

How Toxic Mercury Contaminates Fish in U.S. Waterways

Environment Colorado Research & Policy Center

Acknowledgements

Written for Clear The Air by Zachary Corrigan, Staff Attorney and Clean Air Advocate with Environment Colorado Research & Policy Center. Clear The Air is a joint project of the Clean Air Task Force, National Environmental Trust, and the National Association of State PIRGs and affiliated organizations.

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Executive Summary

oxic mercury, largely emitted from coalburning power plants, is polluting waterways, contaminating the fish we eat, and posing a serious threat to public health. State and tribal health departments issue fish consumption advisories in order to warn people to limit or avoid consumption of contaminated fish species from local rivers, lakes, and other waterbodies. This report details the active fish consumption advisories issued by the states in 2003 due to mercury pollution in local waterways and finds that fish in a large percentage of America's lakes, rivers, and coastal waters are not safe for unlimited consumption.

Mercury is a dangerous toxic metal, especially for children. Exposure to mercury can cause attention and language deficits, impaired memory, and impaired visual and motor function in children. Scientists at the U.S. Environmental Protection Agency (EPA) estimate that one in six women of childbearing age in the U.S. has levels of mercury in her blood sufficiently high to put 630,000 of the four million babies born each year at risk of health problems due to mercury exposure.

Our analysis of EPA data on state fish consumption advisories reveals that mercury advisories cover a greater area than ever before. In 2003, 44 states had active mercury consumption advisories for local waterways compared with only 27 states in 1993 and 39 states in 1997. This is a 63% increase in 11 years. The precipitous increase in mercury advisories over the last decade demonstrates that mercury is pervasive in our environment. As ⊞A Administrator Mike Leavitt has said. "The more waters we monitor, the more we find

mercury...."

recreational fishing generated more than \$35.6 billion in expenditures in 2001. Of all the money spent on fishing, dose to \$28 billion was spent in states that have active fish consumption advisories for mercury.

Addressing the Problem at the Source
To protect public health, preserve a critical
part of our diet, and ensure the survival of
an important American pastime, we need to
dramatically cut the amount of mercury
released into our environment by reducing
mercury emissions from coal-fired power
plants. Power plants are the only major
mercury polluters yet to be regulated under

Mercury Contamination of Fish.

hen power plants and other industries burn coal or wastes containing mercury, they emit mercury from their smokestacks into the air. Rain, snow, and dust particles "wash" some of this mercury out of the air onto land and into waterways, where health problems due to mercury exposure. In adults, mercury exposure can adversely affect fertility and blood pressure regulation and contribute to heart-rate changes and cardiovascular disease.¹²

Mercury in Recreationally-Caught Fish

Data released in 2004 also indicate that mercury levels in many non-commercial fish species can be high enough to warrant limiting consumption, and in some cases high enough to make the fish unsafe to eat at all.

A recent report analyzed the first available data from EPA's ongoing National Study of Chemical Residues in Lake Fish Tissue. The report found that 55% of the fish samples from inland lakes were contaminated with mercury at levels that exceed EPA's "safe" limit for women of average weight who eat fish twice a week.f In 29 states, mercury levels in at least half of the fish samples exceeded this limit.16

For recreationally-caught fish along our coasts, FDA data indicate that some of most the popular sport fish species have high levels of mercury contamination. As shown in Table A, of the most popular recreationally-caught species, six species not included in FDA's 2004 consumption advisory (Spanish mackerel, bluefish, bass, snapper,

Report Findings: A Growing Number of Waterways Under Advisory

his report analyzes all active fish consumption advisories issued by states in 2003 for local waterways due to mercury contamination and reveals that mercury advisories cover a greater area than ever before.

In 2003, 44 states issued advisories for mercury-contaminated fish, warning the general population or sensitive subpopulations to reduce or avoid experienced a double-digit or more percentage increase.

Table C. States Increasing the Number of Lake Acres Under Advisory, 2002 to 2003



Table E New Restrictions Added in 2003 to Lakes Already Under Specific Advisory

State	Lakes with New Consumption Restrictions	Acres Covered by Additional Restrictions
Arizona		140
	Arivaca Lake	
	Pena Blanca Lake	
California	Black Butte Reservoir	23
Idaho	Salmon Falls Creek	3,400
	Reservoir	
Mississippi		15,371
	Enid Lake Archusa Creek Water Park	
South Carolina		301
	Lake HB Robinson Langley Pond	
Total	Largicy rollu	40.005
Total		19,235

Source: Analysis of data provided by U.S. EPA, 2003

Advisories on Our Rivers

States are issuing advisories covering an increasing number of miles of our rivers. Active mercury advisories were in effect for at least 767,000 miles of river (including statewide advisories) in 2003, or 22% of all river miles. As shown in Table F, the states with the most river miles under advisory were Montana, Kentucky, Washington, Wisconsin, Pennsylvania, Florida, Missouri, Indiana, Illinois, and Maine.

In the last year, the number of river miles reported under advisory for mercury increased by 67% (up from 458,000 miles in 2002). As detailed in Table G, six of the nine states that increased the percentage of river miles under advisory in 2003 did so by at least a double-digit percentage increase.

Table F. States with Most River Miles Under Mercury Advisory, 2003

State	Total River Miles Under Advisory	Percentage Under Advisory
Montana	176,750	100
Kentucky	89,431	100
Washington	73,886	100
Wisconsin	57,698	100
Pennsylvania	53,962	100
Horida	51,858	100
Missouri	51,015	100
Indiana	35,673	100
Illinois	32,190	100
Maine	31,672	100

Source: Analysis of data provided by U.S. EPA, 2003

Table G States Increasing Number of River Miles Under Advisory, 2002 to 2003

State	Total Increase in River Miles	Total Percentage Increase ⁱ
California	30	75
Louisiana	157	21
Michigan*	not available	not available
Minnesota*	not available	not available
Montana	176,716	Added statewide advisory
Nebraska	82	132
South Carolina	17	1
Washington	73,886	Added statewide advisory
Wisconsin	57,492	Added statewide advisory

* Michigan and Minnesota increased the extent of their rivers under advisory in 2003 but did not report the number of miles that the new advisories covered.

Source: Analysis of data provided by U.S. EPA, 2003

ⁱ The increase in river miles does not include any increases due to states that, for the first time in 2003, reported to EPA the extent of advisories that they had issued in previous years.

As detailed in Table H and Table I, eight states (Illinois, Indiana, Kentucky, Louisiana, Mississippi, North Dakota, Ohio, and South Carolina) strengthened existing advisories for rivers in 2003. These new advisories apply to 1,340 miles of rivers already covered by statewide advisories and 968 miles already covered by individual advisories issued in previous years.

Table H. New Restrictions Added in 2003 to Rivers Arready Under Statewide Advisory

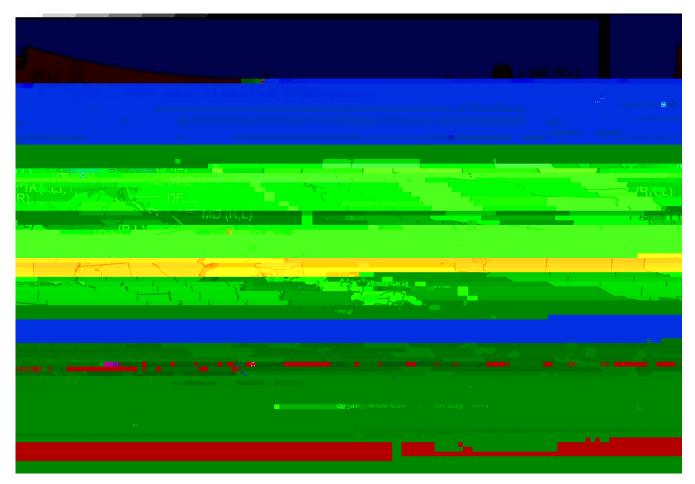
State	Rivers with New Consumption Restrictions	Miles Covered by Additional Restrictions
Illinois	Chicago River	41
Indiana		381
	Anderson River	
	Eel River	
	Greens Fork	
	Indian Creek	
	Laughery Creek	
	Little Blue River	
	Richland Creek	
	South Fork Blue	
	River	
Kentucky	Ohio River	674
North Dakota		10
	Missouri River	
	Red River	
Ohio	Ashtabula River	234
	Grand River	
	Great Miami River	
	Sandusky River	
	Scioto River	
	St. Mary's River	
Total		1,340

Source: Analysis of data provided by U.S. EPA, 2003

Table I. New Restrictions Added in 2003 to Rivers Arready Under Specific Advisory

State	Rivers with New Consumption Restrictions	Miles Covered by Additional Restrictions
Louisiana	Ouachita River	142
Mississippi		246
	Bogue Chitto River	
	Escatawpa River	
	Pascagoula River	
	Pearl River	
	Yookanookany River	
	Yocona River	
South Carolina		580
	Black River	
	Lumber River	
	Lynches River	
	New River	
	North Fork Edisto River	
	North Santee River	
	Savannah River	
	South Fork Edisto	
	River	





Source: U.S. EPA, National Maps and Graphics, downloaded 27 September 2004 from http://epa.gov/waterscience/presentations/fishslides/2003_files/frame.htm. This map was modified from the version obtained from EPA; EPA had erroneously portrayed Kansas as having active fish consumption advisories for mercury.

Coasts under Advisory

Our nation's coastal waters, including estuaries, coastal wetlands, coral reefs, mangrove forests, and upwelling areas, also face threats from mercury pollution. These areas are vitally important for fish and fishing. They are the home of spawning grounds, nurseries, and fisheries and provide shelter and food for fish.¹⁹

Fish consumption advisories for mercury and other contaminants cover more than 70% of the coastline miles of the contiguous 48 states. PA estimates that 92% of the Atlantic coast and 100% of the Gulf coast was under advisory in 2003. 21

As detailed in Table J, in 2003 12 states issued statewide advisories for their entire coastal areas for at least one species of fish. These advisories cover 16,569 miles of our nation's coastline, an increase of 930 miles over 2002 due to Hawaii placing all of its coasts under advisory in 2003.

Table J. U.S. Coasts Covered by Mercury Advisories, 2003

State	Coastal Miles Under Advisory
	,
Alabama	254
Horida	5,161
Georgia	255
Hawaii	930
Louisiana	1,784
Massachusetts	1,116
Maine	2,064
Mississippi	220
North Carolina	1,877
Rhode Island	247
South Carolina	476
Texas	2,185
Total	16,569

Source: U.S. EPA, 2003

In Maine, a tribal advisory for mercury covers all fish and lobster along the state's coast. California, Delaware, Florida, Georgia, South Carolina, and Washington all have additional mercury advisories specifically for estuarine waters.

In its draft Coastline Condition Report, EPA studied 90 specific contaminants from 653 sites throughout the estuarine waters of the United States (except Louisiana, Florida, and Puerto Rico), finding that 42% of the testing sites had fish with mercury contaminant levels above 0.12 parts per million (ppm). This level falls only slightly below what EPA considers a "safe" limit for U.S. women of average weight who consume two average-sized meals of fish per week (0.13 ppm). EPA found fish at 18% of the sites with mercury concentrations dose to twice this level. 22

Public Lands under Advisory

Our public lands, many of which have been specifically protected for recreational uses, are also at risk due to mercury pollution.

Arkansas has issued a fish consumption advisory for the Saline River, located in the 65,000 acre Felsenthal Wildlife Refuge. The refuge is "crisscrossed by an intricate system of rivers, creeks, sloughs and lakes meandering through extensive bottomland hardwood forests with the adjoining higher elevations occupied by pine and upland hardwoods" Tissue samples suggest that birds and mammals living in the refuge, particularly strict fish eaters, may be at risk of high mercury exposure.²⁴

Rorida has issued fish consumption advisories in the Arthur Marshal Loxahatchee National Wildlife Refuge, Crystal River National Wildlife Refuge, St. Marks National Wildlife Refuge, and St. Vincent National Wildlife Refuge. The state also has issued advisories in the Everglades National Park - Shark River Slough, Everglades Water Conservation Areas 2 and 3, Holeyland Wildlife Management Area, and the Santiago Fish Management Area.

New Jersey has issued a mercury fish consumption advisory that waterbodies in the Pinelands National Reserve, which includes portions of seven New Jersev counties encompasses more than one million acres of farms, forests and wetlands. In 1978. Congress established this area as the country's first national reserve, or an area of nationally significant resources that is through land use protected local management and supported by federal financial and technical assistance.25

Massachusetts has issued an advisory covering the Holland Pond and East Brimfield Reservoir in the Quinebaug and Shetucket Rivers Valley National Heritage Corridor. This largely rural area has been called "the last green valley" in the Boston-to-Washington corridor.²⁶

Kentucky has issued a fish advisory for waters in the state-protected West Kentucky Wildlife Management Area. According to a local tourism website, this area is known for its "tupelo swamp, riverside cottonwood trees where eagles perch, native prairie vegetation, and a variety of wildflowers" Regrettably, officials warn anglers not to eat the largemouth bass in 152 acres of this management area.

National Park Service employees also have flagged mercury as a concern in many other nationally protected lands, even though the waterways may not be under fish consumption advisory. A 2003 informal National Park Service survey found that officials at several national parks and protected areas were informing visitors of potential mercury concerns due to contaminated fish and mercury deposition (Table K).²⁸

Table K National Parks with Mercury Problems, as Identified by National Park Service Employees, 2003

N. 4. 15.1	
National Park Service Area	Identified Mercury Concerns
Acadia, ME	Bevated mercury concentrations in wet deposition, elevated mercury levels in fish. Acadia included in statewide fish consumption advisory.
Big Bend, TX	Bevated mercury concentrations in wet deposition.
Catoctin Mountain Park, MD	Mercury deposition at park.
lsle Royale, MI	Bevated mercury levels found in fish. Concern about elevated mercury in wildlife, water, and sediment. Concern about mercury in food web.
Lake Meredith Natl Recreation Area (NRA), TX	Bevated mercury levels found in fish (walleye). Lake Meredith NRA included in state fish consumption advisory.
Mount Rainier, WA	Bevated levels of mercury were found in lake samples collected at park; did not exceed health standards.
North Cascades, WA	Bevated levels of mercury found in lake samples collected at park; did not exceed health standards.
Olympic, WA	Mercury levels in wet deposition.
Rocky Mountain,	Concern for elevated mercury levels in precipitation and possibly in fish tissue.
Shenandoah, VA	Bevated mercury concentrations in wet deposition.

Source: National Park Service, Park Unit Overview, May 2003, downloaded 27 September 2004 from http://www2.nature.nps.gov/air/Studies/air toxics/meroury.htm. Personal communication with Darwin Morse, National Park Service, 14 September 2004.

Safe Eating Guidelines

Increasingly, states are issuing "no restriction" advisories, or "Safe Eating Guidelines" States issue these advisories to let people know that some fish species, or sizes of species, are safe to eat for some or all segments of the population. Safe Eating Guidelines for mercury now cover at least 1.1 million acres of lakes and 65,000 miles of rivers. Connecticut and Wisconsin have issued statewide "no restriction" advisories for trout and yellow perch, respectively. In 2003, states added "no restriction" advisories on at least 854 miles of rivers and 4,534 acres of lakes

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^k This report's measure of waterways "under advisory" does not include these advisories.

For the most part, "no restriction" advisories coexist with acsion" 7 Too-11s

Mercury Contamination Threatens Recreational Fishing

ercury contamination is a threat to recreational fishing, a multi-billion dollar industry that is critical to our national and

Table L 20 States Receiving Most Economic Value from Recreational Fishing, 2001

State	Money Spent on Recreational Fishing, 2001	Statewide Mercury Advisory for Rivers and/or Lakes?
Horida	\$4,083,409,000	Yes
California	\$2,029,581,000	
Texas	\$1,950,902,000	
Minnesota	\$1,284,522,000	Yes
North Carolina	\$1,118,028,000	
New York	\$1,073,019,000	
Wisconsin	\$1,005,149,000	Yes
Washington	\$853,761,000	Yes
Michigan	\$838,558,000	Yes
Ohio	\$761,619,000	Yes
Missouri	\$745,514,000	Yes
Alabama	\$723,467,000	

The Bush Administration's Flawed Plan

The solution is simple. Protecting public health and recreational fishing demands that we reduce mercury emissions from all sources, starting with the largest, uncontrolled source—coal-burning power plants. Clean Air Act is designed to provide these reductions. Under Section 112 of the Clean Air Act, toxic substances such as mercury must be reduced as much as is technologically feasible, meeting a "maximum achievable control technology" (MACT) standard within three years. Two years ago, EPA estimated that under a MACT standard, power plants could reduce mercury emissions by 90% using existing technologies, bringing mercury emissions down to roughly five tons per year by 2008.44

Unfortunately, in January 2004, the Bush administration issued a proposal that would not come dose to achieving the maximum reductions in mercury emissions required by the Clean Air Act and necessary to protect public health. The Bush administration's proposal abandons the MACT approach; instead, the proposal treats toxic mercury from power plants as if it were a conventional air pollutant, like soot and smog.

The proposal would cap power plant mercury emissions at 34 tons in 2010 and 15 tons in 2018, which represent 29% and 69% reductions, respectively. This means that instead of being required to reduce mercury emissions to five tons by 2008 – as would be accomplished by faithful implementation of the Clean Air Act – the Bush plan proposes to allow power plants to emit six to seven times more mercury for more than a decade longer.

PA's proposal also would relieve the power sector of any obligation to control other hazardous air pollutants such as lead, arsenic, chromium, dioxin, acid gases, and organic compounds, among others. See National Environmental Trust, Beyond Mercury, August Further, the administration's own analysis shows that even these weak targets would not be met on EPA's timeline, if ever.⁴⁶

In addition, the Bush administration's plan does not require each and every power plant to make emissions reductions. Instead, some plants would be able to avoid making reductions by buying or trading mercury pollution credits from other plants. Mercury trading substantially increases the likelihood and severity of "hotspots," or communities with high levels of mercury deposition.⁴⁷ This is particularly troubling due to mercury's persistent, bio-accumulative properties.

Requiring plant-specific controls that dramatically reduce mercury emissions, on the other hand, would go a long way towards solving local mercury problems. The state of Florida, EPA, and the U.S. Geological Survey recently issued a study that conduded that the levels of mercury found in largemouth bass and other wildlife in the Everglades has dedined by 80% since state and federal agencies required municipal and medical-waste incinerators to cut their mercury emissions.

Fishing for Trouble 21

Conclusion and Recommendations

One mercury is in the food supply, it puts all of our health at risk, but especially sensitive subpopulations such as children and recreational anglers who consume large amounts of fish. The increasing number and breadth of mercury advisories indicates the vast extent of the mercury contamination problem. In addition to compromising public health, this pollution is a threat to recreational fishing, a treasured American pastime and multi-billion dollar industry that

is vital to our national and state economies.

The Bush administration's proposal for dealing with mercury emissions from power plants is severely flawed. The Bush administration should abandon its current mercury plan and faithfully implement the Clean Air Act to reduce mercury emissions from power plants by at least 90% from existing levels by 2008.

Methodology

his report analyzes data reported to EPA by the states in 2003. While the EPA examines state advisory data nationally, it does not provide analysis by state; in addition, we have attempted to correct a number of problems with EPA's data. For the most recent information on fish consumption advisories for local waterways, refer to EPA's searchable database at www.epa.gov/ost/fish/.

The data in this report do not necessarily mirror similar data calculations by the states, which may use different data and methodologies. These data are intended to be a general reference for the extent of mercury contamination and should not be relied upon for advice on fish consumption. People should consult their state departments of health to receive the most recent information on how much locally-caught fish, if any, can be safely consumed.

Data Source and Parameters: EPA provided us with data on active mercury fish consumption advisories for specific species in all waterbodies between December 31, 2002 and December 31, 2003. Excluded from the summary data in Appendix B, but provided by EPA, are advisories issued by territories.

Geographic Area of Waterbodies Under Fish Consumption Advisory by State: This report follows EPA's methodology of using the geographic area for each mercury advisory as a proxy for extent of mercury contamination. To determine the number of miles acres square miles under advisory for each type of waterbody in each state, we grouped the data by state and waterbody type, as dassified by EPA, and totaled the area covered by fish consumption advisory

for each waterbody type. Often a fish consumption advisory for specific а waterbody contains consumption advice for different fish species of varying sizes. avoid double counting the acreage or mileage of a waterbody under advisory, we only included a specific waterbody or segment of waterbody once in our calculations, regardless of the number of species or variations under advisory for that particular waterbody. We also did not include "no restriction" advisories in our calculations for the extent of advisory overage.

Number of Advisories by State: We followed EPA's methodology of counting the number of waterbodies or segments of waterbodies, or in some cases waterbody types (e.g., all lakes), covered by advisories. While EPA continues to calculate this number, it no longer uses it as the primary measure of geographic extent of mercurv contamination. Because a state can issue an advisory for as little as a single portion of a small waterbody and as much every waterbody of a particular type in a state (e.g., all lakes), an "advisory" is not useful as a proxy for the geographic extent of contamination.

Statewide Advisories:

Appendix A. High Mercury Levels in Commercial Fish and Seafood Not Covered by FDA's 2004 Consumption Advisory, 1978-2003°

				Consumption
	Mean	Minimum		Limit (Meals
Species	(ppm)	(ppm)	(ppm)	Per Month)
GROUPER	0.55	0.07	1.21	1
ORANGEROUGHY	0.54	0.30	0.80	1
MARLIN	0.49	0.10	0.92	1
MACKEREL SPANISH (Gulf of Mexico)	0.45	0.07	1.56	2
BLUETISH	0.31	0.14	0.63	3
LOBSTER (Northern/ American)	0.31	0.05	1.31	3
CROAKER WHITE (Pacific)	0.29	0.18	0.41	3
SCORPIONFISH	0.29	0.02	1.35	3
BASS (Saltwater)	0.27	0.06	0.96	3
HALIBUT	0.26	ND	1.52	3
WEAKRSH (Sea Trout)	0.25	ND	0.74	3
SABLETISH	0.22	ND	0.70	4
BUFFALO FISH	0.19	0.05	0.43	4
SNAPPER	0.19	ND	1.37	4
MACKEREL SPANISH (S. Atlantic)	0.18	0.05	0.73	5
MONKASH	0.18	0.02	1.02	5
CARP	0.14	0.01	0.27	6
PERCH (Freshwater)	0.14	ND	0.31	6
SKATE	0.14	0.04	0.36	6
SHEEPSHEAD	0.13	0.02	0.63	7
TUNA (LIGHT CANNED)	0.12	ND	0.85	7
JACKSMELT	0.11	0.04	0.05	8
COD	0.11	ND	0.42	8

ND = Non-detectable

Source: Analysis of data provided by U.S. FDA, "Mercury Levels in Seafood Species," 19 March 2004, downloaded from http://www.dsan.fda.gov/~frf/sea-mehg.html, 27 September 2004.

[•] This list does not include albacore tuna, shark, swordfish, tilefish, or king mackerel, which are included in FDA's 2004 consumption advisory. FDA advises women who may become pregnant, pregnant women, nursing mothers, and young children not to eat shark, swordfish, king mackerel, or tilefish because they contain high levels of mercury.

Appendix B. State-by-State Mercury Advisory Totals and Money Spent on Recreational Fishing



	# of Mercury	Lake Acres Under Specific	Lake Acres Under Statewide	Total Lake	River Miles Under Specific	River Miles Under
State	Advisories	Advisory	Advisory	Acres	Advisory	

Appendix C. Mercury Air Emissions from Power Plants by State or Territory, 2002

	F
State	Emissions (lbs)
Texas	9815
Ohio	7358
Pennsylvania	7002
Indiana	4927
Illinois	4318
Alabama	3931
West Virginia	3680
Kentucky	3540
North Carolina	3434
Missouri	3084
Georgia	2749
Wisconsin	2615
Michigan	2589
Horida	2411
North Dakota	2365
lowa	2132
Tennessee	2130
Kansas	2048
Maryland	1900
Wyoming	1762
Minnesota	1572
Arizona	1561
Virginia	1290
Louisiana	1262
Oklahoma	1255

State	Emissions (lbs)
New Mexico	1210
New York	1182
Montana	875
Arkansas	820
South Carolina	674
Mississippi	651
Nevada	524
New Jersey	477
Utah	454
Nebraska	414
Colorado	356
Hawaii	280
Delaware	266
Washington	265
South Dakota	263
Puerto Rico	212
Massachusetts	190
Virgin Islands	171
Oregon	143
Connecticut	100
California	16
New Hampshire	16
Alaska	11

Total 90,300

Source: U.S. EPA, 2002 Toxics Release Inventory, downloaded from www.epa.gov/triexplorer 27 September 2004.

				Air
			County or County	Emissions
Fadlity	State	City	Equivalent	(lbs)
RELIANT ENERGY SHAWVILLE STATION	PA	SHAWVILLE	CLEARFIELD	632

				Air
			County or County	Emissions
Facility	State	City	Equivalent	(lbs)

Facility	State	City	

Facility	State	City	County or County Equivalent	Air Emissions (Ibs)
BREMO POWER STATION	VA	BREMO BLUFF	FLUVANNA	168
GEORGIA POWER YATES STEAM ELECTRIC				
GENERATING PLANT	GA	NEWNAN	COWETA	167
IPL HARDING STREET STATION	IN	INDIANAPOLIS	MARION	163
CHESAPEAKE BNERGY CENTER	VA	CHESAPEAKE	CHESAPEAKE CITY	160
AMERICAN ELECTRIC POWER CLINCH RIVER PLANT	VA	CLEVELAND	RUSSELL	160
U.S. TVA ALLEN FOSSIL PLANT	ΤN	MEMPHIS	SHELBY	160
AMERICAN ELECTRIC POWER OKLAUNION POWER STATION	TX	VERNON	WILBARGER	160
RELIANT ENERGY SEWARD POWER PLANT	PA	NEW FLORENCE	INDIANA	156
CRAW FORD GENERATING STATION	IL	CHICAGO	COOK	153
ARIZONA BLECTRIC POWER COOPERATIVE INC	ΑZ	COCHISE	COCHISE	151
HAWAIIAN ELECTRIC CO INC KAHE GENERATING STATION	Н	KAPOLE	HONOLULU	151
BIG BEND STATION	FL.	АРОШО ВЕАСН	HILLSBOROUGH	150
AMERICAN ELECTRIC POWER FLINT CREEK POWER PLANT	AR	GENTRY	BENTON	150
EDGEMOOR HAY ROAD POWER PLANTS	DE	WILMINGTON	NEW CASTLE	148
PSEG POWER LLC HUDSON GENERATING STATION	NJ	JERSEY CITY	HUDSON	145
RODEMACHER POWER STATION	LA	LENA	RAPIDES	144
MICHIGAN CITY GENERATING STATION	IN	MICHIGAN CITY	LA PORTE	143
WATERESTATION - SCE&G	SC	EASTOVER	RICHLAND	143

EXELON FAIRLESS HILLS STEAM GENERATING STATION

				Air
			County or County	Emissions
Facility	State	City	Equivalent	(lbs)

Facility	State	City	

Fadlity	State	۵ty	County or County Equivalent	Air Emissions (lbs)
SOUTH CAROLINA ELECTRIC & GAS CO COPE STATION	SC	COPE	ORANG BURG	40
PROGRESS ENERGY CAROLINAS INC W.H. WEATHERSPOON ELECTRIC	NC	LUMBERTON	ROBESON	40
OMAHA PUBLIC POWER DISTRICT NORTH OMAHA STATION	NE	OMAHA	DOUGLAS	39

			County or County
Facility	State .	City	

Facility	State	City

Facility	9tate	
radiity	Sale	

Colorado

Number of advisories: Lake acres under advisory:

\$\$ Spent on Recreational Fishing (2001):

17,105 \$645,891,000

Statewide Advisories

None

Advisory Extent Mobbee Reservoir						
	Туре	Advisory size	Year Issued	Species	Species size	Restriction/Population Covered
		1493		bass		No Consumption - Sub
	Lake	acres	1993	largemouth	12-18"	Population(s)
		1493		bass		Restricted Consumption - General
Machee Reservoir	Lake	acres	1993	largemouth	12-18"	Population
		1493		bass		Restricted Consumption - General
Machee Reservoir	Lake	acres	1993	smallmouth	1-6"	Population
		1493		bass		Restricted Consumption - General
Mahee Reservoir	Lake	acres	1993	smallmouth	6-12"	Population
		1493		bass		Restricted Consumption - Sub
Machee Reservoir	Lake	acres	1993	smallmouth	1-6"	Population(s)
		1493		bass		Restricted Consumption - Sub
Mahee Reservoir	Lake	acres	1993	smallmouth	6-12"	Population(s)
		1493				Restricted Consumption - General
Mahee Reservoir	Lake	acres	1993	crappie-black	6-12"	Population
		1493				Restricted Consumption - Sub
Møhee Reservoir	Lake	acres	1993	crappie-black	6-12"	Population(s)
		1493				Restricted Consumption - General
Mahee Reservoir	Lake	acres	1993	perd-yellow	1-6"	Population
		1493				Restricted Consumption - General
Mahee Reservoir	Lake	acres	1993	perd-yellow	6-12"	Population
		1493				Restricted Consumption - Sub
Mahee Reservoir Entire reservoir	Lake	acres	1993	perdn-yellow	1-6"	Population(s)

Pestriction/Bonilation Covered	restliction robal attoil covered
Species	size
Spicos	salpade
Year	penss
Advisory	size
Type	adkı
Extent	
Advisory	Advisory

	30-36"	3 pike-northern	1993	577 acres	Lake	Entire reservoir	Narraquimep Reservoir
Nestriction obaration covered	size	Species	Issued	size	adk.		S I CONTRACT
Pestriction/Population Covered	Species	Species	Year	Advisory	Tyne	Extent	Advisory

Advisory	Extent	Type	Advisory size	Year Issued	Species	Species size	Restriction/Population Covered
			14934				Restricted Consumption - Sub
Navajo Reservoir	San Juan and Redra arms	Lake	acres	1993	pike-northern	30-36"	Population(s)
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	carp-common	24-30"	Restricted Consumption - General Population
							Restricted Consumption - Sub
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	carp-common	24-30"	Population(s)
					:		Restricted Consumption - General
Sandhez Reservoir	Entire reservoir	Lake	4 acres	1994	perdn-yellow	_9 <	Population
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	perd-vellow	0 ^	Restricted Consumption - Sub Population(s)
					-		No Consumption - Sub
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	pike-northern	> 24"	Population(s)
 	i i			7007		0	Restricted Consumption - General
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	pike-nortnern		Population
Condon Domingin	io according	<u> </u>	0000	00		10,	Restricted Consumption - Sub
Sandrez reservoir	Entire reservoir	Lake	4 ages	1994	pike-rormern	17-18	
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	trout-brown	18-24"	No Consumption - Sub Population(s)
							Restricted Consumption - General
Sanchez Reservoir	Entire reservoir	Lake	4 acres	1994	trout-brown	18-24"	Population
							No Consumption - Sub
Sandhez Reservoir	Entire reservoir	Lake	4 acres	1994	walleye	> 12"	Population(s)
							Restricted Consumption - General
Sandhez Reservoir	Entire reservoir	Lake	4 acres	1994	walleye	> 12"	
							No Consumption - Sub
Teller Reservoir	Entire reservoir	Lake	97 acres	1994	bullhead	> 10"	Population(s)
							Restricted Consumption - General
Teller Reservoir	Entire reservoir	Lake	97 acres	1994	bullhead	> 10"	Population
							No Consumption - Sub
Teller Reservoir	Entire reservoir	Lake	97 acres	1994	catfish-channel	> 23"	Population(s)
Taller Beenvoir	Hotiro rossarioir	ake	97 acres	1001	lamath channel	"22"	Restricted Consumption - General
			200	2		24 7	No Consimption - Orbital
Teller Reservoir	Entire reservoir	Lake	97 acres	1994	crappie		Population(s)

Advisory	Extent	Туре	Advisory Year	Year	Species	Species	Restriction/Population Covered
			size	Issuea		SIZE	Restricted Consumption - General
Teller Reservoir	Entire reservoir	Lake	97 acres 1994		crappie		Population
No-restriction advisories							

EndNttes

¹ U.S. EPA, Mercury Study Report to Congress, Volume VII: Characterization of Human Health and Wildlife Risks from Mercury Exposure in the United States, 1997.

² U.S. EPA, Mercury Study Report to Congress, Volume III: Fate and Transport of Mercury in the Environment, 1997.

³ U.S. EPA, "Mercury Update. Impact on Fish Advisories," June 2001, downloaded from http://www.epa.gov/ost/fishadvice/mercupd.pdf, 27 September 2004.

⁴ See U.S. EPA, supra, note 2.

⁵ See U.S. EPA, supra, note 1.

⁶ See U.S. EPA, supra, note 3.

⁷ See U.S. EPA, supra, note 1.

⁸ U.S. EPA, Mercury Study Report to Congress, Volume V: Health Effects of Mercury and Mercury Compounds, 1997.

⁹ ld.

¹⁰ National Research Council, Toxicological Effects of Methylmercury, National Academy Press, 2000, downloaded from from http://www.nap.edu/books/0309071402/html/.27 September 2004.

¹¹ Kathryn Mahaffey, Robert P. Cliffner, and Catherine Bodurow, "Blood Organic Mercury and Dietary Mercury Intake: National Health and Nutrition Examination Survey, 1999 and 2000," Environmental Health Perspectives, 112(5) 562-570, April 2004; Kathryn R Mahaffey, U.S. EPA, "Methylmercury Epidemiology Update," Slide presentation given at the National Forum on Contaminants in Fish, San Diego, January 2004. Available at http://www.epa.gov/waterscience/fish/forum/2004/presentations/monday/mahaffey.pdf.

¹² See National Research Council, supra, note 10.

¹³ U.S. EPA, "What You Need to Know about Mercury in Fish and Shellfish," 19 March 2004, downloaded from http://www.epa.gov/waterscience/fishadvice/advice.html, 27 September 2004.

¹⁴ U.S. FDA, "Mercury Levels in Seafood Species," 19 March 2004 downloaded from http://www.cfsan.fda.gov/~frf/sea-mehg.html, 27 September 2004.

¹⁵ U.S. EPA, "Factsheet: National Listing of Fish Advisories, August 2004," downloaded from http://www.epa.gov/waterscience/fish/advisories/factsheet.pdf, 27 September 2004.

33 U.S. Fish and Wildlife Service, supra