ATSDR's Wingspread '97 Revisited Great Lakes Human Health Effects Research Program Expert Panel Meeting February 9-11, 2006 Atlanta, GA

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Wingspread Conference 97' Recommendations

- **The Parties undertake a renewed and strengthened effort to eliminate from the Great Lakes environment those substances responsible for the human health effects documented in the ATSDR report.**

- **The Parties should develop strategies for the destruction of PCBs and other persistent toxics in storage on a firm timetable.**

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Wingspread 97' Recommendations *con't*

- **The Parties in their regulatory protocols address all chemicals that mimic natural chemicals and interfere with human development and function.**

- **Harmonized standards should result in equal or greater testing stringency, not less; screening of chemicals should be harmonized regardless of the intended end use.**

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Wingspread 97' Recommendations *con't*

- **The standard screening protocol should include screening for persistence, toxicity, bioaccumlation potential and ability to disrupt human development and function.**

- **The Parties facilitate discussion of an International Research Institute to provide unbiased quality information on the effects of commercial/industrial chemicals on human development and function.**

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Wingspread 97' Recommendations *con't*

- The Commission sponsor efforts to facilitate harmonization of biomonitoring programs on the Great Lakes between the Parties.

- The Parties continue their on-going effort to identify and standardize biological indicators for human health, wildlife and plant health and environment quality.

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Persistent Toxic Substances (PTSs) in the Great Lakes Basin

- Organochlorine Compounds
  - Polychlorinated biphenyls (PCBs) - Mirex
  - Hexachlorobenzene (HCB) - Dieldrin
  - DDT and its metabolites - Toxaphene
  - Dioxins (2,3,7,8-TCDD) - Furans

- Heavy Metals
- Alkylated lead
- Methylmercury
- Polycyclic Aromatic Hydrocarbons
- Benzo[a]pyrene

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ATSDR Great Lakes Research Program

- Created by the Great Lakes Critical Programs Act of 1990

- Designed to characterize exposure and investigate the association between the consumption of contaminated Great Lakes fish and short- and long-term harmful health effects

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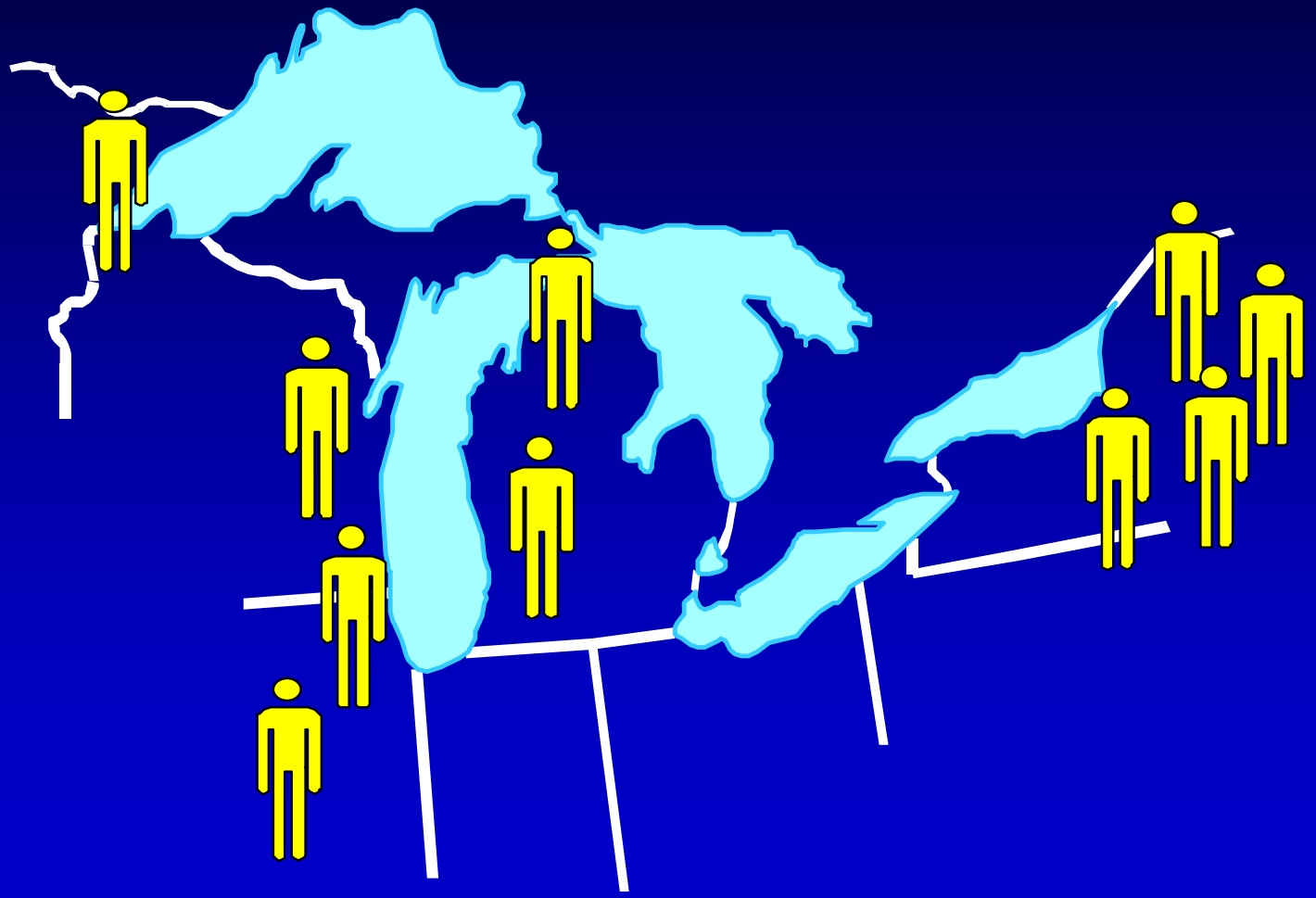
Great Lakes Basin



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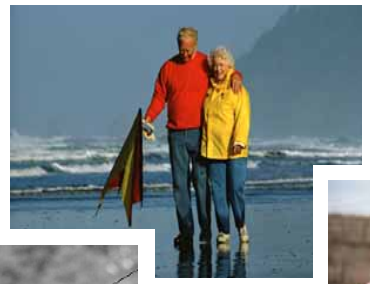
Vulnerable Populations

- Pregnant Females
- Nursing Mothers
- Fetuses and Nursing Infants
- Infants and Children
- American Indians
- Sport Anglers
- African-Americans
- Elderly



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Human Health Endpoints

- Behavioral
- Reproductive
- Endocrinologic
- Developmental
- Neurologic
- Immunologic

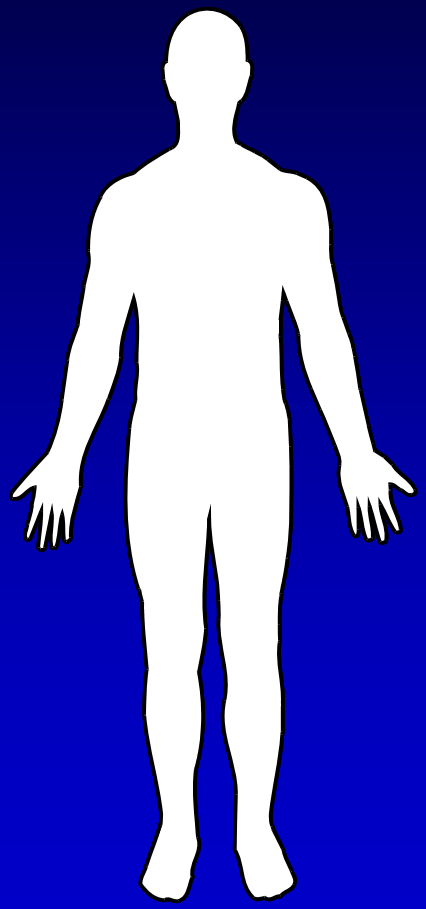

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Table of Effects

Behavioral	Developmental	Endocrine	Neurologic	Reproductive
Inability to respond to negative stimuli; greater number of abnormal reflexes; less mature autonomic responses; less attention to visual and auditory stimuli in newborns (Lonkey et al., 1996)	Increase risk for birth defects in males (Mendola et al., 2005) Low Birth Weight associated with elevated maternal PCB levels (Karmaus et al., 2004) Reduction in birth weight due to *in utero* exposure to PCBs (Weisskopf et al., 2004) Changes in sex ratio (Karmaus et al., 2002; Changes in sex ratio (Weisskopf et al., 2003)	Decreased levels of thyroxine in men and women and decreased levels of sex-hormone binding globulin bound testosterone in men (Persky et al., 2001) Decreased levels of free thyroxine and total thyroxine and increased levels of thyrotropin in children (Schell et al., 2004)	Immature nervous and autonomic responses (Lonkey et al., 1996) Poor performance on the Fagan Test of Intelligence at 6 and 12 months (Darvill et al., 2000) Negative performance on the McCarthy Test at 38 months (Stewart et al., 2003) Deficits in cognitive function at 3-4 years (Stewart et al., 2003)	Conception rate and the incidence of a live birth are lower in women who are high fish consumers (Courval et al., 1996; Buck et al., 2000) Reduction in menstrual cycle length (Mendola et al., 1997) In utero DDE exposure reduced age at menarche by 1 year (Vasiliu et al., 2004) In utero exposure to PCBs results in decrease in gestational age and low birth weight (Taylor et al., 1989)

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Table of Effects *con't*

Behavioral	Developmental	Endocrine	Neurologic	Reproductive
	Suboptimal development of the nervous system – splenium (Stewart et al., 2004)		Low IQ scores, 2 years behind in reading, poor short and long term memory, and difficulty paying attention (Jacobson and Jacobson, 1996)	
			Lower Scores on several measures of memory and learning (Schantz et al., 2003)	

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Conclusions

- **Benefits of fish consumption should be considered when evaluating the associated health implications**
- **At-risk populations are of particular concern because of their elevated exposures, physiologic sensitivity, or both**

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Conclusions *con't*

- **Health education is valuable in preventing potential effects and informing individuals about certain windows of vulnerability, e.g., pregnancy**
- **Pollution prevention strategies remain a key tool for reducing toxic chemical loading in sediments and fish**

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Future Directions/Recommendations

In the area of conducting research in the Great Lakes the expert panel recommended the following is needed:

- **Re-establish the ten cohorts of the Great Lakes program**
- **Establish a Web-based database management system (i.e., a "virtual institute") to be a central repository for all the Great Lakes research being conducted**
- **Synthesize the current work and build on the strengths of the existing programs**
- **Bring the experts together to discuss the issues associated with combining the cohort data and establish a plan to address them**

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Future Directions/Recommendations *con't*

In the area of exposure assessment the expert panel recommended the following is needed:

- **Focus on routes of exposure, and take a community-based approach to studying health effects**
- **Utilized the existing historic cohort data from the Great Lakes program**
- **Consider exposures through other pathways in addition to fish ingestion**
- **Conduct research on biologic markers for exposure in vulnerable populations**
- **Conduct research on mixtures of chemicals and their chemical interactions**
- **Relate wildlife effects and biomonitoring to human health effects**

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Future Directions/Recommendations *con't*

In the area of emerging chemicals the expert panel recommended the following is needed:

- **Investigate potential health effects from exposure to emerging chemicals of concern such as: polybrominated diphenyl ethers (PBDEs); perfluorosulfonates (PFOS); chlorinated naphthalenes and perchlorates to assess their impact on human health**

- **Investigate mixtures of these chemicals and their potential impact on human health**

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Future Directions/Recommendations *con't*

In the area of human health effects the expert panel recommended that additional research is needed through out different life stages:

- **Study the adverse health changes observed in exposed wildlife and relate them to effects being seen in the human population**
- **Conduct research of *in utero* exposures that potentially may cause adverse health impacts later in life**
- **Study multigenerational and transgenerational health effects, including reproductive status**
- **Investigate how childhood exposures might be related to diabetes and cardiovascular disease, and immune system dysfunction later in life**
- **Use the existing historic cohort data from the Great Lakes program**
- **Investigate less studied health effects in the historic Great Lakes cohort**

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Future Directions/Recommendations *con't*

In the area of surveillance the expert panel recommended that the following is needed:

- **Conduct health surveillance activities on the established cohorts**
- **Create a Great Lakes Basin Registry to capture pertinent information about the exposed populations**
- **Focus a syndromic surveillance study around the Areas of Concerns (AOCs) by correlating body burdens with environmental contaminant levels to discover potential health associations**
- **Continue to conduct hazard surveillance in the Great Lakes using the established cohort**

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Future Directions/Recommendations *con't*

In the area of health education and outreach activities the expert panel recommended the following is needed:

- **Does the risk outweigh the benefits/balancing the benefits with the risks of eating fish**
- **Evaluate the effectiveness of fish advisories**
- **Develop fish advisories that are culturally appropriate for specific populations**
- **Revise conflicting/confusing advice**
- **Conduct risk communication research with affected populations**
- **Translate research to show its relevance to people**
- **Target specific populations with a simple, direct message concerning fish advisories through television and/or the print media**

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Future Directions/Recommendations *con't*

- Create a list of questions that could realistically be answered if one had access to data from all 10 studies
- Establish a centralized laboratory to quality control purposes
- Promote the virtual public health institute as a research tool for surveying population health

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