Appendix G

Mercury Update

Mercury Update

Overview

In 1990, the State began testing fish tissue samples for mercury concentrations and found high levels of mercury in certain species of fish. As more samples were collected it became apparent that this problem was widespread across the State and in the Ocean. As a result in 1994, the North Carolina *Department of Health and Human Services* began issuing fish consumption advisories through the *Epidemiology Branch* of the *Division of Public Health* about how much fish is safe to eat and what types of fish are highest in mercury. The current fish consumption advisory as of January 2010 is described below. For the most up to date advisory contact the Department of Health and Human Services. Since there is a statewide fish consumption advisory for Mercury all waters in the state are considered to be impaired for Fish Consumption due to Mercury.

TABLE H-1: FISH CONSUMPTION ADVISORY AS OF JANUARY 2010

	FISH LOW IN MERCURY	FISH HIGH IN MERCURY
Women of childbearing age, pregnant women, nursing mothers and children under age 15	Eat up to 12 ounces per week	**DO NOT EAT**
All other people	Eat up to 24 ounces per week	**Eat only 6 ounces per week**

Ocean Fish High in Mercury

- Albacore (white) tuna
- Almaco jack
- Banded rudderfish
- Cobia
- Crevalle jack
- Greater amberjack
- South Atlantic grouper
- King Mackerel
- Ladyfish
- Little tunny
- Marlin
- Orange roughy
- Shark
- Spanish mackerel
- Swordfish
- Tilefish
- Tuna, fresh or frozen**

Freshwater Fish High in Mercury

- Blackfish (bowfin)*
- Black crappie***
- Catfish (caught wild)*
- Jack fish (chain pickerel)*
- Largemouth bass (statewide)
- Walleye from Lake Fontana and Lake Santeetlah (Graham and Swain counties)
- Warmouth*
- Yellow Perch*

*High mercury levels have been found in blackfish (bowfin), catfish, jack fish (chain pickerel), warmouth, and yellow perch caught south and east of Interstate 85.
**Different species from canned light tuna
***High mercury levels have been found in black crappie caught south and east of Interstate 95.

NPDES Wastewater Discharge Permits Limits and Compliance

There are three wastewater treatment facilities in the Lumber River basin that have violated their permit limit for mercury. They are the Tabor City WWTP and the Red Springs WWTP, which have a limit of 12 ng/L, and the White Marsh WWTP, which has a limit of 4 ng/L. Of these facilities, the White Marsh WWTP is the most compliant. The Tabor City WWTP was issued an administrative order by the United States Environmental Protection Agency (EPA) in October 2009 to reduce mercury. This facility must develop a Mercury Minimization Plan and submit monthly monitoring reports to EPA. This administrative order was issued because the facility had frequent levels of mercury well above their permit limit over a number of years. If a discharger released a million gallons of wastewater a day with 12 ng/L of Mercury the total release for one year would equal 16.58 grams.

Atmospheric Deposition Rates

The main source of mercury pollution in the State is thought to be from atmospheric sources. Figure H-1 is a graph of total (wet and dry) mercury deposition at National Atmospheric Deposition Program site NC08 which is located in Lake Waccamaw State Park.

FIGURE H-1: ATMOSPHERIC MERCURY DEPOSITION IN ng/m²
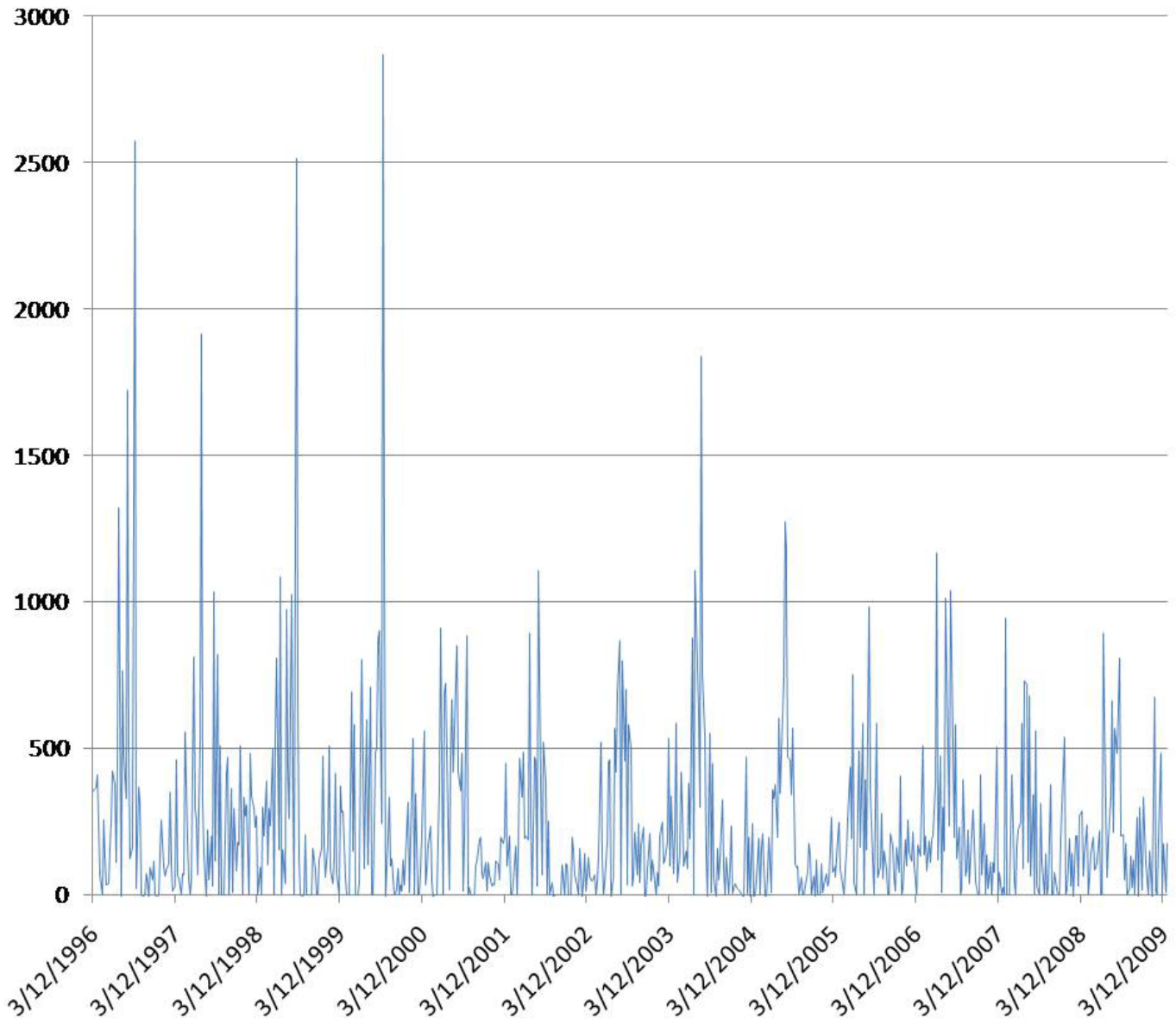
Source: *National Atmospheric Deposition Program Monitoring Site NC08*

Local Atmospheric Mercury Emissions

Atmospheric releases of mercury have decreased by approximately 60 percent statewide and even greater reductions have taken place in the Lumber River basin (Table H-2). The largest emitter of mercury in the basin, HoltraChem in Columbus County, ceased operation in 2000. In 1996 this facility released an estimated 1,446 pounds of mercury to the atmosphere. The two coal-fired power plants in the basin are planning on converting to natural gas within the next few years which will reduce their emissions. At this time, it is uncertain to what degree local sources contribute to the overall mercury deposition.

TABLE H-2: ESTIMATED ATMOSPHERIC EMISSIONS IN POUNDS PER YEAR

COUNTY	1996	2008	PERCENT CHANGE
Bladen	10.7	1.9	-82.0
Brunswick	436.6	60.43	-86.2
Columbus	1,515.3	6.3	-99.6
Cumberland	66.7	3.2	-95.3
Hoke	3.5	0.0	-100.0
Montgomery	1.5	4.7	213.6
Moore	7.9	0.0	-100.0
New Hanover	467.3	216.5	-53.7
Richmond	3.6	0.9	-75.2
Robeson	8.8	38.3	337.6
Scotland	19.0	0.9	-95.2
Statewide	7,632.0	3,045.6	-60.1

Source: *North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report*

Fish Tissue Data for the Lumber River Basin

The fish tissue data collected from the Lumber River Basin does not show a decrease in mercury concentrations. Table H-3 provides a summary of fish tissue data from the Lumber River basin between 1990 and 2008. The United States Environmental Protection Agency's human-health standard criterion is 0.3 milligrams of mercury per kilogram of fish tissue. The amount of mercury in fish tissue is dependent on the size and type of fish tested. Although mercury emissions from local atmospheric and treated wastewater sources have decreased, there has been no reduction of mercury in fish tissue. This may be due to atmospheric deposition from global sources and the persistent cycling of mercury through the environment.

TABLE H-3: MERCURY RESULTS FOR LUMBER RIVER BASIN FISH TISSUE SAMPLES

YEAR	# OF SAMPLES	AVG. FISH WEIGHT (g)	AVG. MERCURY CONCENTRATION (mg/kg)	WATERBODIES SAMPLED	SITES SAMPLED
1990	3	211	0.20	1	1
1992	142	560	0.73	8	12
1993	408	850	0.78	13	17
1996	149	805	0.69	8	9
2000	22	793	0.80	1	1
2003	41	604	0.50	3	3
2005	14	524	0.82	1	1
2008	27	533	0.57	2	2
1990 - 2008	806	758	0.73	21	35

Mercury Cycling in the Environment

Mercury is a persistent pollutant with a complex cycle (Figure H-2). Even with reductions of atmospheric deposition and in the waste stream it may take several years before an improvement can be detected. In addition, conditions such as low pH and high organic content in the water and sediment increases the potential for the methylation of mercury. Methylmercury bioaccumulates in organisms and can lead to central nervous system damage to the people who consume them.

FIGURE H-2: SIMPLIFIED MERCURY CYCLE