories and in particular target the populations most at risk.
6. The FDA should resume its monitoring program for domestic fish to protect the U.S. consumer from contaminated catch. The results of the monitoring should be readily available to the public.
7. FDA should post its advice to consumers wherever fish are sold.
8. The EPA should incorporate pollution prevention principles in its rule-making process and require the use of non-mercury substitutes in products and industrial processes where such substitutes are available.

## What Should Consumers Do?

What about the apparently conflicting information consumers are given about eating fish? On the one hand, numerous publications and scientific studies advise people to eat more fish for essential nutrients and cardiovascular benefits. On the other hand, reports like this one warn about contamination of the fisheries by mercury and other pollutants. Common sense advice to consumers is this:

**Stay informed.** If you fish or eat fish, find out whether there are advisories for the area where you are fishing and/or for the species you are eating.

**Inform others.** Tell your friends, families and other fishermen about advisories in your area.

**Ask questions.** Your state health department is the best source of information for conditions in your state and they can put you in touch with health departments in other states if you are fishing elsewhere.

**Eat fish as part of a balanced diet** and eat a variety of fish. However, eating any kind of fish every day or consistently eating fish that have high mercury levels will surely lead to higher mercury exposure.

**If you are planning a pregnancy,** be aware that refraining from eating fish for about 3 months prior to pregnancy should mean that blood mercury levels will be well within normal values (if you aren't exposed to other sources of mercury).

**If you are pregnant now,** be careful about the fish species that you eat and especially avoid swordfish, shark, king mackerel, yellowfin tuna and other species known to have high mercury levels in them. Remember that even frequent consumption (e.g., more than once a week) of fish with relatively low levels of mercury (e.g., canned tuna) can increase your body burden of mercury. Over time, mercury can accumulate in the body to unsafe levels. Because the nervous system continues to develop until about age 14, this approach also makes sense for nursing mothers and children.

**Ask your doctor** about taking dietary supplements (e.g., omega-3 fatty acids) instead of eating fish during pregnancy. Some scientists think that during pregnancy the benefits of eating the essential nutrients in fish outweigh the risks of methylmercury exposure to the fetus. However, others have found that it is not clear whether eating seafood, beyond a minimal level, during pregnancy is beneficial. Mercury toxicity may outweigh the benefits, especially when contaminated seafood is eaten frequently or in large amounts at a time.[37] If you are concerned about your mercury exposure during pregnancy, ask your doctor about testing your hair or blood mercury levels.

# Endnotes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## Where can I find out about fish advisories in my state?

State-specific information is available at:

**www.cleartheair.org**

**www.epa.gov/ost/fish**

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