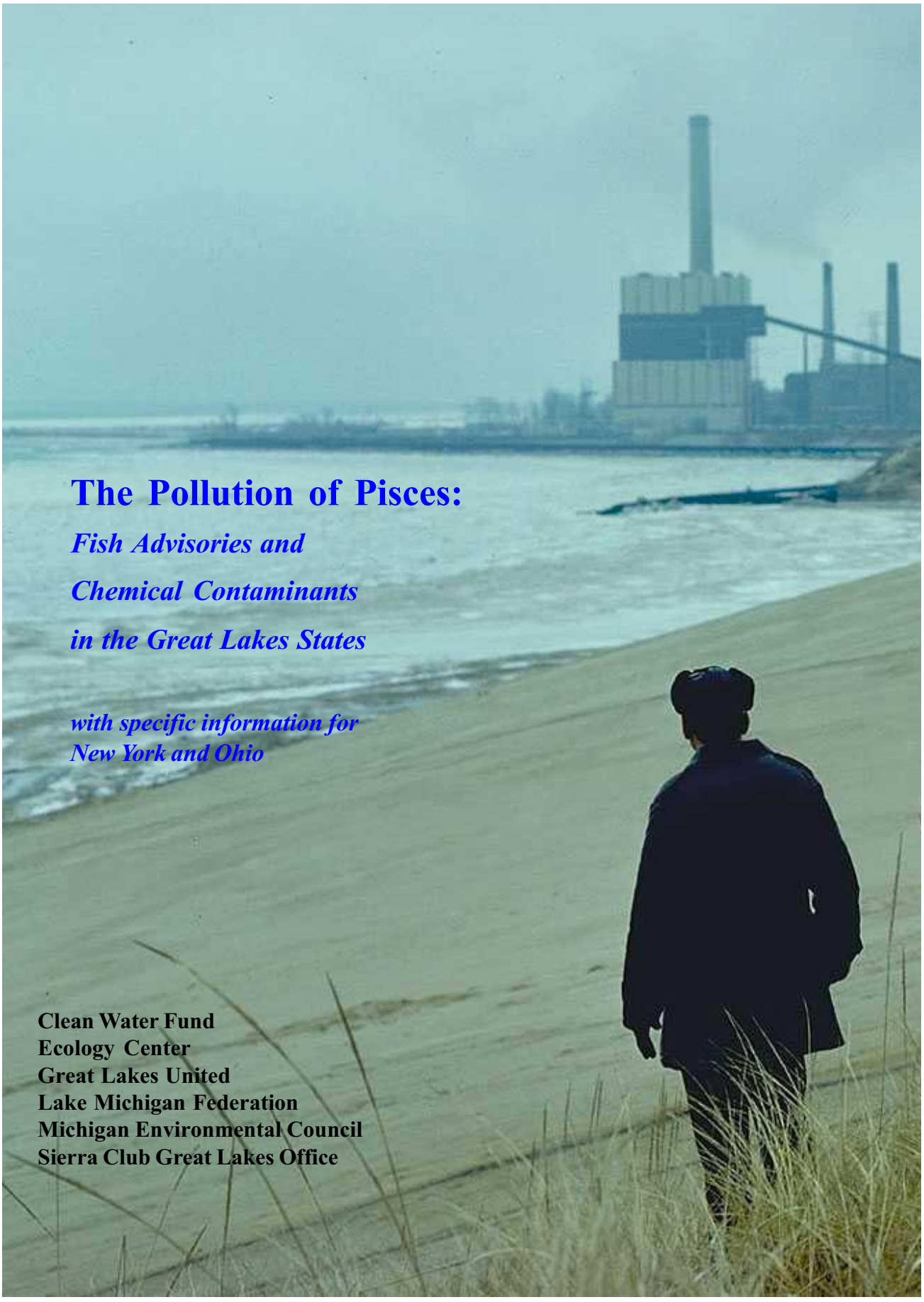


The Pollution of Pisces:

Fish Advisories and Chemical Contaminants in the Great Lakes States

with specific information for New York and Ohio

Clean Water Fund
Ecology Center
Great Lakes United
Lake Michigan Federation
Michigan Environmental Council
Sierra Club Great Lakes Office

A Window to Chemical Contamination

Fish advisories are warnings to the public from state health departments and federal agencies that eating certain fish poses a danger to health because of chemical contamination. They provide graphic public testimony to the risks chemical contamination poses to local and regional ecosystems.

Fish advisories are also a testament to the resiliency of chemicals that have been banned in this country for nearly three decades. The unique characteristic of these "persistent organic pollutants" (POPs) is that, once they are released into the local environment or arrive via air and water currents, they are very difficult to eliminate and can remain virtually intact for many years. In the meantime, they "bioaccumulate" their way up the food chain into fruits, vegetables, grains, and ultimately, animal products, including fish and wildlife. That's one reason why ***POPs account for 75 percent of all of the fish advisories issued in the United States.***[1] That is also why the United States and more than 100 other nations have been negotiating a legally binding global treaty to eliminate the production and use of POP chemicals. [2]

The Public Health Threat from POPs

POPs are primarily the products and by-products of economic activity: pesticides, .
industrial processes, and chemical manufacturing. They are relatively new, with most produced since World War II. Scientists and researchers became aware of the problems associated with POPs during the late 1960s, when they began to observe behavioral abnormalities and gross birth defects in fish, birds and mammals in and around the North American Great Lakes. The abnormalities were linked to pollutants in the water of the lakes. Health effects were especially prevalent in predator species.

Alarmed by these findings, scientists launched investigations to determine whether POPs posed a danger to humans. In the ensuing years, researchers found evidence that POPs are linked to a variety of immune, reproductive and neurological disorders, and that women, infants and children are especially vulnerable. In the 1970s, the US Environmental Protection Agency (EPA) began banning the production and use of POPs, as studies showed that humans were absorbing these chemicals into their systems at potentially harmful rates.

POPs pose multiple risks. Because POPs resist breaking down into harmless compounds and are not water soluble, they persist in the environment and the bodies of humans and animals for years, often accumulating to toxic levels. Even extremely small amounts of some of these substancees—sometimes billionths of a gram—can cause developmental and reproductive disorders, neurological damage and chronic diseases, such as cancer. In fact, one type of dioxin has been found by the EPA to be the most potent synthetic carcinogen yet tested.

Most of the ingested POPs are stored in the fatty tissues of humans and animals or incorporated into the body's chemical functions. Some POPs mimic human hormones and thereby disrupt the normal functioning of the human endocrine system. POPS are particularly dangerous to the developing neurological, reproductive, or immunological systems of infants and children. Mothers may transfer POPS stored in their fat to their infants through breast feeding, or through the placenta. Evidence also associates POPS with cancers and tumors at multiple sites; neurobehavioral impairment, including learning disorders; immune system changes; reproductive deficits and sex-linked disorders; shortened period of lactation in nursing mothers; and diseases such as endometriosis, increased incidence of diabetes, and others.

Harvesting EPA's Fish Advisory Database

The Environmental Protection Agency has compiled rich databases of fish advisories issued throughout the country that disclose widespread contamination of fish (and waterfowl) by POPs such as DDT, PCBs and dioxin. As of December 1998, more than 13,000 advisories were in effect. Unfortunately, since these advisories are often never seen or are ignored, many Americans are ingesting POPs in the food they eat.

This report compiles and analyzes findings from EPA's fish advisory databases. The newest data (from the 1999 database) shows how widespread POPs contamination of our waters and fish remains, despite the 30 year-old federal ban on most of these chemicals. The message is clear: POPs are virtually everywhere; they have compromised the health of our environment; and everything possible should be done to prevent further contamination.

FINDING: ***Toxic Chemicals Pervade The Nation's Waterways***

As of December 1998, the last month accounted for by EPA's most recently published database, 13,237 fish advisories were active throughout the United States. However, this aggregate number tells only part of the story:

- 15.8 percent of the nation's total lake acreage and 6.8 percent of the nation's total river miles are under fish and wildlife advisories. In certain areas, particularly in states around the Great Lakes, this percentage is much greater.
- 100 percent of lake acres are under fish advisories in eleven states (Maine, Vermont, New Hampshire, Massachusetts, New York, Rhode Island, North Carolina, Ohio, Michigan, New Jersey, and Maryland).
- Eleven states (Maine, Vermont, New Hampshire, Massachusetts, New York, North Carolina, Ohio, Indiana, New Jersey, Rhode Island and Maryland) have 100 percent of their river miles under fish advisories.
- Almost 59 percent of the heavily fished coastal waters of the 48 contiguous US states are under advisories. This includes 61.5 percent of the Atlantic Coast and 100 percent of the Gulf Coast**.**

FINDING: ***The Great Lakes Region Leads the Nation in Fish Advisories***

The Great Lakes region of the United States contains a disproportionate share of the nation's fish advisories. While the states bordering the Great Lakes account for 27 percent of the nation's people, they are home to 75 percent of the nation's fish advisories and 72 percent of all of the nation's fish advisories due to POPs contamination. Fully 100 percent of the Great Lakes waters and their connecting waters are under advisories.

Table 1, below, which was drawn from the EPA database, provides a state-by-state breakdown of fish advisories in the Great Lakes region. The data from EPA's earlier database is drawn from a 1998 study by the Natural Resources Defense Council, which compared data on fish advisories for 1993 and 1996.[3]

The data presented in Table 1 indicate that:

- In the past two years, the number of fish advisories in the Great Lakes region increased significantly (17 percent).
- The number of fish advisories declined in only two Great Lakes states, and those declines represented only one-half of one percent of the region's fish advisories.
- Almost three-quarters of all U.S. fish advisories caused by contamination of the 12 POPs covered in the global treaty occur in the Great Lakes states.
- In six of the eight Great Lakes states, the 12 POPs being considered in the global treaty accounted for more than 50 percent of each state's fish advisories. In three states, more than 85 percent were due to the 12 POPs.

Table 1. Fish Advisories in The U.S and Great Lakes States, 1999

	No. of Advisories in 1998	in 1996	% Change	No. Advisories due to Treaty POPs	% Advisories due to Treaty POPs
Illinois	65	71	8% decrease	61	95%
Indiana	1627	1521	7% increase	944	58%
Michigan	716	384	86% increase	523	73%
Minnesota	5148	4251	21% increase	256	5%
Ohio	147	78	88% increase	109	74%
Penna.	99	83	19% increase	98	99%
New York	358	404	9% decrease	309	86%
Wisconsin	1772	1721	3% increase	484	28%
Total Great Lakes States	**9,932**	**8,513**	**17% increase**	**2794**	**28%**
Total U.S.	13,237	11,531	15% increase	3855	29%

(Sources: U.S. EPA, Office of Water, 1999. *Listing of Fish and Wildlife Advisories;* U.S. EPA, Office of Water, 1997. *National Listing of Fish Consumption Advisories.)*

FINDING: ***Americans Continue to Consume Contaminated Fish and Wildlife.***

Despite the development and dissemination of information about the dangers of fish found in contaminated lakes and streams, Americans continue to consume contaminated fish and wildlife.

l A study sponsored by the US Public Health Service Agency for Toxic Substances and Disease Registry found that less than 50 percent of Great Lakes sport fish consumers were aware of fish advisories. [4]

l The study also found evidence that a large portion of consumers of Great Lakes fish are unlicensed anglers. They, therefore, may not have access to one of the main points of distribution of their state's health advisories—licensing outlets.[5]

l Great Lakes state governments and interested organizations have increased efforts to target women, non-Whites, (particularly Native Americans and Hmong), and low-income groups to increase awareness of fishing advisories. In some states, governments are distributing fish advisory information in WIC (Women, Infants and Children) clinics to reach additional fish consumers to warn about the risks of POPs to developing fetuses and children.[6] These efforts reflect a recognition that consumption of contaminated fish is widespread despite the advisories.

l An EPA study on Native American diets of the Great Lakes area found that 90 percent of the meat, fish and poultry consumed by these groups came from deer, bear, rabbits, walleye, northern pike, ducks and other wildlife.[7] Many of these species have shown heavy concentrations of environmental pollutants[8] .

l A study of New York anglers found that 54 percent of survey respondents ate species listed on fishing advisories in amounts above the advisory limits. Many of those who did had used charter boat operators as an information source. Even those who used the Fishing Regulations Guide were more likely to eat fish over the limit. And while most anglers used risk reducing cleaning methods, only 25 percent used risk reducing cooking methods[9] .

Table 2. Health Effects of POPs in Great Lakes States Fish Advisories

Chemical Contaminant	Health Affects Associated with Chemical
Chlordane/heptachlor	· Possible human carcinogen · Liver damage · Central nervous system disorders
DDT	· Possible human carcinogen · Reproductive failure in wildlife · Liver damage · Central nervous system disorders
Dioxins/Furans	· Human carcinogen · Furans are possibly carcinogenic to humans · Neurodevelopmental effects: reduced IQ, increase in hyperactive behavior, adverse effects on attentional processes, increased prevalence of withdrawn /depressed behavior · Altered immune function · Central nervous system disorders · Chloracne and other skin disorders · Disrupts liver and kidney function · Alters hormone levels: thyroid, testosterone and estrogen · Reproductive effects: altered sex ratio, reduced fertility · Birth defects: hypospadias · Endometriosis
Hexachlorobenzene	· Possible human carcinogen · Disrupts hormone function · Liver damage · Damages thyroid, kidneys, blood and immune system
Mirex	· Possibly carcinogenic to humans · Suppresses immune system · Liver damage · Damages stomach, kidneys, thyroid, nervous and reproductive systems.
PCBs	· Probable human carcinogen · Chloracne and other skin disorders · Liver damage · Neurodevelopmental effects: reduced IQ; short term memory, spatial effects · Disrupts hormone function

Sources: Agency for Toxic Substances and Disease Registry Toxicity Profiles, US Department of Health and Human Services, Public Health Service; Physicians for Social Responsibility**,** *Health Effects of the Short List Empirical Findings***.**

Table 3. POPs Fish Advisories for New York State

Chemical Contaminant	Number Advisories	Health Affects Associated with Chemical
Chlordane	33	Possibly carcinogenic to humans Liver damage Central nervous system disorders
DDT	6	Possibly carcinogenic to humans Liver damage Central nervous system disorders
Dioxin	45	Dioxin is a human carcinogen Neurodevelopmental effects: reduced IQ, increase in hyperactive behavior, adverse effects on attentional processes, increased with drawn /depressed behavior Altered immune function Central nervous system disorders Chloracne and other skin disorders Disrupts liver and kidney function Alters hormone levels: thyroid, testosterone and estrogen Reproductive effects: altered sex ratio, reduced fertility Birth defects: hypospadias Endometriosis
Mirex	42	Possibly carcinogenic to humans Suppresses immune system Liver damage Damages stomach, kidneys eyes, thyroid, nervous and reproductive systems.
PCBs	183	Probably carcinogenic to humans Chloracne and other skin disorders Liver damage Neurodevelopmental effects: reduced IQ, short term memory and spatial effects Disrupts hormone function

(Advisory data from EPA National Listing of Fish and Wildlife Advisories, 1998; Health Information Sources: Agency for Toxic Substances and Disease Registry (ATSDR) Toxicity Profiles, US Department of Health and Human Services, Public Health Service. Physicians for Social Responsibility, Health Effects of the Short List: Empirical Findings.)

Table 4. POPs Fish Advisories for Ohio, 1999

Chemical Contaminant	Number Advisories	Health Affects Associated with Chemical
Chlordane	4	Possible human carcinogen Liver damage Central nervous system disorders
Hexachlorobenzene	6	Possible human carcinogen Reproductive failure in wildlife Liver damage Central nervous system disorders
Mirex	1	Possible human carcinogen Suppresses immune system Liver damage Damages stomach, kidneys eyes, thyroid, nervous and reproductive systems.
PCBs	98	Probable human carcinogen Chloracne and other skin disorders Liver damage Neurodevelopmental effects: reduced IQ, short term memory and spatial effects Disrupts hormone function

(Advisory data from EPA *National Listing of Fish and Wildlife Advisories*, 1998; Health Information Sources: Agency for Toxic Substances and Disease Registry (ATSDR) Toxicity Profiles, US Department of Health and Human Services, Public Health Service. Physicians for Social Responsibility*, Health Effects of the Short List: Empirical Findings*.)

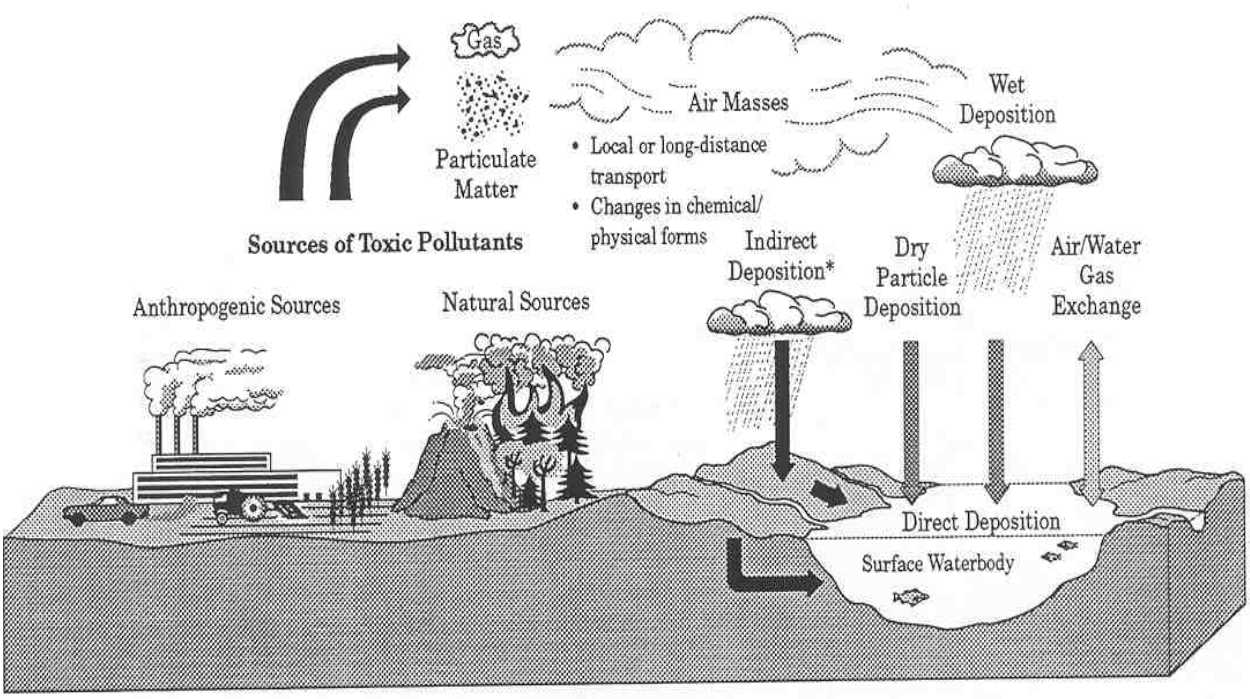
Long-Range POPs Transport, Fish Advisories, and The Global POPs Treaty

Scientific evidence indicates that POPs are very mobile. They are largely transmitted through air and water currents and precipitation, , across the globe to sites as remote as the North Pole. Widespread evidence that DDT, PCBs, chlordane and dieldrin contaminate wildlife and humans in the Arctic and Antarctic regions, where they were never produced or used, demonstrates the global mobility of these chemicals.

POPs emissions have the ability to be carried by rain, fog or snow or to be carried in air currents in dry particle form. Air currents can transport particles through the atmosphere, depositing them when wind speeds drop or the material comes in contact with solid surfaces[10] . Because POPs are resistant to degradation, they can be carried several times, moving farther and farther from their source. A 1998 study by the International Whaling Commission found that some marine mammals were so highly contaminated by POPs, that the animals would be classified as hazardous waste sites if they were on land.

Despite bans on the production and use of many POPs that contaminate the Great Lakes and its waterways, the region remains vulnerable to further POPs contamination because POPs are so mobile and long-lasting. Even if the Great Lakes were cleansed of all existing POPs contamination, the region would not be free of the threat of further contamination from global sources of POPs pollution.

Figure 1: Long Range Transport and Deposition of POPs



Source: U.S. Environmental Protection Agency, 1994.

The world's scientists and policy makers now recognize that the release of POPs anywhere is a threat to public health everywhere. That has led to efforts by the United Nations to foster a global, legally binding treaty to eliminate production and use of these chemicals. By addressing POPs pollution at its sources, the treaty offers an unprecedented chance to protect future generations in the Great Lakes from birth defects, developmental disorders, cancers and other chronic illnesses.

Vast improvements in dissemination of fish advisories are not, in themselves, the answer to a future free of POPs contamination. Strong cultural and ethnic imperatives, as well as communications barriers, means that consumption of contaminated fish for subsistence or recreational purposes will continue. The only genuine, long-lasting solutions are those that address POPs contamination at their sources, rather than at their human consumption and health end points.

It has been nearly three decades since Rachel Carson's *Silent Spring* led to public outcry about POPs and federal government bans of DDT and its chemical cousins. Not since then has there been a better opportunity for U.S. policymakers to make prevention, rather than risk management or damage control, the centerpiece of an attack upon this global threat to public health.

[1] As of December 1998 as reported by the U.S. Environmental Protection Agency.

[2] The POPs treaty would initially include twelve of the most dangerous POPs. The list of POPs covered under the proposed POPs Treaty include some of the most dangerous chemicals known, including DDT, PCBs, dieldrin, aldrin, chlordane, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, furans and dioxins.

[3] Natural Resources Defense Council. *Contaminated Catch: The Public Health Threat from Toxics in Fish, 1998.*

[4] Health Advisories for Consumers of Great Lakes Sports Fish: Is the Message Being Received?, US Epidemic Intelligence Service, Centers for Disease Control and Prevention, et al, from December 1997 *Environmental Health Perspectives.*

[5] Ibid

[6] Commission Wants Better Warnings About Fish Toxins, *Telegraph Herald* (Dubuque, IA), July 28, 2000.

[7] Tribes at Risk: The Wisconsin Tribes Comparative Risk Project, Environmental Protection Agency.

[8] Tribes at Risk: The Wisconsin Tribes Comparative Risk Project, Environmental Protection Agency.

[9] New York Angler Cohort Study: Health Advisory Knowledge and Related Attitudes and Behavior, With a Focus on Lake Ontario, New York State College of Agriculture and Life Sciences.

[10] Thomas M. Holsen, Department of Civil & Environmental Engineering, Clarkson University. Presentation at US Senate Briefing, August 14, 2000.