Mercury Contamination in Florida:
Strategies to Reduce Mercury Pollution and Protect Public Health

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Executive Summary

Mercury pollution of Florida's waterways and fish threatens the health of Florida's residents.

Mercury is a heavy metal that can cause severe health damage, even when people are exposed to small doses.

- Mercury is a neurotoxin, particularly for developing fetuses. Children born to mothers exposed to mercury may learn to walk and talk later or have reduced neurological test scores.
- The Food and Drug Administration considers fish and seafood with methylmercury levels higher than 1 part per million unsafe.

The primary route through which Floridians are exposed to mercury is consumption of contaminated fish.

- Pregnant women and other vulnerable populations in Florida are warned not to consume more than eight ounces of certain fish every four weeks to prevent damage to developing fetuses and other health problems.
- The state Department of Health warns everyone to limit consumption of largemouth bass, bowfin, and gar caught in any of Florida's freshwater streams and lakes due to unsafe levels of mercury.
- The Department of Health recently added red and gray snapper, dolphin, yellowfin tuna, and a number of popular fish to its list of species that people should consume in only limited quantities.

Coal-fired power plants are the largest source of mercury in Florida, and are likely a major cause of mercury pollution in the state's waters. Within Florida, coal-fired power plants were responsible for 60 percent of reported mercury releases in 2000. Nationally, they are responsible for 40 percent of mercury released to the air.

Florida should immediately seek to reduce mercury pollution from coal-fired power plants and other sources.

There are two ways the state can reduce mercury emissions—through proper enforcement of the Clean Water Act and by imposing tough air pollution standards on power plants.

1. The federal Clean Water Act requires states to set limits on pollutants such as mercury that threaten water quality. Yet, Florida law and the Department of Environmental Protection's guidelines delay developing standards for allowable mercury levels in waterbodies until 2011. This delay will allow additional mercury contamination and will expose many more people to dangerous mercury levels.

   To rectify this problem, the state should move up the schedule for setting limits on mercury pollution that are protective of the state's waters. The state should also fix problems in the Impaired Waters Rule that require many waterways with high levels of mercury pollution to be listed as "not impaired" for the pollutant, thus exempting them from tough pollution limits.

2. Florida should also adopt stringent standards on emissions from the state's 13 coal-fired power plants, and recommend that the federal government impose similar limits on power plants outside the state—whose mercury emissions can end up in Florida waterways. The U.S. Environmental Protection Agency's current proposal for dealing with mercury pollution would skirt Clean Air Act requirements for a 90 percent reduction in emissions by 2008 and fail to guarantee major emission reductions from power plants in Florida.

3. To further reduce releases of mercury into Florida's environment, the state should promote mercury recycling and make it available to all users of mercury-containing devices.

Coal-fired power plants are responsible for 60 percent of Florida's mercury releases.

Introduction

Mercury is a highly toxic substance that can cause neurological damage even at extremely low doses. It is of particular concern for children and for pregnant women who can pass it to their fetuses, for whom exposure can lead to delayed development or mental impairments later in life.

Clearly, mercury exposure is to be avoided. Yet mercury pollution in Florida is widespread and people are exposed to mercury every day by eating fish caught from a local stream or lake. What is a nearly undetectable amount of mercury pollution in a waterway can become a significant amount as it accumulates in fish.

Fish consumption advisories are in place for nearly 7,000 square miles of Florida's coastal waters because of mercury contamination.

Mercury contamination of Florida's waterways is so severe that the Florida Department of Health warns people to limit their consumption of largemouth bass, bowfin, and gar caught anywhere in the state. In some lakes, fish are so tainted with mercury that the Department of Health cautions people not to eat those three species at all. Warnings are in place for a number of other species also, including gray, red and mutton snapper; blackfin and yellowfin tuna; and dolphin.

Reducing mercury emissions from power plants will cut pollution of waterways, but because mercury is flushed from the environment so slowly, it will take years for fish consumption advisories to be lifted. Thus it is crucial that Florida act now to reduce mercury pollution of its water and fish, and to protect the health of the state's residents.

Health Effects of Mercury Pollution

Mercury is a naturally occurring metal. It is unusual among metals in that it is a liquid at room temperature and atmospheric pressure. Mercury has been used for a variety of purposes throughout history and today is used as a component of products including fluorescent lamps, switches, dental fillings, pharmaceutical products, and some types of batteries.[1]

It is also highly toxic.

Mercury can have a variety of health effects, but its most potent effect—and the effect most likely to occur at the lowest doses—is neurotoxicity, causing damage to the nervous system, particularly for developing fetuses. Methylmercury, an organic form of mercury that is easily absorbed by animals, is readily transported across the placental barrier, meaning that a pregnant woman's exposure to mercury exposes her fetus as well.

The health impacts of fetal exposure to mercury are well documented. Children born to mothers exposed to mercury during pregnancy can exhibit a wide variety of neurological problems, including delayed onset of walking and talking and reduced neurological test scores.[2]

Mercury exposure represents a major potential health threat to tens of thousands of Americans. A 2004 study by EPA scientists found that one in six American women of reproductive age had levels of mercury that exceeded levels that could damage a developing fetus.[3]

Mercury has also been found in breast milk, presenting another route of exposure for infants. Similar effects are possible for small children exposed to mercury in fish. Other health effects of mercury exposure may include damage to the immune, cardiovascular and reproductive systems.[4] Evidence linking mercury exposure to cancer is inconclusive.[5]

Mercury is particularly dangerous to humans due to that fact that it builds up in the environment and accumulates in living tissue. For this reason, it is considered a persistent bioaccumulative toxin (PBT) and is subject to relatively stringent reporting standards under the federal Right to Know Act. Power plants, manufacturers, and others who manufacture or process more than 10 pounds of

mercury annually must report those releases to the federal Toxics Release Inventory. In contrast, the reporting threshold for many PBTs is 100 pounds, and for most chemicals, including other toxics like benzene, the standard is 10,000 to 25,000 pounds.[6]

Routes of Mercury Exposure

Fish consumption is the most important pathway for mercury exposure in humans. Mercury from the atmosphere is deposited into waterways, where it is converted by aquatic organisms into its organic form, methylmercury. The aquatic food chain is typically made up of many levels—ranging from tiny plankton through small fish and up to the larger fish that humans typically consume. At each step of the food chain, methylmercury becomes increasingly concentrated in animal tissue, such that large fish can accumulate significant amounts within their bodies—enough to cause health problems for the birds and mammals (including people) that consume the fish.

Photo: William B. Folsom, NMFS

Children and women of child-bearing age are warned to limit their consumption of fish to reduce the risk of toxic effects from mercury.

How Much Mercury Is Too Much?

Even a small amount of mercury can make fish unsafe to eat, because mercury is so toxic and because mercury accumulates in tissue. The Food and Drug Administration (FDA) considers fish and seafood with methylmercury levels higher than 1 part per million unsafe.[7]

The U.S. Environmental Protection Agency (EPA) and FDA have issued national recommendations that pregnant women, women who may become pregnant, and young children limit their consumption of all fish—and completely avoid some fish—to reduce the risk of toxic effects from mercury.

Specifically, the EPA and FDA recommend the following limits for these vulnerable populations:

- No consumption of shark, swordfish, king mackerel or tilefish, which all contain high levels of mercury.
- Consumption of no more than 6 ounces (one average meal) per week of fish caught from local lakes, rivers and coastal areas unless there is a specific advisory against fish consumption.[8]
- Consumption of up to 12 ounces (two average meals) per week of fish with low levels of mercury, such as salmon, catfish and pollock.

The EPA/FDA advisory recommends smaller portions of fish for young children.

Serious questions have been raised as to whether EPA/FDA advisories are protective enough of the health of pregnant women and small children. FDA data obtained by the Environmental Working Group through a Freedom of Information Act request show that levels of mercury in some species of fish—including bluefish, sea trout, orange roughy, grouper and canned albacore tuna—are higher than levels in some fish subject to "no consumption" warnings. The EPA/FDA advisory does not specifically warn women and children against any of these fish, except for albacore tuna, for which EPA/FDA recommend consumption of less than 6 ounces per week.[9]

These warnings are significant for Floridians because, as seen in the next section, Florida suffers from serious mercury pollution.

Mercury in Florida's Environment

Florida is uniquely affected by mercury pollution, due to weather conditions that promote rapid deposition of locally emitted mercury and historically intense use of high-emission waste incinerators.

High Deposition Rates

Mercury deposition rates are higher in Florida than in most parts of the country. A 1997 EPA report singled out Miami and Tampa as having the greatest mercury deposition rates in the southeastern states.[10] More recent data from the National Atmospheric Deposition Program's four Florida monitoring locations in 2002 also show high deposition rates. Of the 54 monitoring sites in 2002, three of the four highest recorded deposition rates were in Florida.[11]

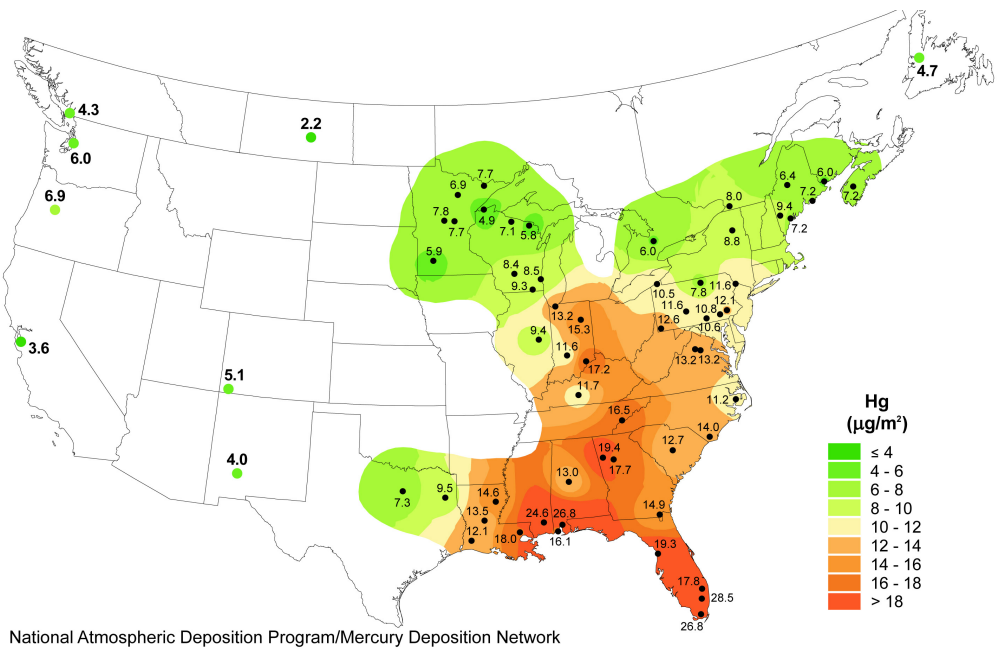
Contamination of Florida's Fish

This pollution has led to elevated levels of mercury in the fish in Florida's waters. Mercury pollution of Florida's waterways is so severe that the state Department of Health (DOH) has issued warnings to the state's residents not to consume some kinds of fish at all and to limit their intake of other kinds.

Fish in Florida's freshwater lakes and streams contain so much mercury that the DOH has issued warnings about consuming largemouth bass, bowfin, and gar. In 20 Florida counties, "no consumption" advisories are in place for the general population for some rivers and streams.[12] The most severely polluted areas are in the Everglades, where fish advisories are in place for roughly 2 million acres.[13] Across the state, women of childbearing age and small children are advised to limit their consumption of fish to one or two six-ounce meals per week.[14]

Mercury pollution affects coastal waters also. The DOH cautions that nobody should eat any king mackerel longer than 31 inches or shark longer than 43 inches caught anywhere along the Florida coastline.[15] Restrictions are greater for vulnerable populations: in addition to avoiding larger shark and king mackerel, women of childbearing age and young children

Figure 1. Florida Has One of the Highest Mercury Deposition Rates in the Nation (total mercury wet deposition, 2003)



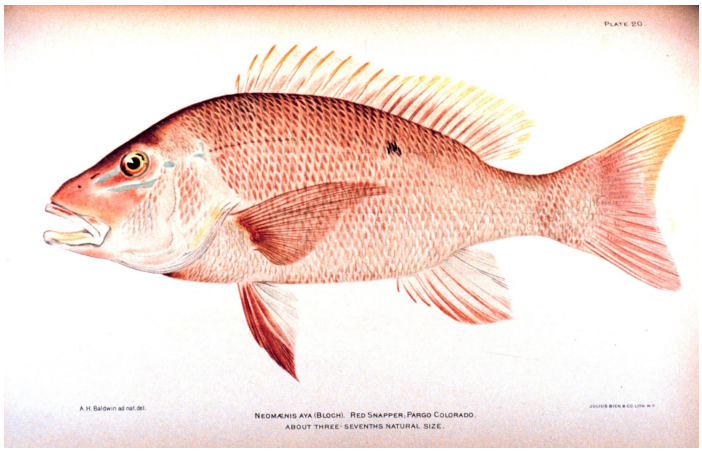
should not eat blackfin tuna, cobia, little tunny, or even small shark or king mackerel. For all Floridians, the state has listed warnings for 14 other fish, such as black and snowy grouper and Spanish mackerel, no matter the size of the fish or where they were caught along the coast.[16]

The DOH recently added mercury pollution warnings for a number of popular fish, including red and gray snapper, dolphin and yellowfin tuna.[17]

The federal Clean Water Act requires that waterways that fail to support their traditional uses—including fishing—must be listed as "impaired" by the Florida Department of Environment Protection (DEP). Once a waterbody is designated as impaired, the federal Clean Water Act requires that the state take steps to clean it up. Unfortunately, the DEP has done little using clean water laws to address mercury pollution.

The Florida DEP recently submitted to the U.S. EPA a summary report on water quality in Florida. The DEP reported that 6,693 square miles of ocean, 957 square miles of estuary, 5.4 square miles of lakes, and 317 miles of river are impaired by mercury.[18] However, the area

Illustration: NOAA



The Florida Department of Health has issued mercury consumption warnings for red snapper.

Mercury contamination threatens recreational fishing, a time-honored Florida pastime that is vital to our state economy. Studies indicate that fish consumption advisories cause many anglers to reduce the number of days they fish, choose other locations to fish, and take fewer overall fishing trips.

of freshwater contamination seems small when compared to the approximately 150 lakes and roughly 50 rivers for which there are fish consumption advisories.

The total contaminated area listed by DEP also seems small when compared to an earlier map of mercury contamination in Florida. A map published by the DOH titled "Health Advisories for Mercury in Florida Fish 1989-1996" suggests many more waterways suffer from high levels of mercury. Changes in Florida's standards for determining which waterbodies are contaminated may have led to the apparent drop in listings. (See "Reducing Mercury Pollution," page 16.)

Sources of Mercury Contamination

Mercury is an unusual water pollutant, because the primary source of contamination is air emissions from burning fuel and waste.

Once airborne, mercury is dispersed by air currents before falling to the ground or into water. Deposition patterns are complex, because how far the mercury travels and when it is deposited on the earth depend on the interplay of the type of mercury, and wind and precipitation patterns.

Mercury is released in several forms. A single facility will release multiple types of mercury. Reactive mercury, which predominates in releases from incinerators, is deposited more quickly than elemental mercury. Reactive mercury remains airborne for only a few hours or at most several days.[20]

Deposition is accelerated by rain. Precipitation washes mercury out of the air and increases the amount of pollution in streams, lakes, and other waterbodies. Florida's regular rainfall, especially in the rainy season, means the state has a disproportionate amount of mercury in its waterways.

Local emissions and environmental conditions can cause the emergence of mercury "hot spots" in which concentrations of mercury are much higher than they are elsewhere. Modeling done by EPA suggests that local sources were responsible for almost 70 percent of the mercury that created Florida's hot spots.[21]

Despite the uncertainties surrounding mercury dispersion and deposition, it is clear that emissions from local sources have a significant impact on mercury levels of fish in surrounding waters.

General Sources of Mercury

The vast majority of mercury emissions in the United States comes from coal-fired power plants, the combustion of waste in incinerators, and industrial processes such as cement and chlorine manufacturing. These sources represented an estimated 87 percent of U.S. mercury emissions in 1994-95.[22] Coal-fired power plants are estimated to be the largest single source of mercury emissions, responsible for about 40 percent of mercury releases.[23]

Contemporary mercury emissions are only one source of the mercury that finds its way into rivers and streams. Mercury can travel for a long time through the atmosphere to points across the globe, and previously emitted mercury can be recycled from land and water. While mercury is a naturally occurring element and background levels of mercury have always existed, human activity has increased the amount of mercury in Florida's waterways.

Mercury Sources in Florida

Determining the percentage of Florida's mercury pollution that comes from local sources versus distant ones is not easy, but it is clear that in-state air emitters contribute significantly to the problem.

In the Florida Everglades, more than 95 percent of annual inflows of mercury come from atmospheric deposition.[24] A large portion of that is from local sources. The Florida DEP, in its study of mercury in the Everglades based on deposition data from 1995-1996, assumed that 90 percent of all airborne mercury in South Florida comes from local sources.[25] Other Florida studies of mercury flushed from the atmosphere by rain have shown local sources were responsible for a smaller portion; either way, local emissions are a significant part of the problem.[26]

Leading Sources in the Past Two Decades: Incinerators and Waste Combustors

Since the early 1990s, Florida has made significant progress toward making fish safe for human consumption by reducing mercury emissions from local sources. Florida's action reduced mercury from major in-state emitters, caused deposition rates to fall, and cut the amount of mercury in fish, though not to safe levels.

In the 1990s, two industries were responsible for the bulk of South Florida's mercury pollution. Medical waste incinerators and municipal waste combustors emitted 92 to 96 percent of the region's mercury.[27]

Those sources were relatively new to Florida. In 1983, several medical waste incinerators and municipal waste combustors began operating in the state, primarily in South Florida. As a result, in 1983 South Florida mercury emissions soared to 3.5 times higher than 1982 levels.[28]

When tighter controls were imposed on mercury pollution from incinerators and combustors, emissions dropped. In 1992, Florida adopted stronger restrictions on mercury emissions from waste incinerators, banning the disposal of fluorescent lamps in incinerators and tightening standards for the amount of mercury that could be released through exhaust gas.[29] Florida also implemented a mercury recycling campaign to reduce the amount of mercury in the waste stream.[30] In 1995, Florida began promoting mercury recovery and reclamation.[31] Stringent federal standards also took effect in the late 1990s.

These measures significantly reduced mercury emissions. Releases in 1993 were 65 percent lower than in 1991, and continued to decline throughout the decade.[32] By 2000, total mercury emissions

from all sources in Florida had dropped by 93 percent compared to the 1991 peak.

The rates of mercury deposition into Florida's waterways also decreased over this time period, though not by the same degree. Though emissions fell by 93 percent from 1993 to 2000, statewide deposition rates fell by 25 percent.[33] Greater benefits were experienced in the Everglades, located downwind from South Florida's high concentration of incinerators. Deposition of mercury there declined by approximately 60 percent from 1990 to 2001. Mercury levels in fish there fell, dropping 75 percent from the mid-1990s to 2002.[34]

Despite the reductions in emissions from incinerators, there is still much work to do. Fish in the Everglades remain unsafe for human consumption. For a 3-year-old largemouth bass caught in the Everglades to reach a safe level of mercury contamination, mercury deposition will need to be reduced by 80 percent.[35] Achieving that level of reduction will require further reductions in emissions from local and non-local sources – including electric power plants.

Florida's 13 coal-fired power plants are the largest source of mercury emissions in the state.

Mercury Emissions Today: The Role of Power Plants

Now that emissions from medical waste incinerators and municipal waste combustors have been reduced, the state's 13 coal-fired power plants are responsible for much of the mercury released into Florida's air. Of the Florida industries that reported mercury emissions to the state, power plants accounted for 60 percent of the mercury released to the air in Florida in 2000.[36] (See Table 1 for a list of coal-fired power plants in Florida.)

Other sources of contemporary mercury emissions include sugar processing facilities, mercury used in electrical equipment, laboratories, and measuring and control instruments.[37]

Table 1. Coal-Fired Power Plants in Florida[38]

Operator	Plant	Location
Cedar Bay Generating Co., L.P.	Cedar Bay Cogeneration Project	Duval
Gulf Power	Crist	Escambia
Gulf Power	Lansing Smith	Bay
Gulf Power	Scholtz	Jackson
Indiantown Cogen. L.P.	Indiantown Cogeneration Project	Martin
Jacksonville Electric Authority	Northside 1 & 2	Duval
Jacksonville Electric Authority/ Florida Power & Light	St. Johns River Power Park	Duval
Lakeland	McIntosh 3	Polk
Orlando Utilities Commission	Stanton 1 & 2	Orange
Progress Energy Florida	Crystal River 1, 2, 4 & 5	Citrus
Seminole Electric Coop	Seminole Plant	Putnam
Tampa Electric Company	Big Bend 1, 2, 3 & 4	Hillsborough
Tampa Electric Company	Polk 1	Polk

Reducing Mercury Pollution

Florida has a severe mercury pollution problem. The state has several tools available for reducing mercury contamination, and now needs to begin using them to reduce mercury pollution. Both clean water and clean air laws can be used to reduce emissions from coal-fired power plants, thus reducing the amount of mercury deposited in the state's waterways.

Using Clean Water Laws

Under the federal Clean Water Act, states must identify waterways that fail to meet water quality standards and create plans for returning those waterways to clean, usable condition. The state must assess the quality of its waterways and create a list of those waterways that do not meet their "designated uses"—for example, fishing, swimming or use as drinking water. For these impaired waterways that do not measure up, states must create waterway-specific cleanup plans, which include a determination of the levels of water pollution to which a waterway may be exposed while maintaining its designated uses. These pollution limits are called Total Maximum Daily Loads, or TMDLs.

Once a TMDL is established for a waterway, the state must allocate portions of the load among the sources of pollution along the waterway. This includes both point sources—which typically must adhere to limits written into a discharge permit—and non-point sources of pollution. These allocations must incorporate a margin of safety to ensure that waterways will attain their designated uses.

By implementing timely and health-protective TMDLs for the state's contaminated waterways, Florida could take a major step toward reducing ongoing mercury contamination of fish and the threat posed by mercury to public health statewide.

Florida's Flawed TMDL Process

Florida has not yet developed TMDLs that will reduce mercury from the state's waterways. However, the current regulations that guide the creation of TMDLs are inadequate to protect Florida's streams, lakes, and coastal waters.

The Florida Department of Environmental Protection (DEP) adopted criteria, known as the Impaired Waters Rule (IWR), guiding the process by which the state lists impaired waterways and establishes TMDLs. A federal appeals court ruled recently that the IWR inappropriately changes Florida's water protection laws to allow greater pollution.[39] Federal law requires that revisions to a state's water quality standards cannot result in more polluted waterways, yet the IWR does precisely that. It fails to list waterways as impaired even if water quality tests repeatedly show pollution at levels higher than approved levels, and it allows the Florida DEP to ignore other criteria for evaluating pollution.

As discussed below, the loopholes and weaknesses of the IWR mean that it fails to reduce mercury pollution in Florida's waters.

Current Rules May Exclude Some Mercury-Impaired Waterways from the Impaired Waters List

The federal Clean Water Act requires that waters that cannot be used for their traditional purposes be listed as impaired. Requirements in Florida's IWR may prevent the DEP from listing some waterways with unsafe levels of mercury in fish even though the Department of Health may have issued fish consumption advisories.

The IWR improperly restricts what data the DEP may consider when determining a waterbody's health. This likely has led to the omission of some mercury-polluted waterways from the impaired waters list. It is clear that guidelines in the IWR have allowed the DEP to leave some polluted waterways off its list of impaired waters and thus not even consider setting TMDLs for them. When the DEP used the IWR to update its list of impaired waterways for one area of the state, it dropped more than 100 waterways from an earlier inventory that had been created using more protective standards. In reviewing the DEP's list, the U.S. EPA concluded that many of the rivers, streams, and lakes were polluted and added them back to the list.[40] However, the EPA did not review the status of all waterbodies and therefore the list still likely omits impaired waterways.

There are multiple standards by which DEP can evaluate the pollution of a waterway and place it on the planning list. The relevant standard for mercury is fish consumption advisories. The IWR permits DEP to use the presence of fish consumption advisories issued by the Department of Health as reason to list a waterbody as impaired, provided the advisories meet strict criteria. The advisory must be based on samples from at least 12 different fish in the water segment and they must have been collected within the past 7.5 years.[41] There are two problems with this requirement.

First, the state is not prepared to pursue as extensive a testing program as would be necessary to provide 12 samples within 7.5 years for every waterbody segment. This may result in the exclusion of waterways in need of protection from the impaired waters list. Testing of fish is done by the DEP, which tests approximately 20 fish from each of 20 sites, or roughly 400 fish per year.[42] There are approximately 7,800 waterbody segments scheduled for review under the TMDL program.[43] The current rate of testing allows complete results for at most 33 waterbody segments per year, though the focus on just a few sites means that closer to 20 segments are tested. This means that DEP may fail to fulfill its obligations under the Clean Water Act to identify all impaired waterways.

Second, the requirement for extensive data complicates a simple truth, which is that fish advisories are in place for all waterways in the state and thus

lakes, rivers, and the ocean are impaired. The Department of Health warns people to limit their consumption of certain fish caught anywhere in Florida. These consumption warnings mean a waterway is impaired, and should be adequate reason for the DEP to add a waterway to the impaired list.

Process for Cleaning Up Mercury Is Delayed

The federal appeals court ruled in response to actions of the Florida DEP and the U.S. EPA during the first step of the TMDL-setting process. The plan for the next steps is equally flawed.

The IWR provides a five-phase process for reviewing contamination of waterways, setting TMDLs, and reducing pollution. It divides the state's waterways into "basin groups" that are reviewed at different times. Were the impaired waters lists created for basin groups 1 and 2 adequate, the next step would be to establish TMDLs to reduce mercury contamination of those waterways. However, DEP has not begun this and does not plan to set TMDLs for mercury until 2011 at the earliest.

This delay in establishing mercury TMDLs stems directly from the IWR. The IWR deprioritizes addressing mercury contamination, despite the fact that it is a persistent bioaccumulative toxin with known impacts on public health and wildlife. The IWR specifies that "water segments that are listed before 2010 due to fish consumption advisories for mercury" should be considered low priority for setting TMDLs. The rule explains this is due to the "current insufficient understanding of mercury cycling in the environment."[44] As will be discussed below, though current knowledge is not complete, it is nonetheless adequate to allow substantial progress on reducing mercury pollution.

According to DEP's schedule for setting TMDLs, limits for low-priority pollutants will not be established until 2012 to 2016. Reducing emissions to acceptable levels will occur after that.[45] Thus, the result of the IWR guidance and the TMDL schedule means that in waters that are clearly impaired—fish caught there cannot be consumed because they contain so much mercury—no improvement may occur for years.

Why Delaying Mercury Cleanup Due to "Insufficient Understanding" Is Unacceptable

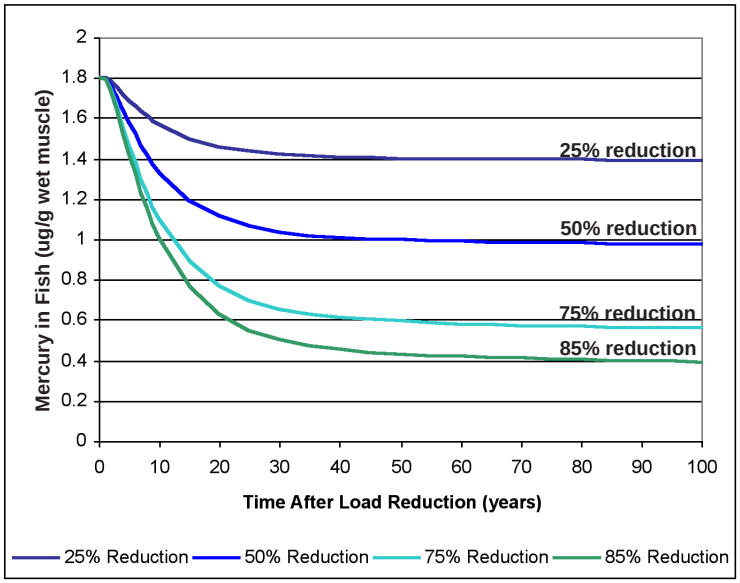
It is true that controlling mercury contamination presents a challenge compared to addressing most other forms of water pollution. Typically, water pollution comes from sources such as water treatment plants or factories that discharge directly into a waterway or from general sources that send polluted runoff into streams or rivers. In contrast, mercury begins as an air pollutant but becomes a water pollutant.

Though identifying all sources of mercury pollution and measuring their contribution to the problem is a complicated task, it is nonetheless a manageable one. The Florida DEP modeled mercury deposition in the Florida Everglades, based on predictions of atmospheric transport of mercury from local sources, and calculated how that mercury moves through the ecosystem to contaminate fish. That study, released in 2003, concluded that it is possible to achieve "reliable, confident allocations of mercury emissions to protect the designated uses of the Everglades."[46]

Presumably, were the same care applied statewide, reliable, confident estimates are possible for creating TMDLs for all of Florida.

While mercury's long life in the environment means that the full benefits of

Figure 2. Mercury Levels in Fish Decline Measurably Once Deposition Is Reduced[47]



Predicted dynamic response of Hg concentrations in largemouth bass in WCA 3A-15 following different reductions in Hg(II) deposition. Predictions are based on calibration to current loading of 35 μg/m^2/yr.

pollution control efforts will not be felt for years, researchers studying pollution in the Everglades calculated that mercury concentrations in fish tissue would decline measurably with any reduction of mercury deposition rates. (See Figure 2.) Thus any reductions the state achieves today will quickly bring fish closer to being safe to consume.

Using Clean Air Laws

Addressing mercury pollution in Florida will require reducing the amount of mercury that is released into the air from coal-fired power plants. Florida has the ability to limit emissions from the state's power plants and can encourage the federal government to require power plants nationwide to reduce their emissions.

Cutting In-State Airborne Mercury Emissions

Florida's 13 coal-fired power plants were responsible for over 60 percent of the mercury reported as released into Florida's air in 2000. These plants created hot spots and added to Florida's broader mercury problem. Through decisive action, Florida can dramatically reduce emissions from these sources.

Massachusetts and New Hampshire have established limits on pollution from in-state power plants. Massachusetts recently adopted rules that require power plants to capture 85 percent of their mercury emissions by 2008 and 95 percent by 2012.[48] Florida could dramatically reduce its in-state mercury pollution if it adopted similar rules.

Cutting National Airborne Mercury Emissions

Florida also can recommend that the U.S. EPA fully comply with the federal Clean Air Act and require a 90 percent reduction in mercury emissions from power plants and other sources.

Currently, the EPA is subject to a settlement agreement to propose emission standards for power plants for hazardous air pollutants, including mercury. The Clean Air Act directs the agency to base emission standards on the pollution rates currently achieved by the lowest-emitting power plants using the levels achievable by the "maximum achievable control technology" (MACT).

These low-emitting existing power plants have demonstrated that it is possible to reduce mercury emissions by 90 percent, bringing national mercury emissions down from nearly 50 tons per year to only five tons per year.[49] The MACT proposal put forth by EPA, however, is far weaker and would not achieve this level of reductions. It would reduce mercury emissions by approximately 30 percent by early 2008.[50] Rather than setting an emissions standard equal to at least the best-controlled source in the industry, EPA sorted power plants into classes according to the type of coal they burn and created other distinctions that limited the control measures required of different plants. This means that plants need to clean up only to the level now achieved by the best facility within that subcategory.[51] Thus EPA's proposed MACT standard produces limited benefit.

The EPA has drafted an alternative plan to the MACT standards. Because EPA's proposed MACT standard is so weak, EPA's alternative plan appears to be better. However, this initiative would repeal the Clean Air Act regulations that apply to mercury from power plants and replace them with a national emissions limit and emissions trading program. EPA estimates that its alternative policy would reduce total mercury emissions by 70 percent by 2018 at the earliest, a smaller reduction on a longer timeline than an adequate MACT standard.[52] The timeline for reductions will likely be delayed, in part due to the use of credits for early partial compliance with the plan.[53]

Further, the EPA proposal achieves these emissions reductions through a "cap and trade" program, which can allow "hot spots" of mercury emissions to persist. A cap and trade program allocates a pollution allowance to every power plant. A plant that can cheaply reduce mercury emissions will cut its emissions to below the permitted level and sell the unused pollution allowance to a plant that cannot reduce its emissions so easily. That plant will purchase credits from other sources far away to add to its own allowance and will continue to emit large amounts of mercury. Thus, though a cap and trade system can lower mercury emissions nationwide, continued high emissions from a subset of power plants will likely create and exacerbate areas of high mercury concentration.

It is not known which of Florida's 13 power plants would reduce their mercury emissions and sell credits to others under EPA's proposed cap and trade program. Each one may reduce mercury emissions and sell credits to plants in other states, but some may purchase credits and thus avoid reducing emissions, maintaining Florida's existing mercury hot spots.

Policy Recommendations

Cleaning up mercury contamination in the state to make fish safe to eat will require substantial reductions in mercury pollution. Florida has two methods it can use to reduce mercury pollution: clean water laws and clean air laws. With either route, Florida should act soon and can achieve real reductions in mercury contamination of fish.

The state should fulfill its obligations under the Clean Water Act by identifying all waterways impaired by mercury and beginning to reduce that impairment. This will require revising the Impaired Waters Rule (IWR). The state should identify as impaired all waters for which the Department of Health has issued a fish advisory. Such waterways clearly are impaired.

Second, establishing TMDLs for mercury should be placed on DEP's high priority list, not on the low priority list. The IWR currently instructs the DEP to delay developing standards for allowable mercury levels in waterbodies until 2011 or later. Reducing pollution to acceptable levels will occur even later. This delay will result in hundreds of pounds of additional mercury contamination and will expose many more people to dangerous mercury levels.

The other approach Florida should pursue to reduce mercury pollution is tightening air pollution standards for power plants. Florida has demonstrated the effectiveness of state emissions laws through controls on incinerators that lowered mercury levels in fish. The state should cap emissions from coal-fired power plants, the biggest in-state source of mercury. One model for strong state-level curbs on mercury emissions from power plants is Massachusetts' recently adopted rule.

To reduce emissions from power plants outside the state, Florida can recommend that the U.S. EPA strongly implement the Clean Air Act and reduce mercury emissions from power plants by at least 90 percent from existing levels.

Finally, Florida should promote mercury recycling for all mercury-containing devices. Currently, recycling programs are available to state and local government agencies in Florida. Individual citizens have no easy options for properly disposing of lamps, thermostats, thermometers, and other items that contain mercury.

Notes

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31. Waste Management, Florida DEP, *Program Description*, downloaded from www.dep.state.fl.us/waste/categories/mercury/pages/program_description.htm, 6 July 2004.

32. See note 13.

33. See note 13.

34. See note 13.

35. See note 13.

36. *Emissions Report by Facility* for all facilities reporting mercury emissions in 2000, provided by Yi Zhu, Department of Air Resources Management, DEP, personal communication, 21 September 2004. Note that formerly Florida DEP employees visited industrial facilities in the state and measured their mercury emissions. Now, emissions testing and reporting is done by the facilities themselves.

37. See note 13.

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