

Health Consultation

Mercury in Fish from Salmon Falls Creek Reservoir Rogerson, Idaho

July 26, 2012

Prepared by

**Idaho Department of Health and Welfare
Division of Public Health
Bureau of Community and Environmental Health
Under Cooperative Agreement with
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry**

This report was supported in part by funds from a cooperative agreement with the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. This document has not been reviewed and cleared by ATSDR.



C.L. "BUTCH" OTTER – GOVERNOR
RICHARD M. ARMSTRONG – DIRECTOR

IDAHO DEPARTMENT OF HEALTH & WELFARE

ELKE SHAW-TULLOCH – CHIEF
BUREAU OF COMMUNITY & ENVIRONMENTAL HEALTH
450 West State Street, 6th Floor
P.O. Box 83720
Boise, Idaho 83720-0036
PHONE 208-334-5927
FAX 208-334-6573

July 26, 2012

Mr. Ken Marcy
U.S. Environmental Protection Agency
12928 SW 276th Street
Vashon, WA 98070

Dear Mr. Marcy:

The Idaho Department of Health and Welfare's Bureau of Community and Environmental Health (BCEH) is responsible for issuing fish advisories for lakes and streams where contaminants in fish may pose a health risk to those who eat them. To achieve our goal of protecting Idahoans from harmful exposures to contaminants in fish, BCEH works through the Idaho Fish Consumption Advisory Project (IFCAP). This group consists of staff from the Idaho Department of Health and Welfare (IDHW), Idaho Department of Fish and Game, Idaho Department of Environmental Quality, Idaho State Department of Agriculture, United States Geological Survey, and the EPA Boise Operations Office. IFCAP relies on these agencies' collective resources and skills to conduct sampling, laboratory analysis, risk analysis, hazard communication, and outreach.

Background and Statement of Issues

On June 16, 2010, the Idaho Conservation League, concerned that mercury releases to the air from northern Nevada gold mining and ore roasting operations were contaminating the Salmon Falls Creek Reservoir (SFCR), petitioned EPA Region 10 to conduct a preliminary assessment of the hazards to public health and the environment from those releases. In response, the EPA contracted TechLaw, Inc. to produce a Superfund Technical and Response Team Site Summary Report for SFCR. The report, based on existing reports and information, focused on the sources and pathways of human and environmental exposure to mercury in SFCR and made recommendations. Specific to human health assessment and risk communication, the report recommended that state agencies, including IDHW, evaluate the effectiveness of current efforts to communicate the fishing advisory to the public, and to ensure recreational fishing is not promoted without first adequately informing the public of the potential hazards. The report recommended that the agencies work through IFCAP.

Site Description

SFCR lies in extreme south-central Idaho, approximately 31 miles southwest of Twin Falls in Twin Falls County and 6 miles north of the Nevada border. The reservoir is long (10.5 miles) and narrow (0.25 miles), and covers 2,500 acres. It is used for agricultural irrigation, fishing, and recreation. The reservoir

lies at an elevation of 5,000 feet on the southern edge of the Snake River Plain and occupies a canyon in a broad (12.5 miles), flat valley surrounded on the east and west by 1,600 feet high hills. It has a very large watershed catchment area that is annually charged by relatively rapid snowmelt runoff from the upper basin in the spring. The reservoir is located on land primarily controlled by the U.S. Bureau of Land Management (BLM). The reservoir was formed by the Salmon Falls Dam constructed on the Salmon Falls Creek in 1910. The land surrounding the reservoir is primarily rangeland.

Environmental Sampling

On October 5, 2011, IFCAP met to discuss SFCR and what could be done to fill data gaps and expand outreach communication for the existing fish advisory. In the meeting members of IFCAP agreed that additional fish sampling was needed for certain species and size ranges of fish. As a result, BCEH prepared a sampling and quality assurance plan for SFCR. BCEH submitted the sampling and quality assurance plan to IFCAP members in April 2012 for comments and it was finalized in May. The plan called for collection of rainbow trout, smallmouth bass, yellow perch and walleye from SFCR. It was determined that walleye should be collected in three size categories since the size of walleye in SFCR vary greatly and the 2008 issued advisory was based on one composite sample of 10 large fish (average length = 19 inches, average weight = 2.9 pounds). IFCAP members agreed that the three size categories of walleye would be 12-16 inches, 16-20 inches, and over 20 inches. According to IFCAP protocol, 10 individual fish of each species and each size category should be analyzed to reduce the chance of error in calculating the mean concentration of the contaminant and, thus, assure that the advisory is correctly issued.

The Idaho Department of Fish and Game conducted sampling on May 29 and 30, 2012. Electrofishing was used to collect the smallmouth bass on May 29. Gill nets were set that same evening and fish were collected from the nets the next morning. Sufficient quantities of rainbow trout, yellow perch and walleye in the 12-16 inch range were collected. However, only four walleye in the 16-20 inch range and one in the over 20 inch range were collected. All fish were placed on ice and shipped to the IDHW Bureau of Laboratories for processing and contaminant analysis.

Discussion

Health Concerns from Mercury in Fish

The nervous system is very sensitive to all forms of mercury. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems (ATSDR ToxFAQs). In fish, the majority of mercury is an organic form, methylmercury. Exposure to methylmercury is more dangerous for young children than for adults because methylmercury more easily passes into the developing brain of young children and may interfere with neurological development. Critical periods of neonatal development and the early months after birth are times that are particularly sensitive to the harmful effects of methylmercury on the nervous system (ATSDR 1999). Grandjean et al. (1997) demonstrated that in utero and early childhood exposures to methylmercury can cause decreases in scores on tests designed to measure cognitive skills of children. In instances in which the exposure to methylmercury is great, the effects may be more serious. In some such cases of mercury exposure involving serious exposure to the developing fetus, the effects are delayed. The infant may be born apparently normal, but later show effects that may range from the infant being slower to reach developmental milestones, such as the age of first walking and talking, to more severe effects including brain damage with mental retardation, incoordination, and inability to move (ATSDR 1999). Eating fish is the primary exposure humans have to methylmercury.

Fish Data

On June 4, 5 and 6, 2012 the IDHW Bureau of Laboratories completed the analysis for mercury concentrations in the fish tissue samples. The results of the samples are in Table 1.

Table 1. 2012 Sampling Results of Mercury in Fish from Salmon Falls Creek Reservoir

Fish Species	Number Sampled	Length Range (inches)	Mercury Concentration (ppm)*
Rainbow Trout	10	15 – 18	0.28
Smallmouth Bass	10	11.5 – 14	0.99
Walleye (under 16 inches)	10	12 – 15.25	0.64
Walleye (16-20 inches)	4	16 – 19	0.95
Walleye (over 20 inches)	1	23.5	1.98
Yellow Perch	10	9.5 – 11	0.69

*reported as geometric mean

Fish Advisory –Calculation of Daily Consumption Amounts

To protect adults and children who eat fish from Idaho waters, BCEH issues advisories based on contaminant levels in fish from specific waters and follows the IFCAP guidance for issuing fish advisories. The IFCAP guidance states that a consumption advisory will be issued when it is not possible to follow the American Heart Association’s recommendation to eat at least 2 fish meals a week or roughly 8.5 meals per month. IFCAP’s recommended serving size is 4 ounces per meal for adults and 2.25 ounces per meal for children. For women of reproductive age and children IFCAP uses the EPA’s Reference Dose (RfD) for methylmercury of 0.0001 milligrams per kilogram of bodyweight per day (mg/kg/day) and default body weights (70 kilograms for women and 20 kilograms for children) to calculate the number of meals that can safely consumed in a week. For the general population, IFCAP uses ATSDR’s Minimum Risk level (MRL) of 0.0003 mg/kg/day and a default body weight of 80 kilograms. The equation to calculate daily consumption amounts is:

$$\text{Consumption rate} = \text{Reference Dose (mg/kg/day)} \times \text{Body Weight (kg)} / \text{Contaminant Concentration (mg/kg)}$$

Using this equation, the monthly number of meals for each species is shown in Table 2.

Table 2. Meals per Month that can be Safely Consumed from Salmon Falls Creek Reservoir

Fish Species	Number of Meals* Per Month	
	Women and Children	General Population
Rainbow Trout	6	22
Smallmouth Bass	None	6
Walleye (under 16 inches)	2	10
Walleye (16-20 inches)	None	6
Walleye (over 20 inches)	None	2
Yellow Perch	2	10

*Meal size = 4 ounces for adults and 2.25 ounces for children

Conclusions

For women of reproductive age and children, it is not possible to eat 2 fish meals per week of rainbow trout, bass, walleye and yellow perch without exceeding the RfD. The general population cannot eat 2 meals per week of bass and large walleye without exceeding the MRL. Therefore, BCEH concludes that the levels of methylmercury in the fish sampled from Salmon Falls Creek Reservoir pose a health hazard for developing babies and young children if fish are eaten by pregnant women, nursing mothers or children in amounts exceeding our recommendations. Others in the general public that eat the fish from SFCR over the course of months in amounts that exceed our recommendations also risk harming their health from exposure to methylmercury. The current fish advisory's recommended fish eating guidance will need to be updated to reflect the latest analytical results and promote safe eating recommendations.

Recommendations

The following recommendations are suggested to ensure that the public who consume fish from SFCR are aware of the levels of mercury in the fish and eat fish in amounts that will not cause harm to their health.

- BCEH should update its Fish Advisory Website to reflect the new advisories.
- BCEH should post new fish advisory posters at fishing access points on SFCR.
- BCEH should coordinate with Idaho Department of Fish and Game (IDFG) to include information on fish advisories in the IDFG Fishing Regulation Booklet.
- BCEH should issue a press release regarding the new advisory to media outlets in the Twin Falls area.
- BCEH should work with IFCAP members to determine if sampling of larger walleye is needed.
- BCEH should work with IDFG to determine if a catch and release regulation can be put into place for large walleye.

Plan of Action

BCEH will work to assure all the recommendations are completed by August 2012.

If you have any questions, please do not hesitate to contact me at 208-334-4964 or at vannoyj@dhw.idaho.gov.

Best regards,

Jim Vannoy, MPH
Program Manager
Environmental Health Education and Assessment Program

Cc: IFCAP members

References

ATSDR 1999. Public Health Statement – Mercury found at: <http://www.atsdr.cdc.gov/ToxProfiles/tp46-c1-b.pdf>

ATSDR ToxFAQs on Mercury found online at: <http://www.atsdr.cdc.gov/tfacts46.pdf>

Grandjean P, Weihe P, White RF, Debes F, Araki S, Murata K, Sørensen N, Dahl D, Yokoyama K, Jørgensen PJ (1997). Cognitive deficit in 7-year-old children with prenatal exposure to methylmercury. *Neurotoxicol. Teratol.* 19: 417-428.