Integration of Multiple Information Sources

A Discovery Process

Source Characterization

- **US point sources**
  - TRI (8050), PCS (2059),
- **Canada point sources**
  - NPRI (907), SIS/SRDS (42)
- **Tributaries**
  - STORET (1418), PWQMN (30), HYDAT
- **Atmospheric**
  - IADN, MDN

Table 6. Ontario Point Source discharge (SIS/SRDS) data summary

Category	Pollutant	Number of Facilities	Number of Observations	% > Reporting Limit
Organochlorine Compounds	DDT	0	0	0
	Mirex	0	0	0
	Dioxin	17	62	1.6
	Chlordane	0	0	0
	PCBs	15	37	0
Polyaromatic hydrocarbons	Anthracene	19	43	0
	Benz(a)anthracene	13	35	0
	Benzo(a)pyrene	19	69	0
	Benzo(b)fluoranthene	13	35	0
	Benzo(k)fluoranthene	13	35	0
	Benzo(ghi)perylene	19	43	0
	Chrysene	19	43	0
	Indeno(123-cd)pyrene	19	43	0
	Fluoranthene	19	43	0
Trace Metals	Mercury	21	143	12.6
	Lead	17	1514	73.2
Other Contaminants	Total Phosphorus	31	1530	83
	Nitrate-Nitrogen	13	41	73
	Fecal coliforms	1	8	25
	E. coli	1	30	47
	Suspended Sediments	40	7372	83.9

Table 5. US Point Source discharge (PCS) data summary

Category	Pollutant	Number of Facilities	Number of Observations	% > Reporting Limit
Organochlorine Compounds	DDT	3	127	2
	Mirex	0	0	0
	Dioxin	1	94	0
	Chlordane	0	0	0
	PCBs	15	926	5
Polyaromatic hydrocarbons	Anthracene	0	0	0
	Benz(a)anthracene	2	18	0
	Benzo(a)pyrene	5	59	7
	Benzo(b)fluoranthene	0	0	0
	Benzo(k)fluoranthene	0	0	0
	Benzo(ghi)perylene	0	0	0
	Chrysene	2	18	0
	Indeno(123-cd)pyrene	0	0	0
	Fluoranthene	3	260	0
Trace Metals	Mercury	170	7664	23
	Lead	214	11522	40
Other Contaminants	Total Phosphorus	591	47609	74
	Nitrate-Nitrogen	153	9883	92
	Fecal coliforms	388	17234	72
	E. coli	93	1994	75
	Suspended Sediments	945	98523	70

Table 17. Pollutant class, pollutant, percent detected, number of samples and sites, and number of sites within indicated range of samples per site for the Lake Erie basin in Ontario, 1986-96.

	Pollutant	Percent > Det. Limit	# samples	# sites	1-9	10-49	50-99	100-500	>500
Organo-chlorine compounds	DDT	0.07	2673	5	0	1	1	2	1
	Mirex	0	850	5	1	1	1	1	1
	Chlordane	0	976	5	0	2	0	2	1
	Dieldrin	0	850	5	1	1	1	1	1
	PCBs	0.2	899	5	0	2	1	1	1
PAHs	Benzo(a)pyrene	0	0	0	0	0	0	0	0
Metals	Mercury	15.2	1253	4	0	0	1	3	0
	Lead	14.6	2334	19	2	2	9	6	0
Others	Atrazine	70.3	791	3	0	1	0	1	1
	Nitrate-N	97.6	3534	29	2	3	11	12	1
	Total Phosphorus	99.8	3408	29	2	3	11	13	0
	Escherichia coli	76.9	338	27	5	22	0	0	0
	Suspended sediment	98.0	3383	29	1	4	12	12	0

Includes all observations reported as less than detected or with remark codes indicating the same.
(No., number; number of samples shown are only those sites located at downstream terminus of stream basin; >, greater than)

Pollutant class, pollutant, percentage detected, number of samples and sites, and number of sites within indicated range of samples per site, Lake Erie basin in the United States; 1986-1996.

Pollutant Class	Pollutant (STORET pcode)	Percent > detection limit	No. of samples	No. of sites	No. of sites within indicated range of samples per site				
					1-9	10-49	50-99	100-500	> 500
Organo-chlorine compounds	DDT (39300, 39310, 39320,39360, 39365, 39370)	11.2	596	93	88	4	0	1	0
	Mirex (39500)	0	141	77	73	4	0	0	0
	Chlordane (39350)	0	117	9	4	4	1	0	0
	Dieldrin (39380)	23.6	199	93	88	4	1	0	0
	PCBs (39488-39516, 34671, 81648, 81649)	0.1	1,112	89	79	5	1	4	0
PAHs	Benzo(a)pyrene (34247)	0	196	120	116	4	0	0	0
Trace metals	Mercury (71900)	17.4	3,197	312	228	74	2	8	0
	Lead (01051)	46.2	10,433	1,141	972	120	30	19	0
Other Contaminants	Atrazine (39632, 39033)	85.6	938	11	4	2	0	5	0
	Nitrate-N (00630, 00631)	94.6	32,607	1,417	1,181	153	32	38	13
	Total Phosphorus (00665)	95.5	35,078	1,435	1,175	162	44	41	13
	Escherichia coli (31633, 31648)	99.8	1,503	35	9	16	7	3	0
	Suspended sediment or Total Nonfilterable Residue (00530, 70300, 80154)	89.8	29,477	1,418	970	336	46	59	7

(STORET, Storage and Retrieval system for environmental data in the United States; pcode, parameter code; a data label that identifies a specific chemical compound, physical property, characteristic, or biological property, and indicates how it was analyzed; >, greater than); no. = number;
[1]Includes all observations reported as less than detected or with remark codes indicating the same.
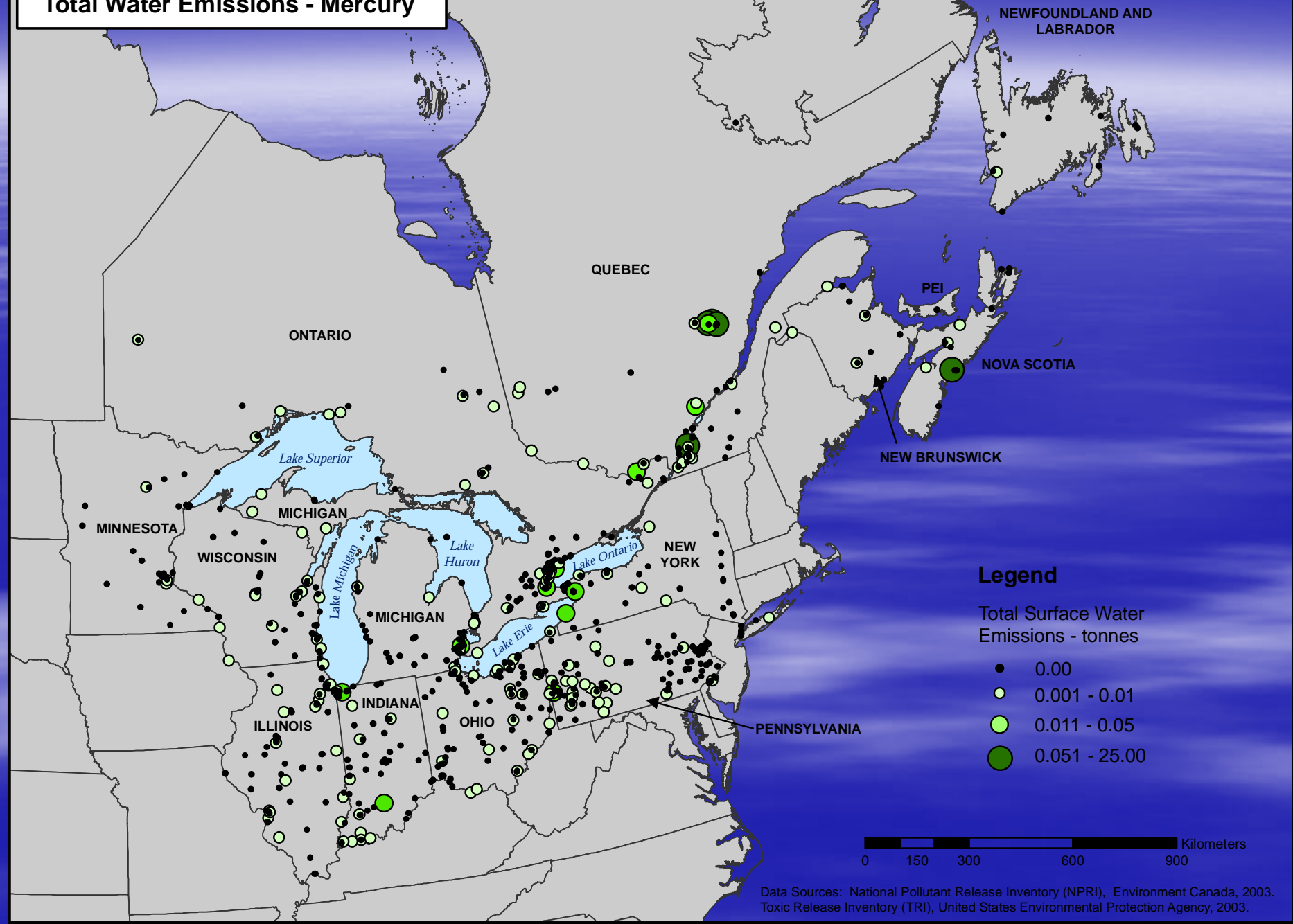
Conclusions

- Existing tributary and point source information inadequate for the computation of loads to Lake Erie for Critical Pollutants
- Existing data should be evaluated for source trackdown potential

Future Direction
Source Information

- Source analysis identifies known or "reported" critical pollutant discharges

NPRI and TRI Data
Total Water Emissions - Mercury

NEWFOUNDLAND AND LABRADOR

QUEBEC

PEI

NOVA SCOTIA

NEW BRUNSWICK

ONTARIO

Lake Superior

MICHIGAN

MINNESOTA

WISCONSIN

Lake Michigan

Lake Huron

MICHIGAN

Lake Ontario

NEW YORK

Lake Erie

ILLINOIS

INDIANA

OHIO

PENNSYLVANIA

Legend

Total Surface Water Emissions - tonnes

- ● 0.00
- ◉ 0.001 - 0.01
- ● 0.011 - 0.05
- ● 0.051 - 25.00

Kilometers

0   150   300   600   900

Future Direction
Ambient Monitoring Information

- Have we monitored environmental quality in areas which we would suspect could be contaminated based on proximity to sources?

- Can the environmental quality be explained by known upstream sources?

EXPLANATION

Mercury in bed sediments relative to biological effect levels*; data points overlain in chronological order

○ Not detected; detection limit equal to or greater than the TEL

● Less than the TEL

● Equal to or greater than the TEL and less than the PEL

● Equal to or greater than the PEL and less than 10 times the PEL

● Equal to or greater than 10 times the PEL and less than 100 times the PEL

* Threshold Effect Level (TEL) = 0.174 mg/kg
  Probable Effect Level (PEL) = 0.486 mg/kg