

The Atmospheric Transport and Deposition of Mercury to the Great Lakes



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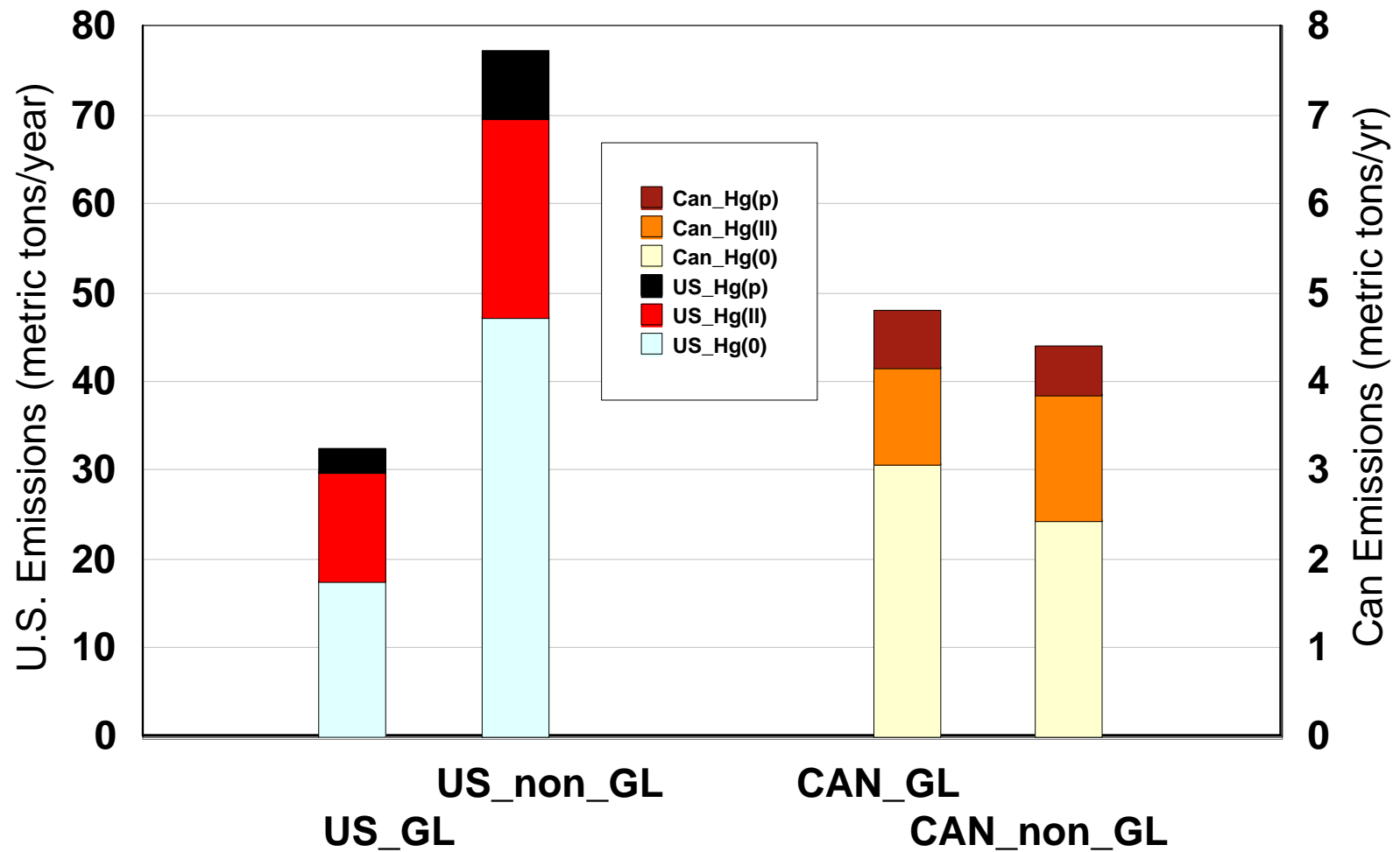
Collection of Graphics for
IJC Air Quality Advisory Board
April 16, 2004

Methodology

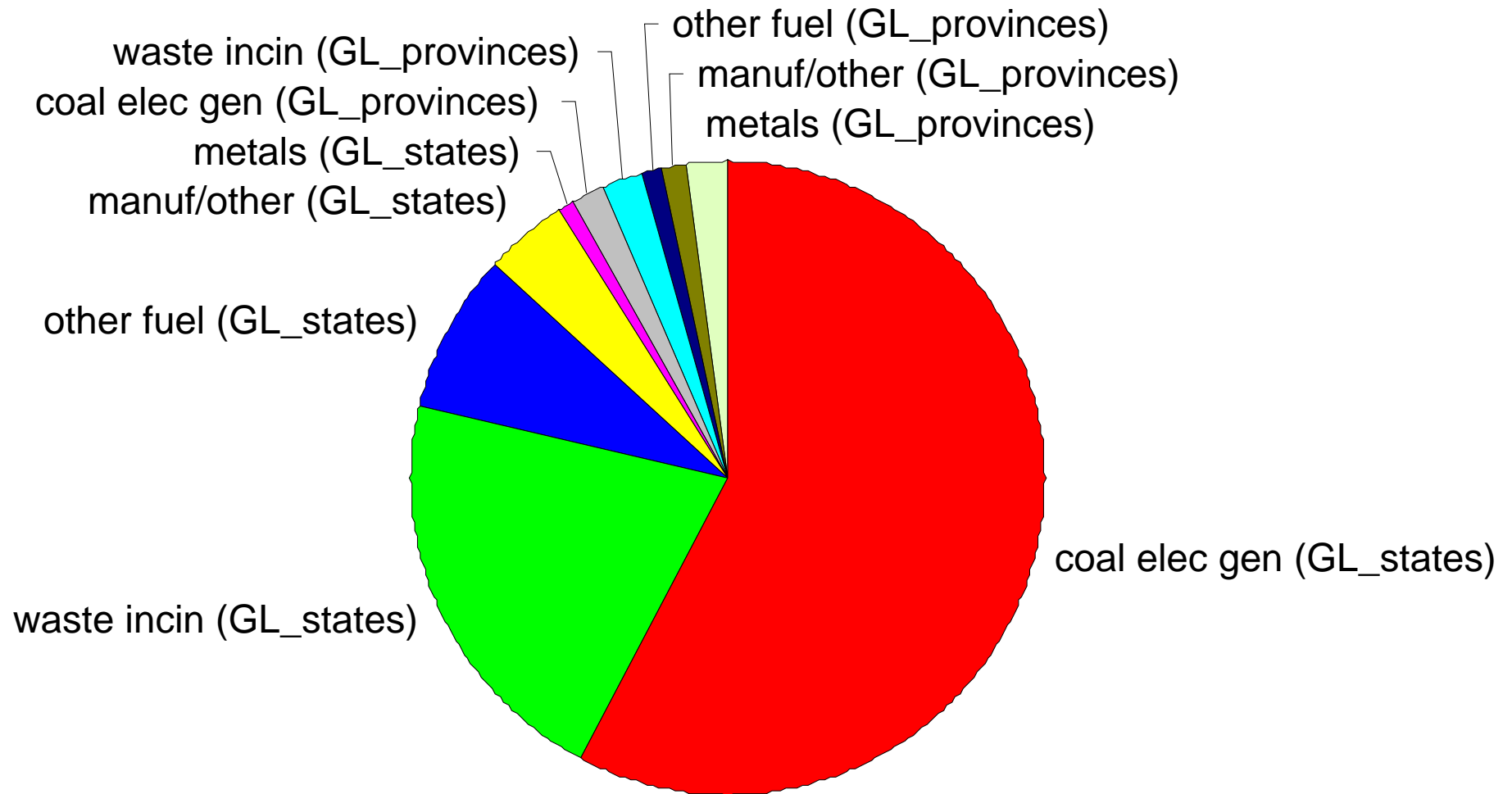
- Modeling methodology outlined in Cohen *et al.*, 2004;
 - The same 1996 meteorology was used in this new analysis, with updated emissions inventory data
 - Only inventoried anthropogenic sources in the U.S. and Canada are considered
- U.S. point and area source emissions from EPA 1999 National Emissions Inventory
 - Top contributing sources checked and updated using Great Lakes Regional Toxics Inventory and other sources
 - Mobile source emissions estimates from 1996 NEI (no 1999 data available)
- Canadian point and area source emissions from 1995 Environment Canada inventory
 - Top contributing sources updated using 2000 NPRI

**Mercury
Emissions
Inventory**

Anthropogenic Mercury Emissions from U.S. and Canadian Great Lakes States/Provinces and other States/Provinces

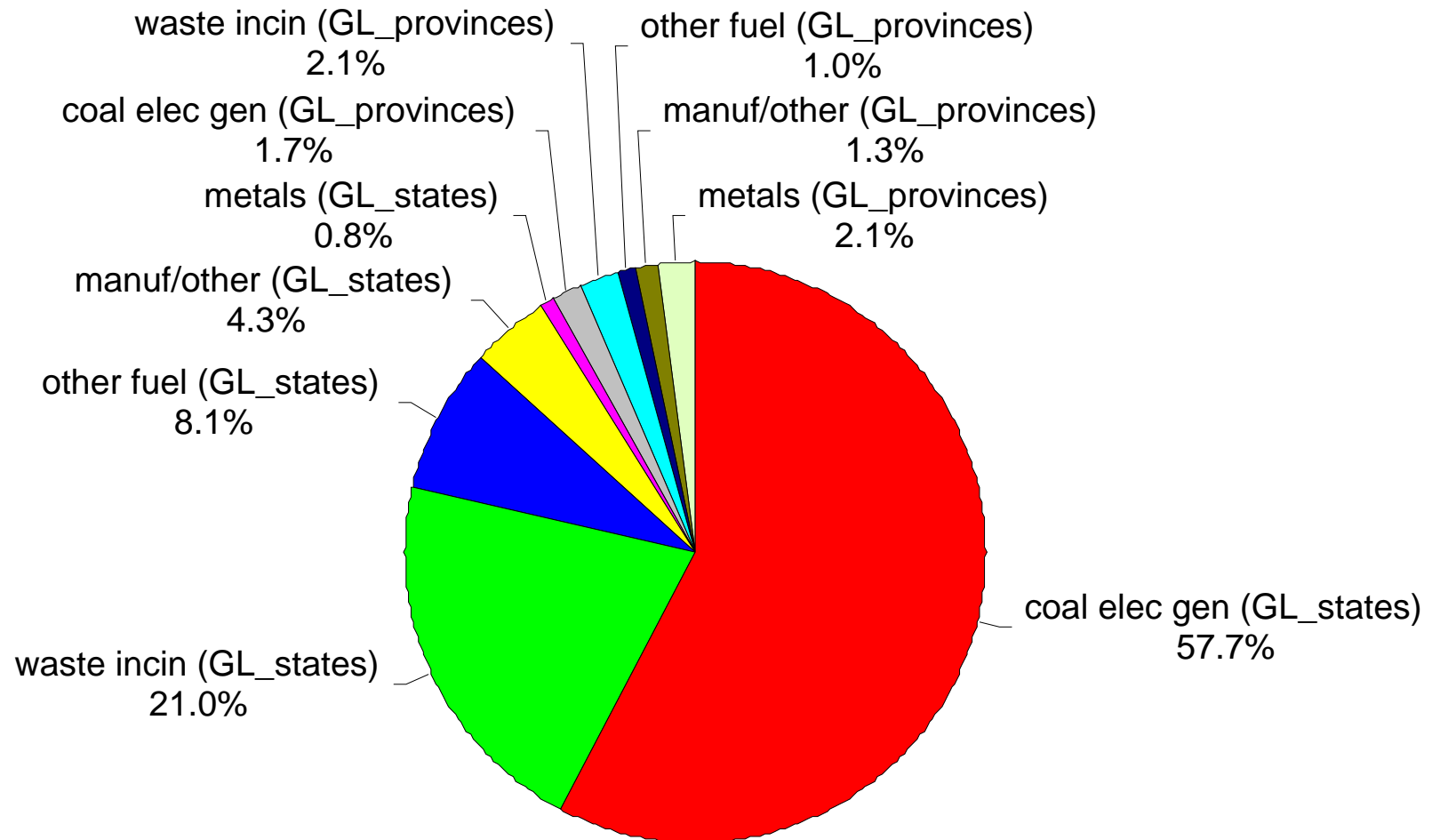


Emissions of Ionic Mercury (RGM) from Different Anthropogenic Source Sectors in Great Lakes States and Provinces (~1999-2000)
[Total RGM emissions = 13.4 metric tons/year]



Emissions of Ionic Mercury (RGM) from Different Anthropogenic Source Sectors in Great Lakes States and Provinces (~1999-2000)

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Emissions of Ionic Mercury (RGM) from Different Anthropogenic Source Sectors in Great Lakes States and Provinces (~1999-2000)
[Amounts (kg/yr) shown]

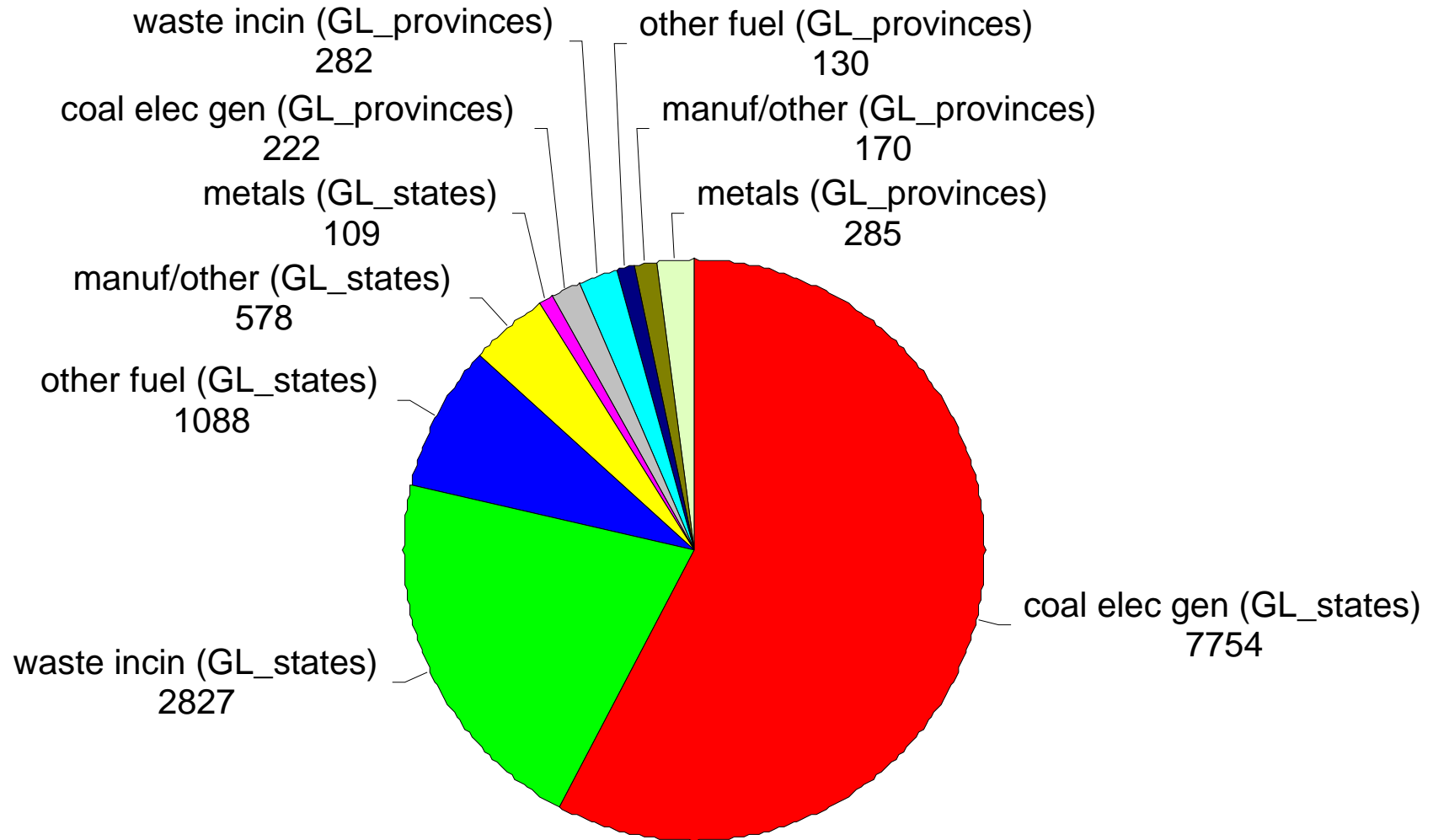


Figure 2. Estimated 1999 U.S. Atmospheric Anthropogenic Mercury Emissions

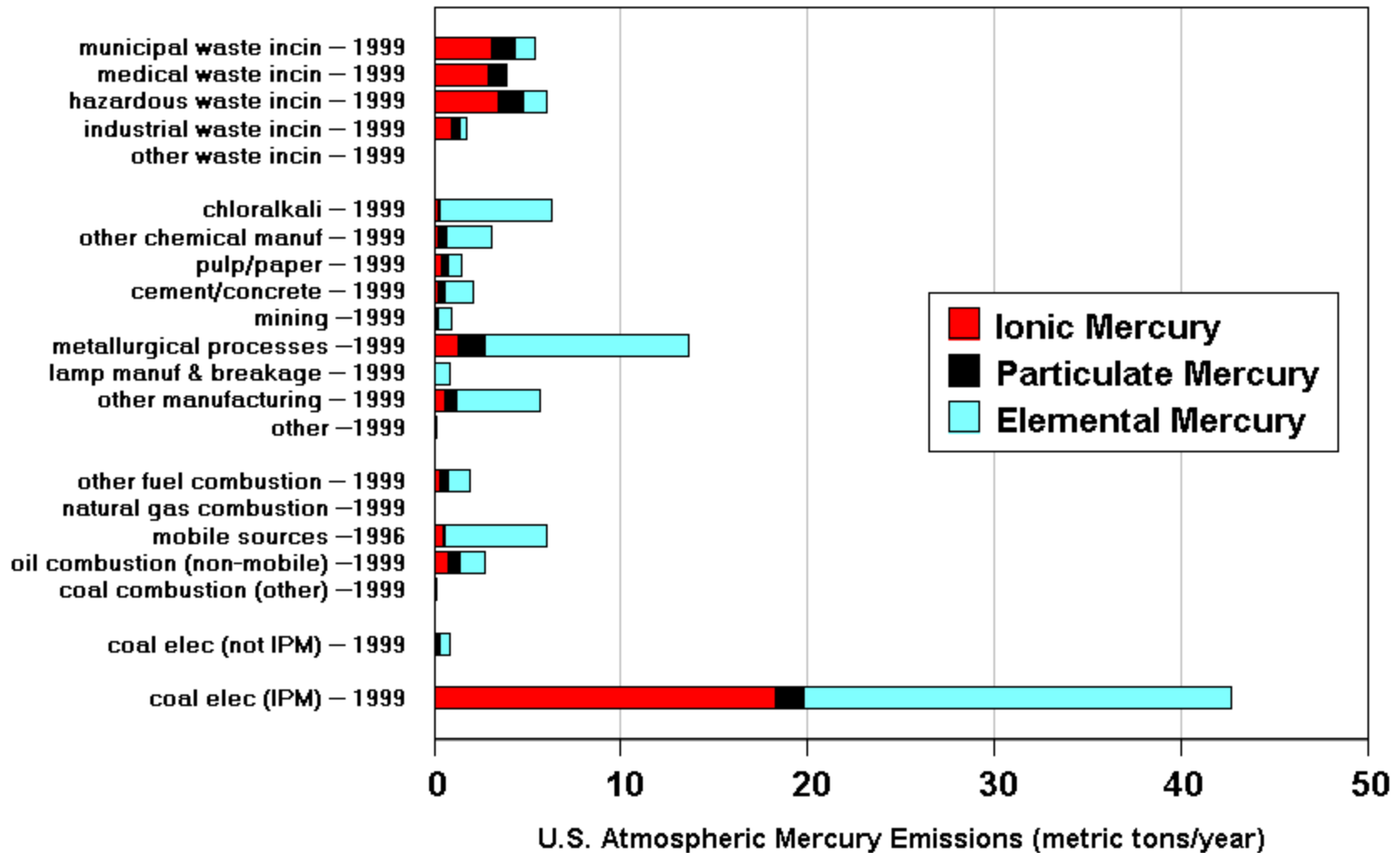


Figure 3. Estimated Speciation Profile for 1999 U.S. Atmospheric Anthropogenic Mercury Emissions

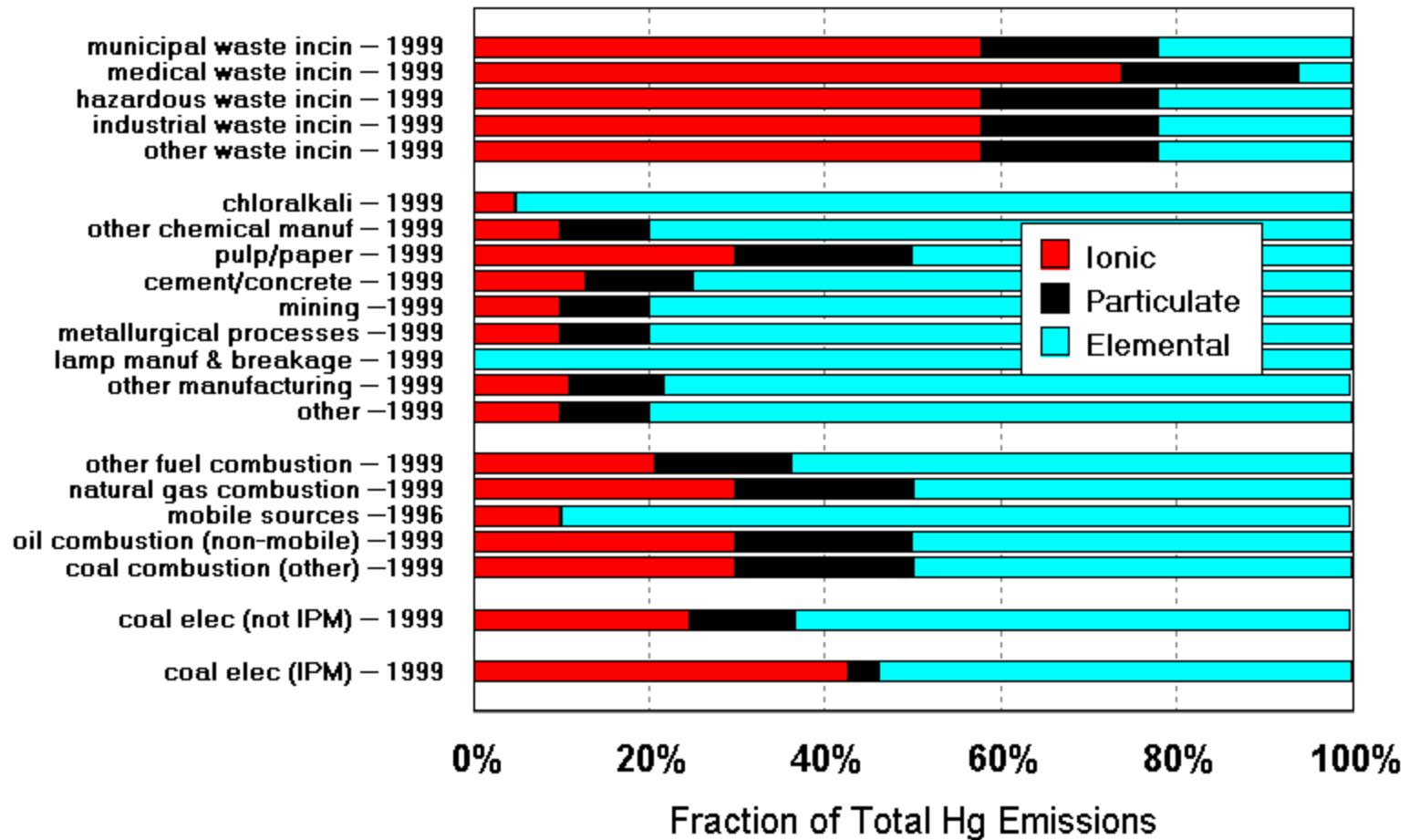


Figure 4. Estimated 2000 Canadian Atmospheric Anthropogenic Mercury Emissions

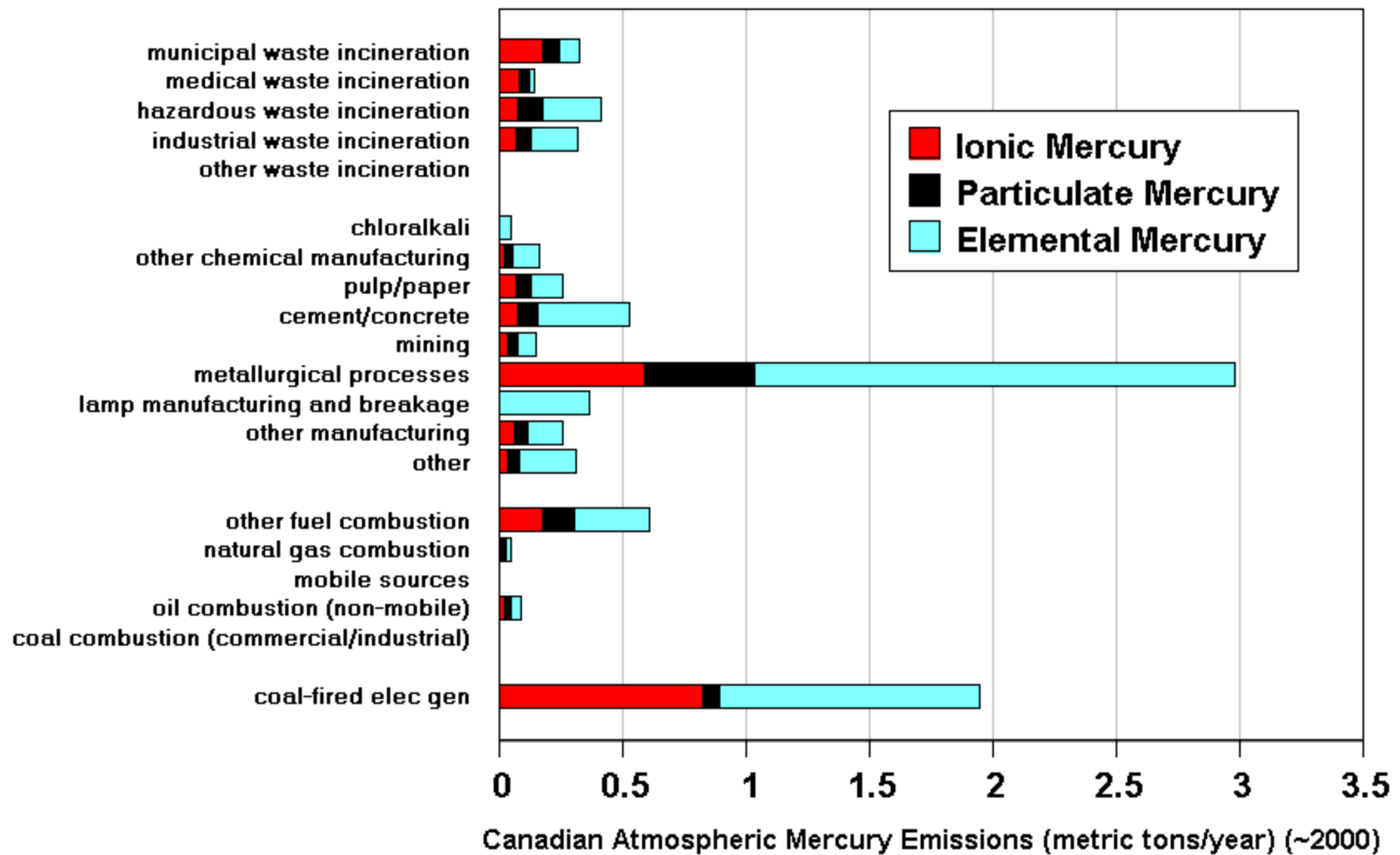
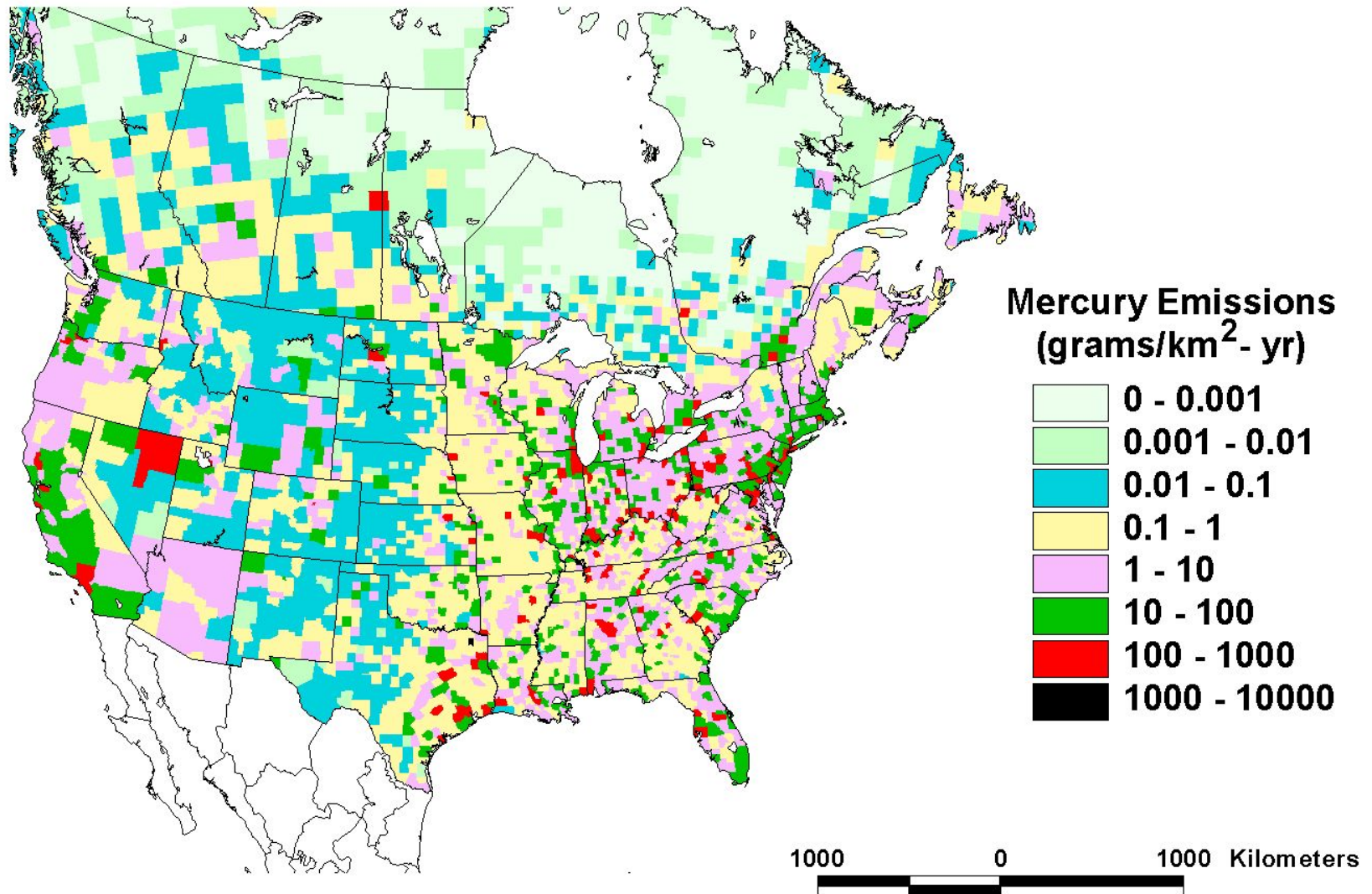


Figure 5. Geographic Distribution of Estimated Anthropogenic Mercury Emissions in the U.S. (1999) and Canada (2000)



**Overall
Summary of
Results
Obtained
to Date**

Figure 1. Receptors Analyzed in Present Study



Figure 11. Mercury deposition at selected receptors arising from 1999 emissions from anthropogenic sources in the United States and Canada. Percentage labels are the fraction of this deposition arising from U.S. coal-fired electricity generation facilities

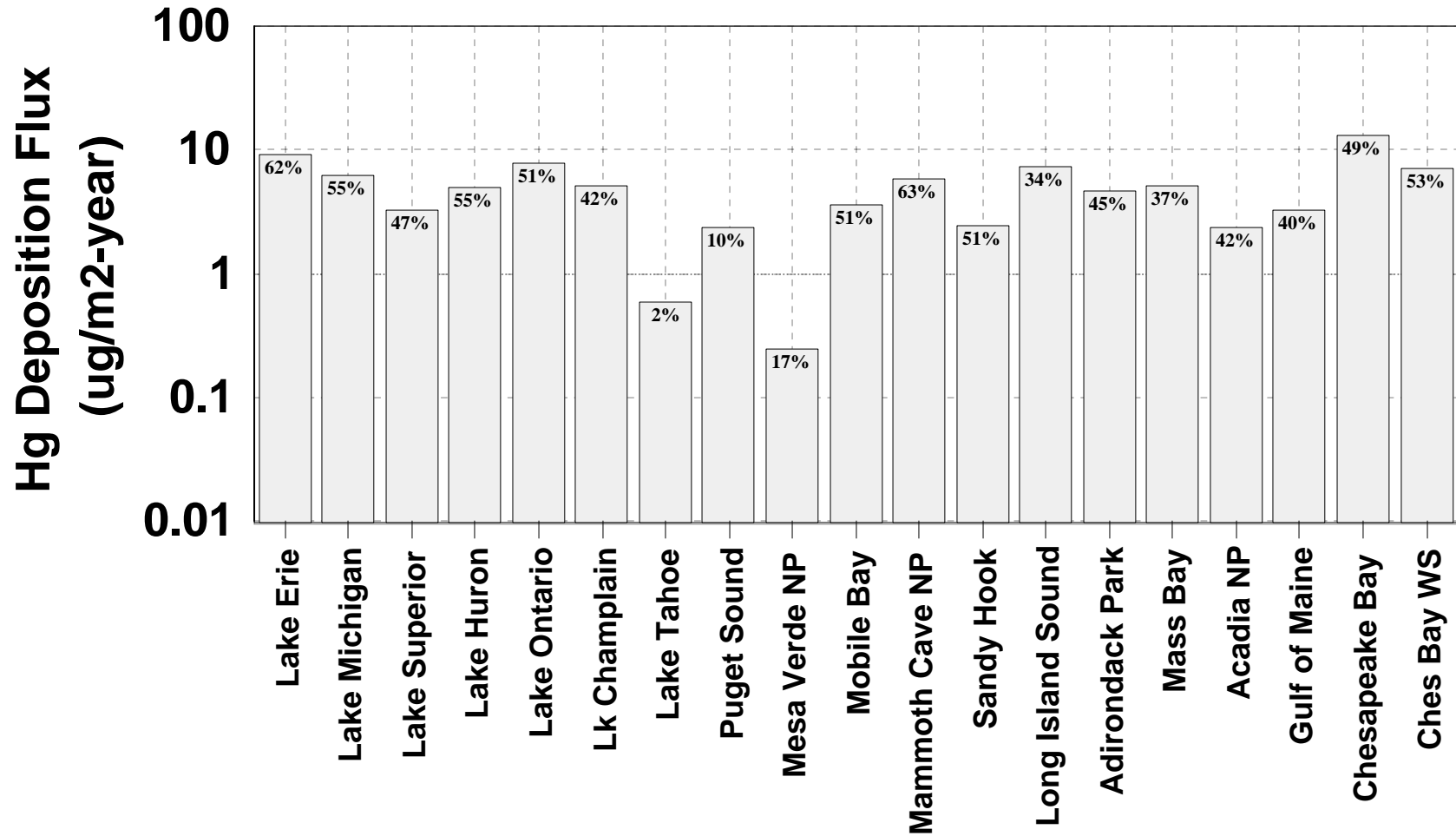


Figure 12-A. Mercury deposition at selected receptors arising from 1999 emissions from anthropogenic sources in the United States and Canada. Percentage labels are the fraction of this deposition arising from U.S. “IPM” coal-fired electricity generation facilities

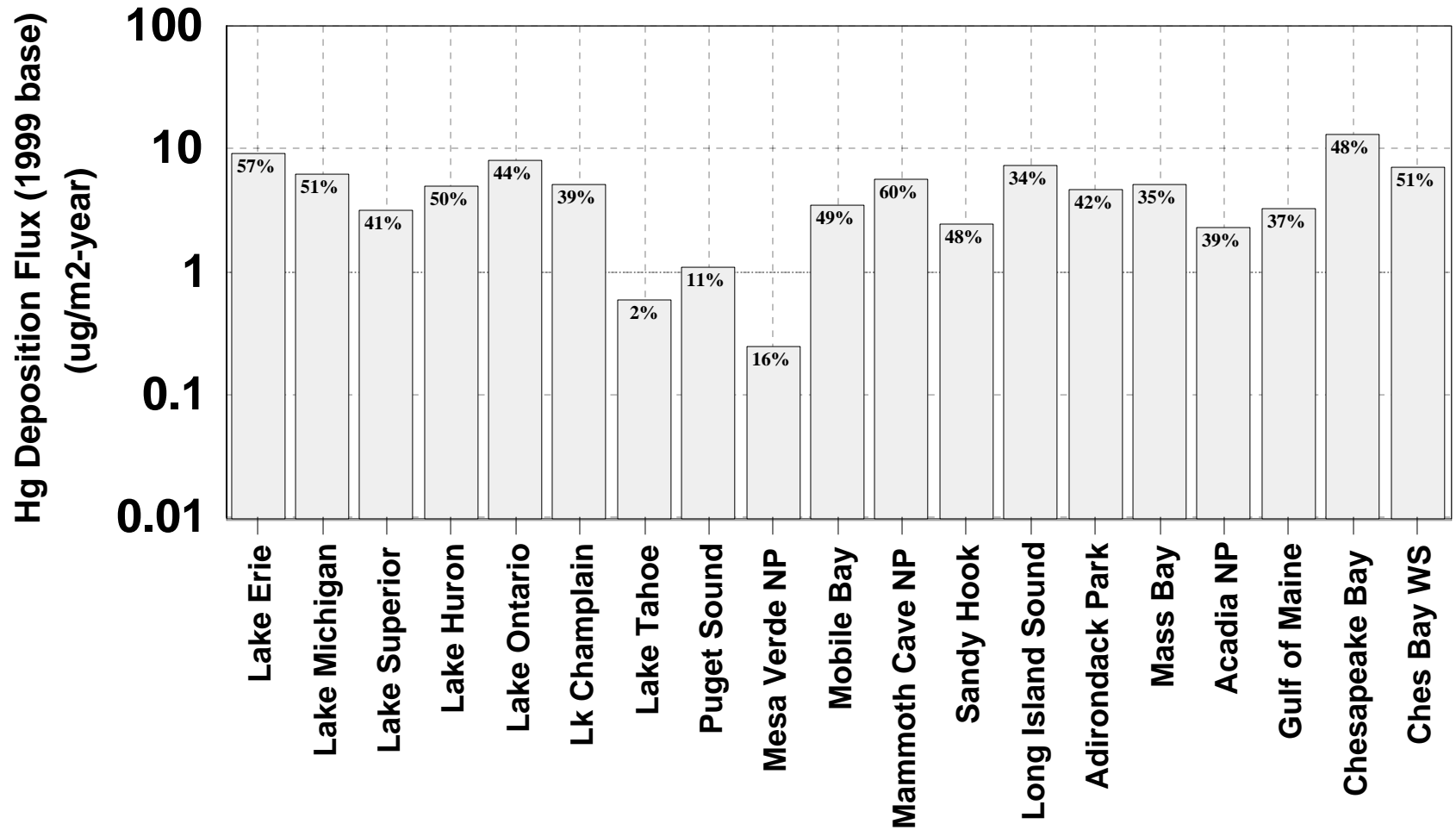


Figure 13-A. Mercury deposition at selected receptors arising from 1999 base-case emissions from anthropogenic sources in the United States and Canada (IPM coal fired plants are large coal-fired plants in the U.S. only)

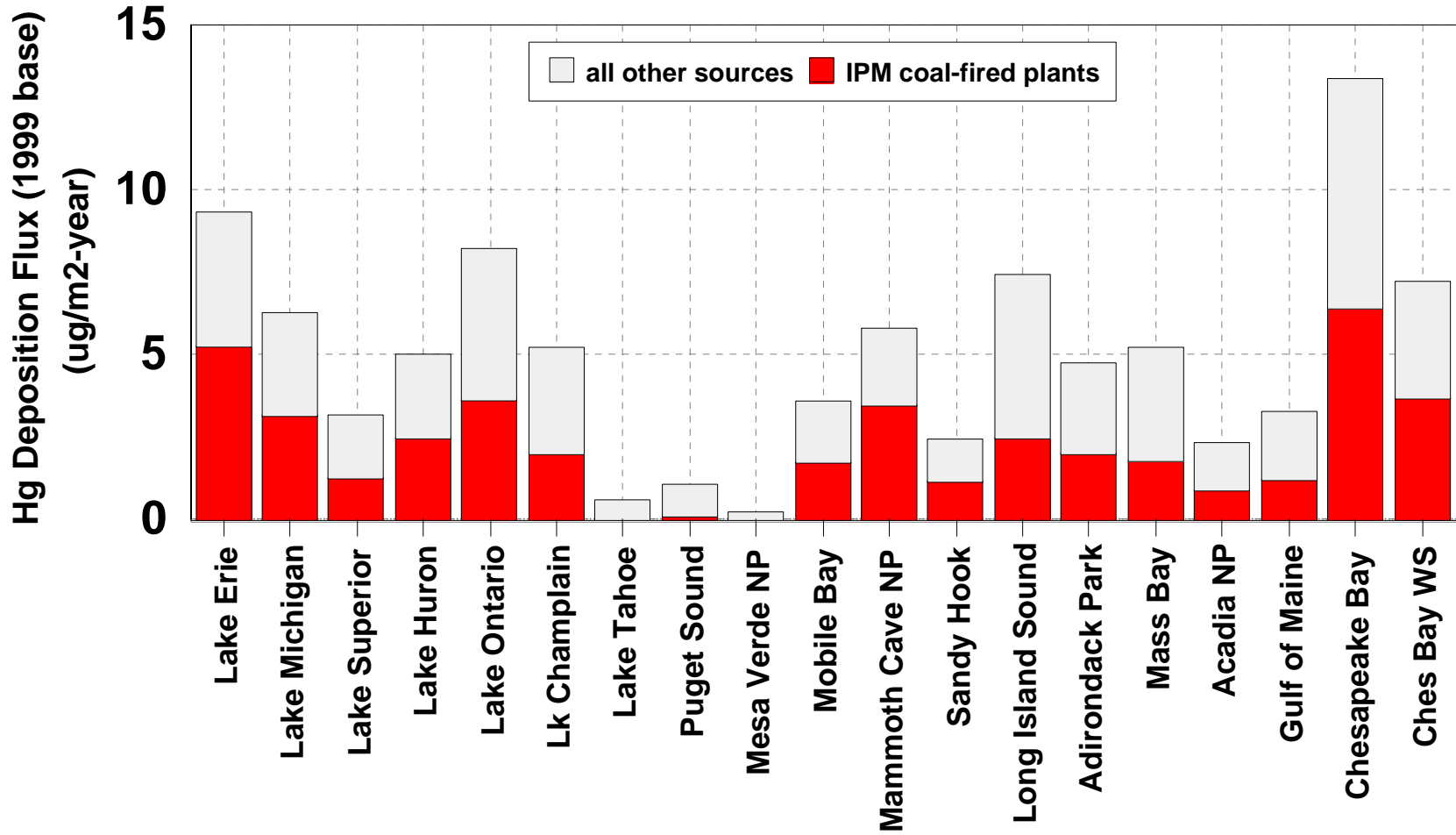
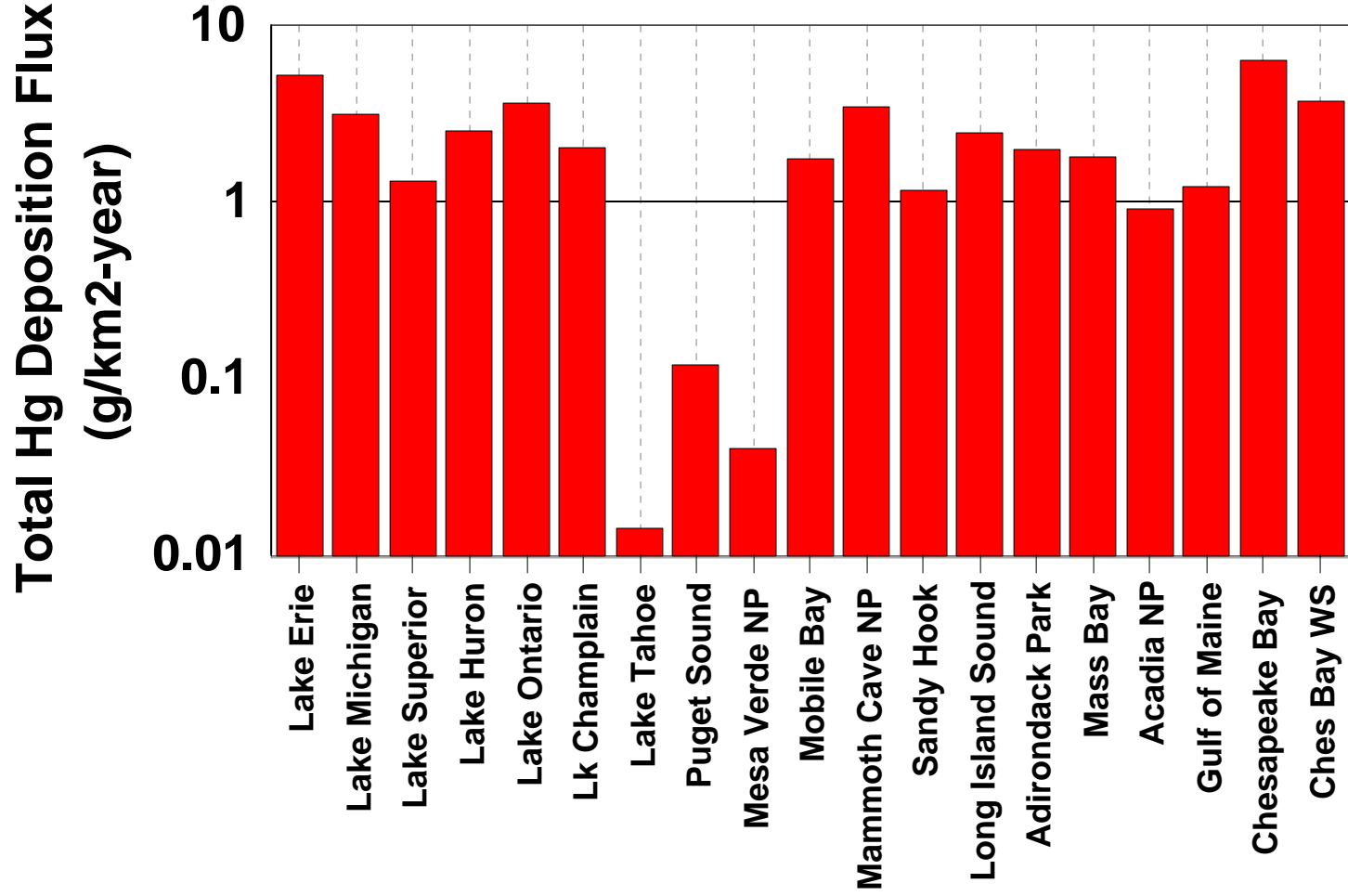
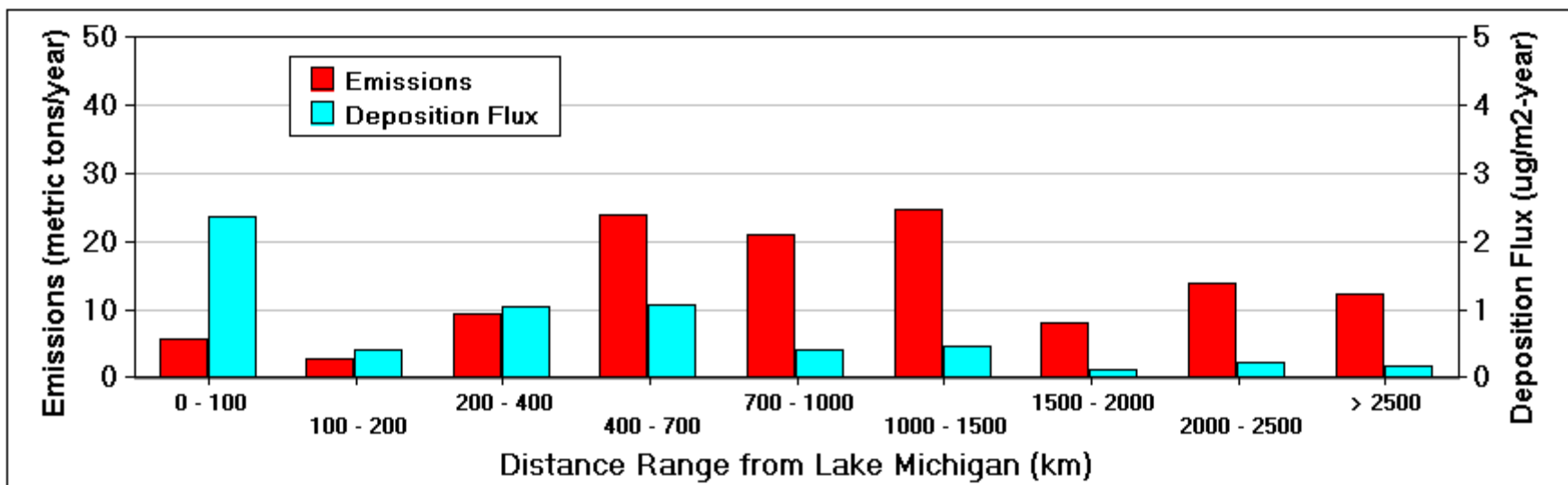
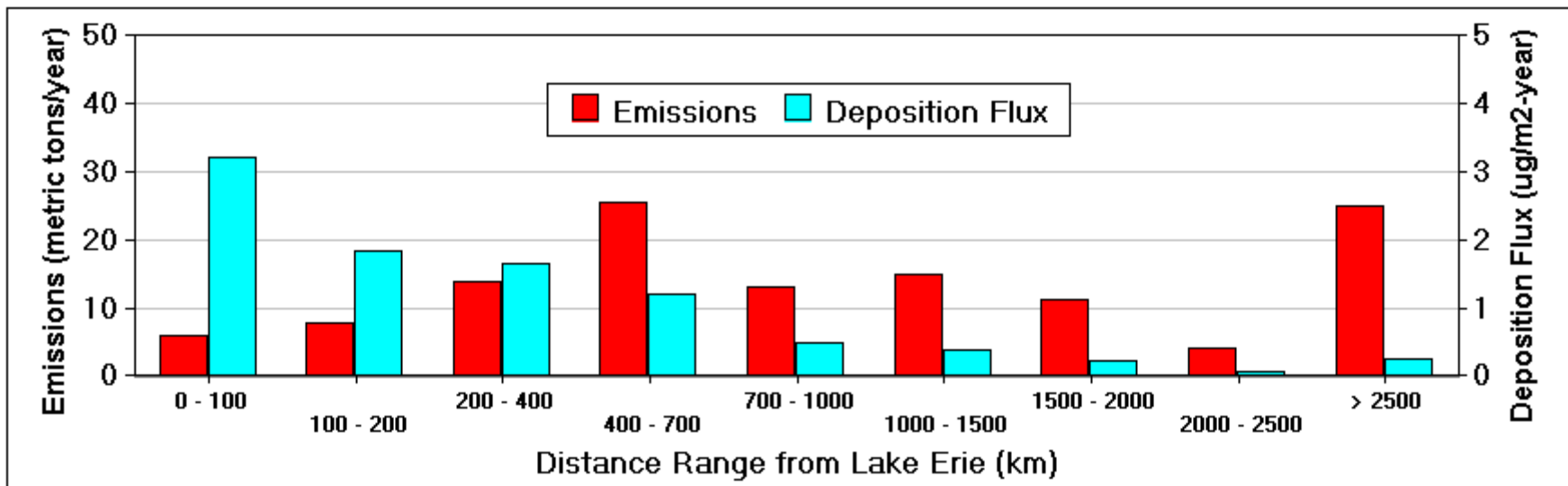
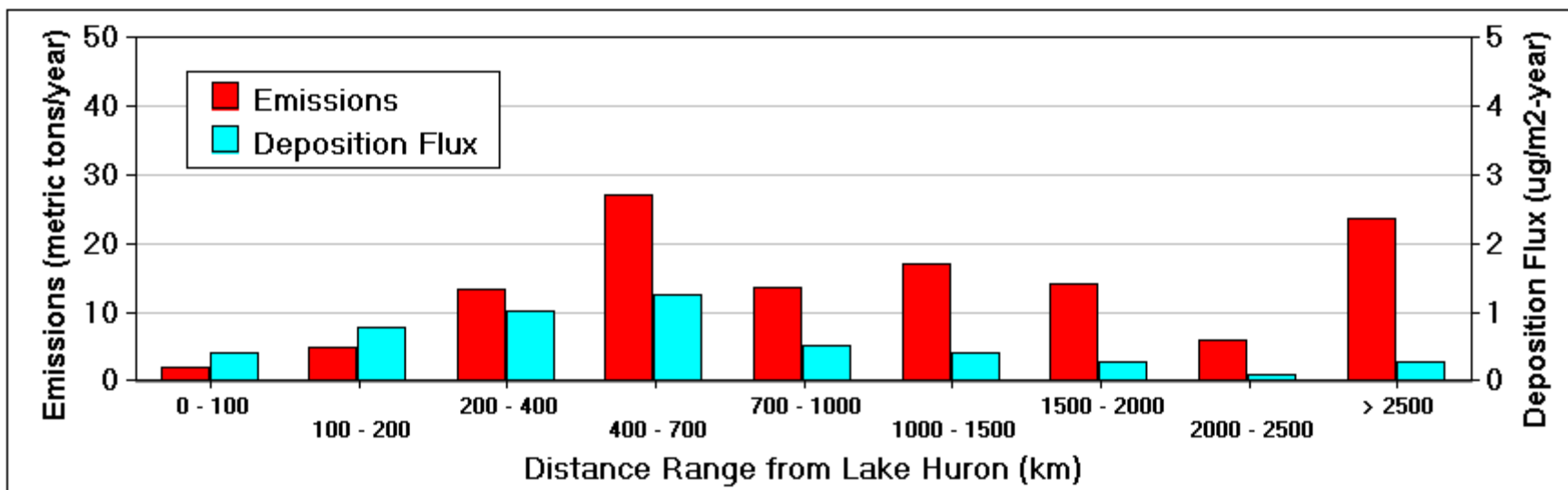
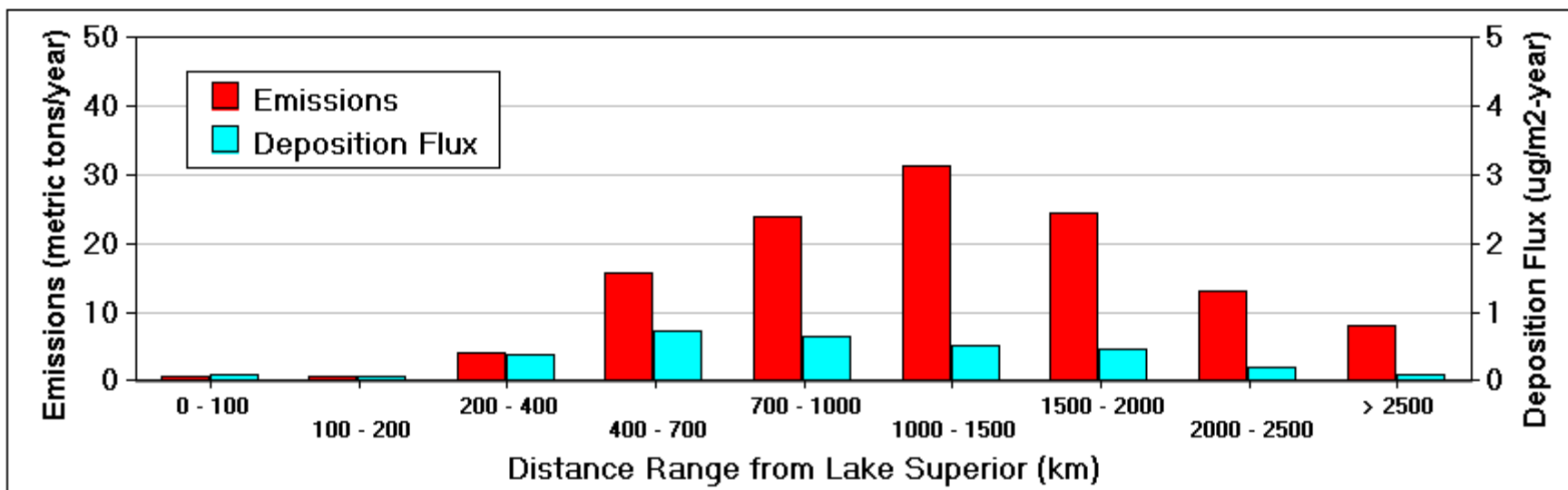


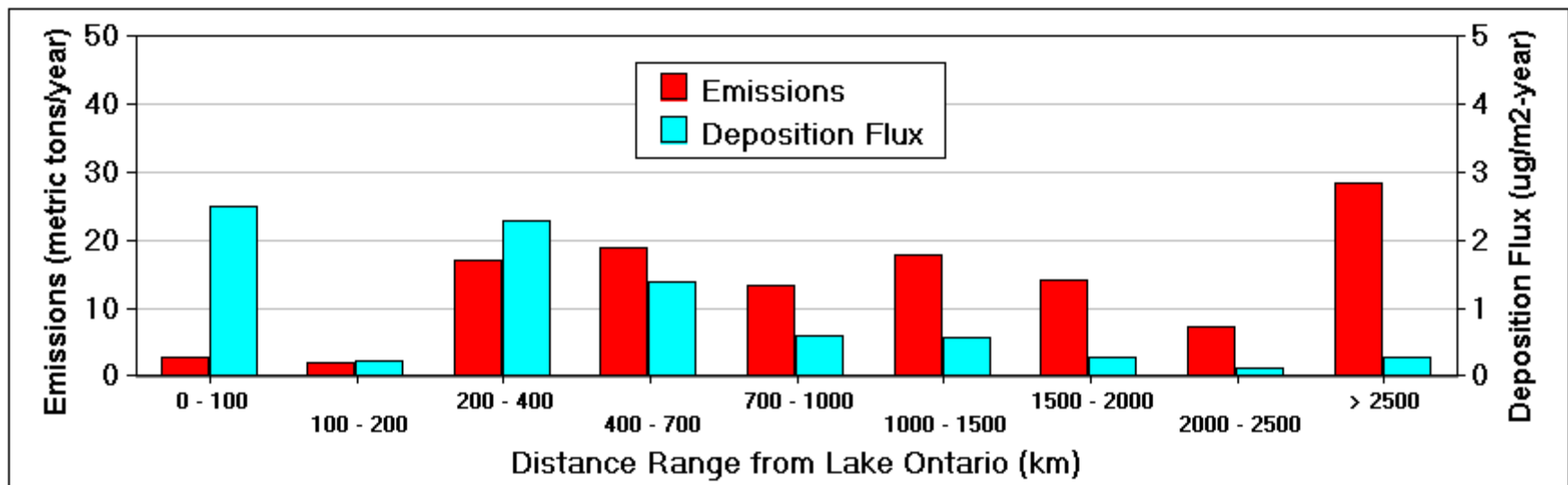
Figure __. Hg Deposition From U.S.
Coal-Fired Power Plants in 1999



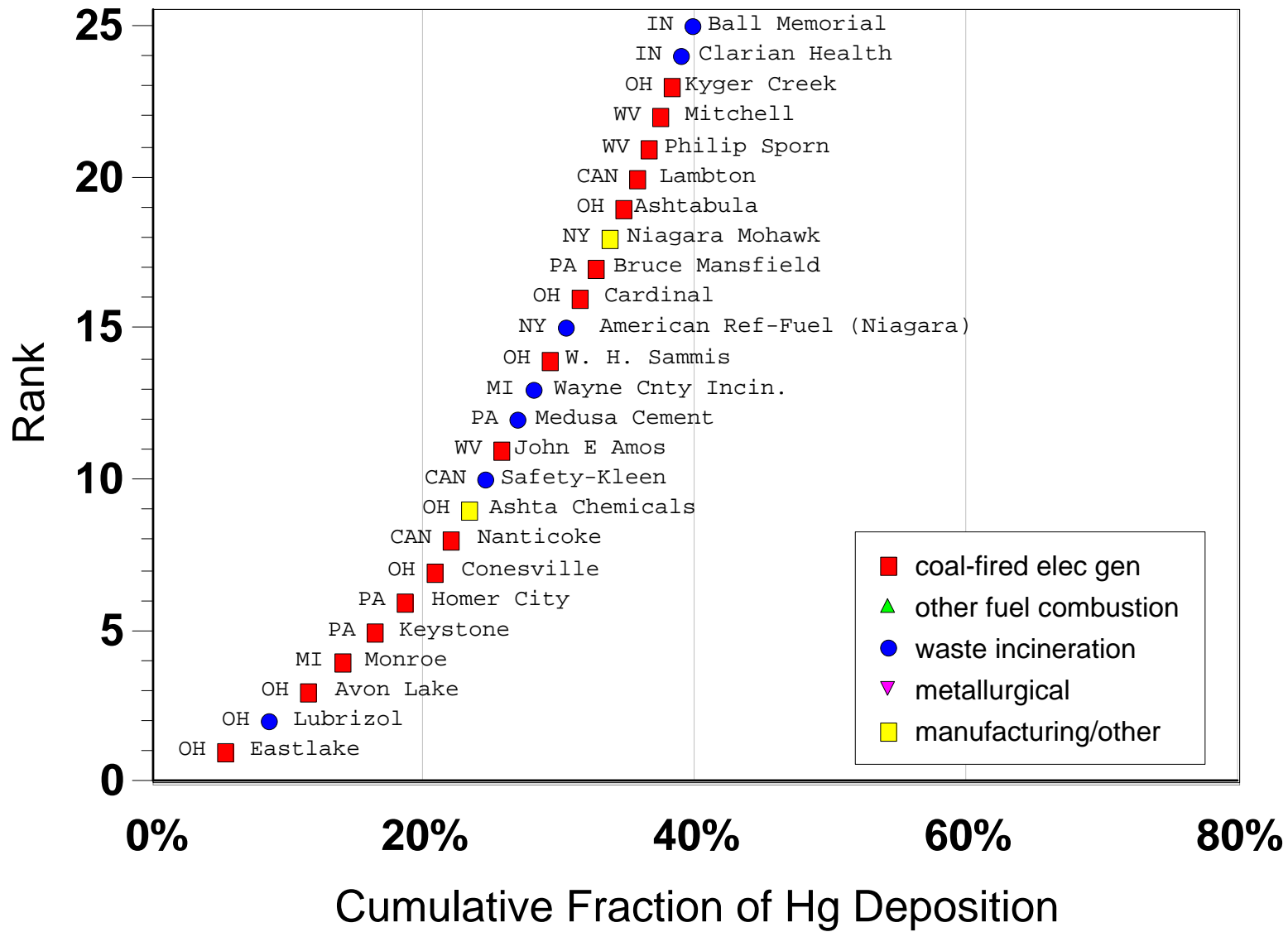
**Overall
Summary of
Great Lakes
Results**



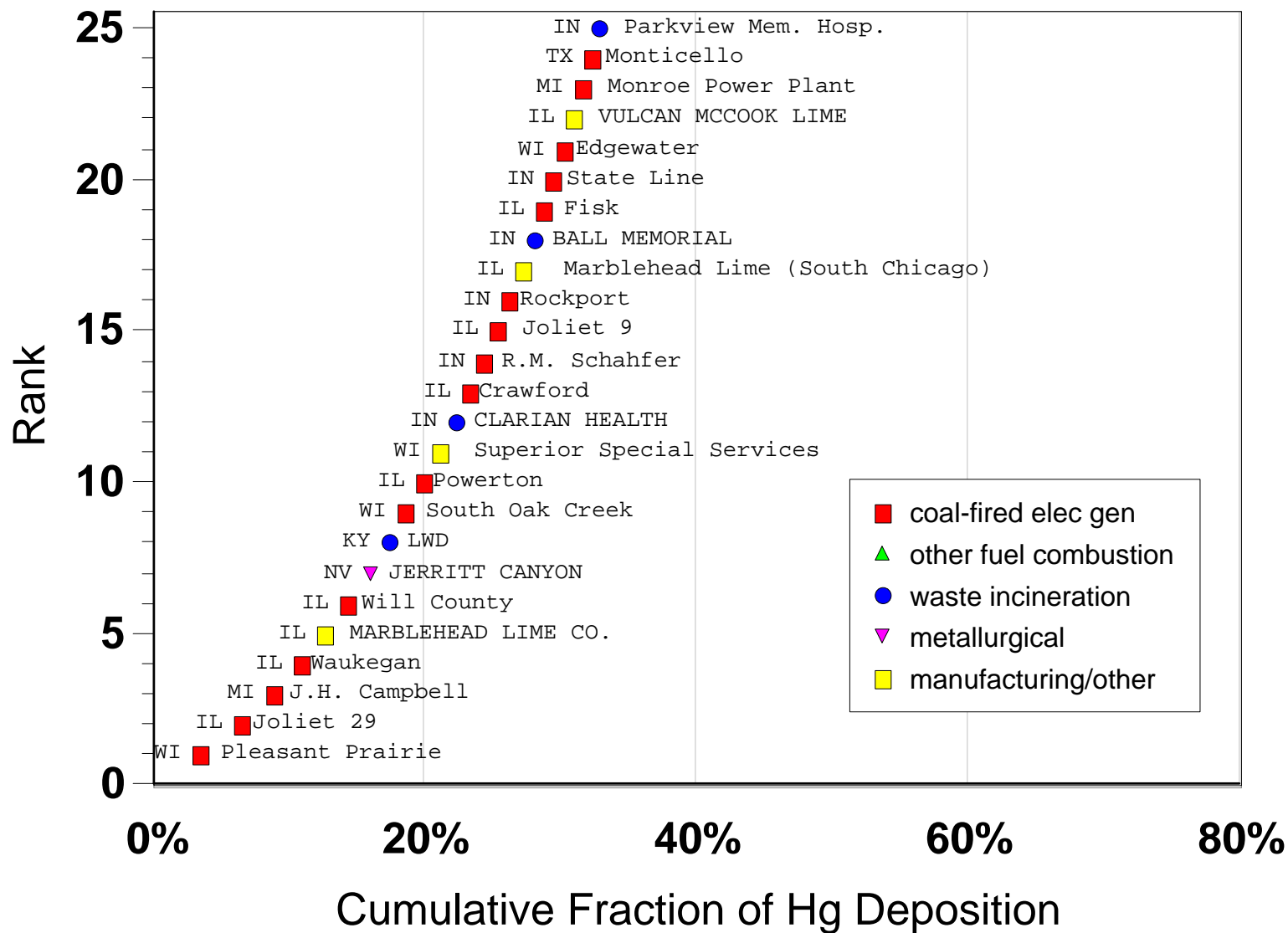




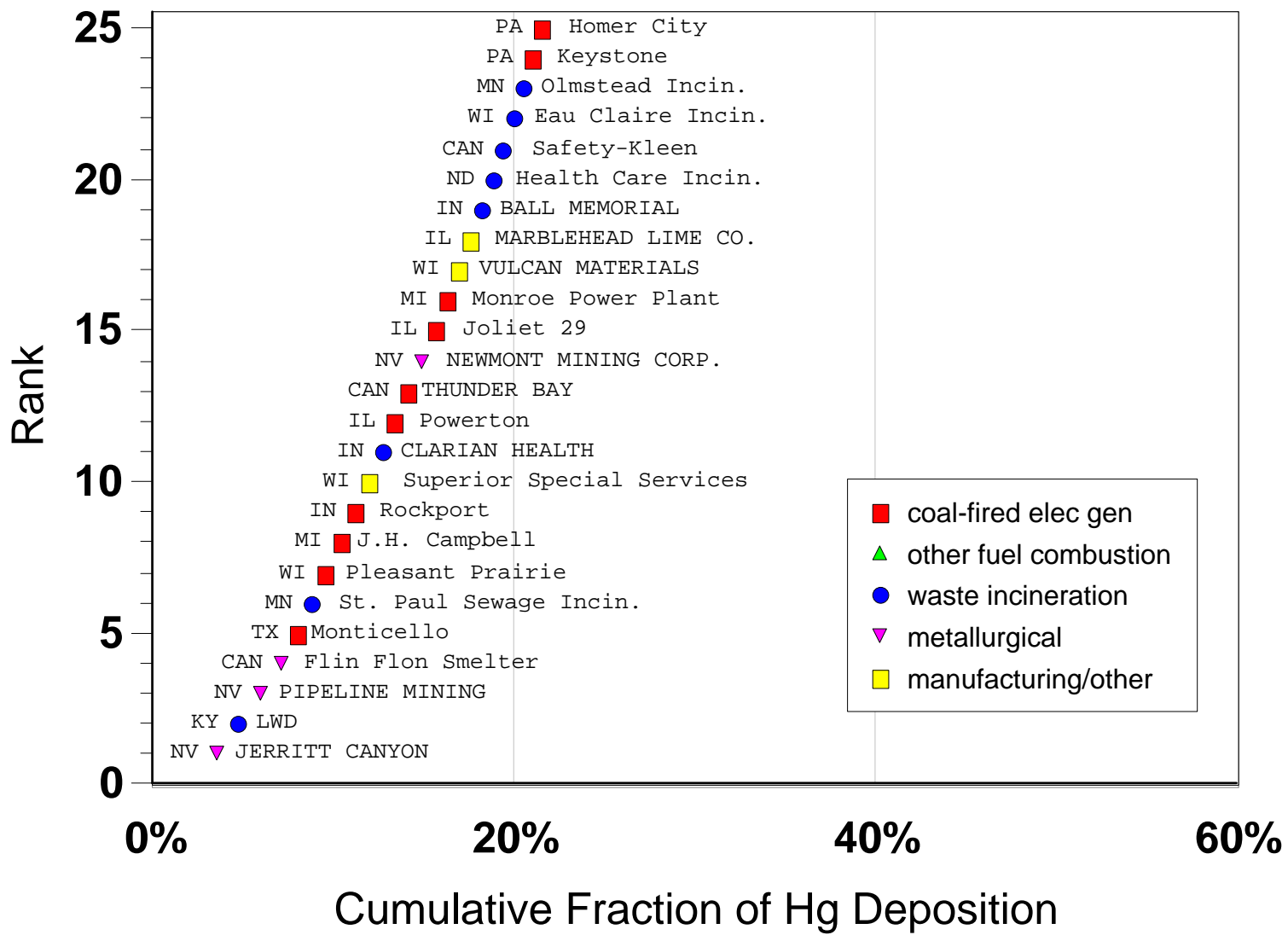
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Erie



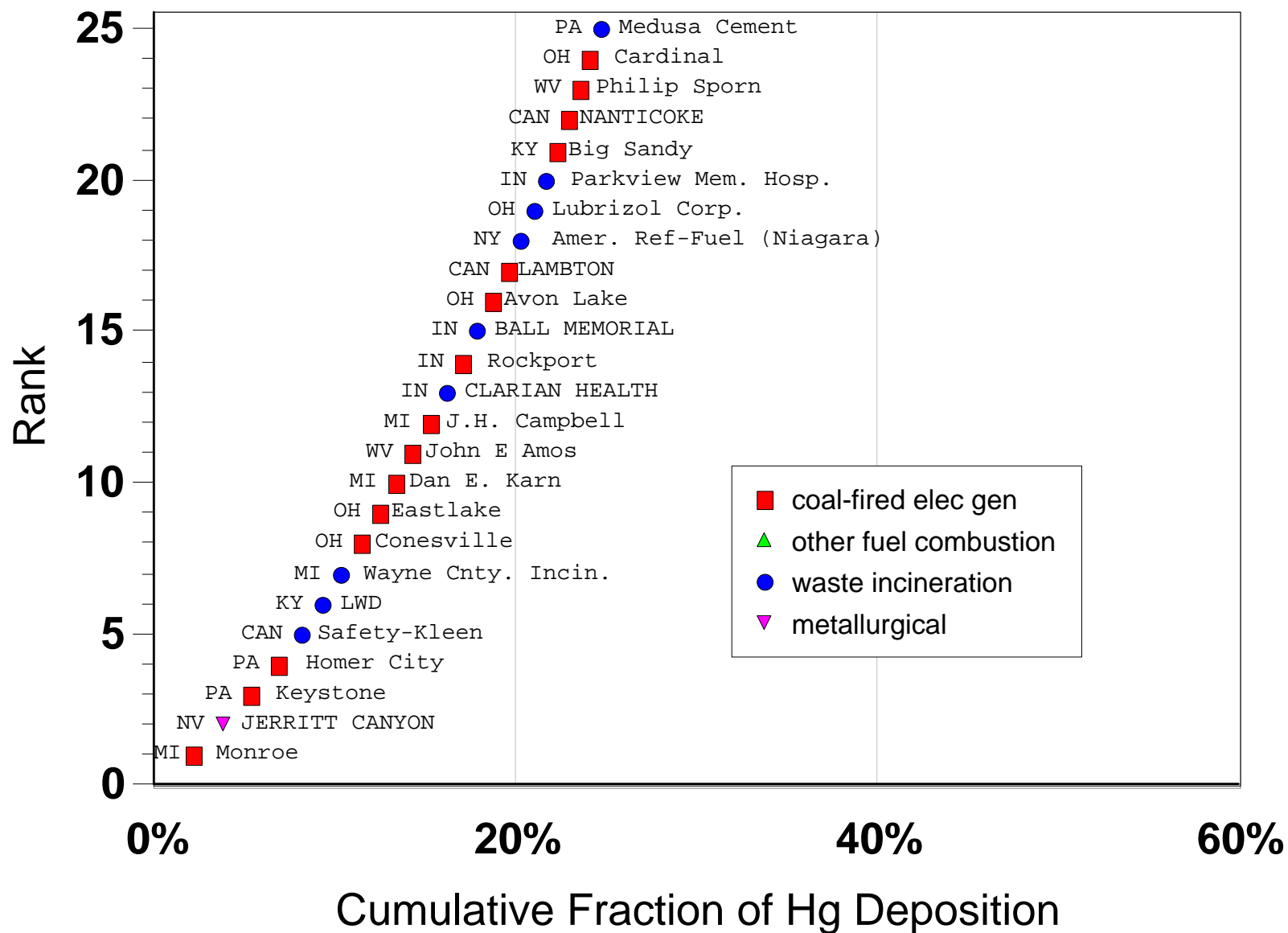
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Michigan



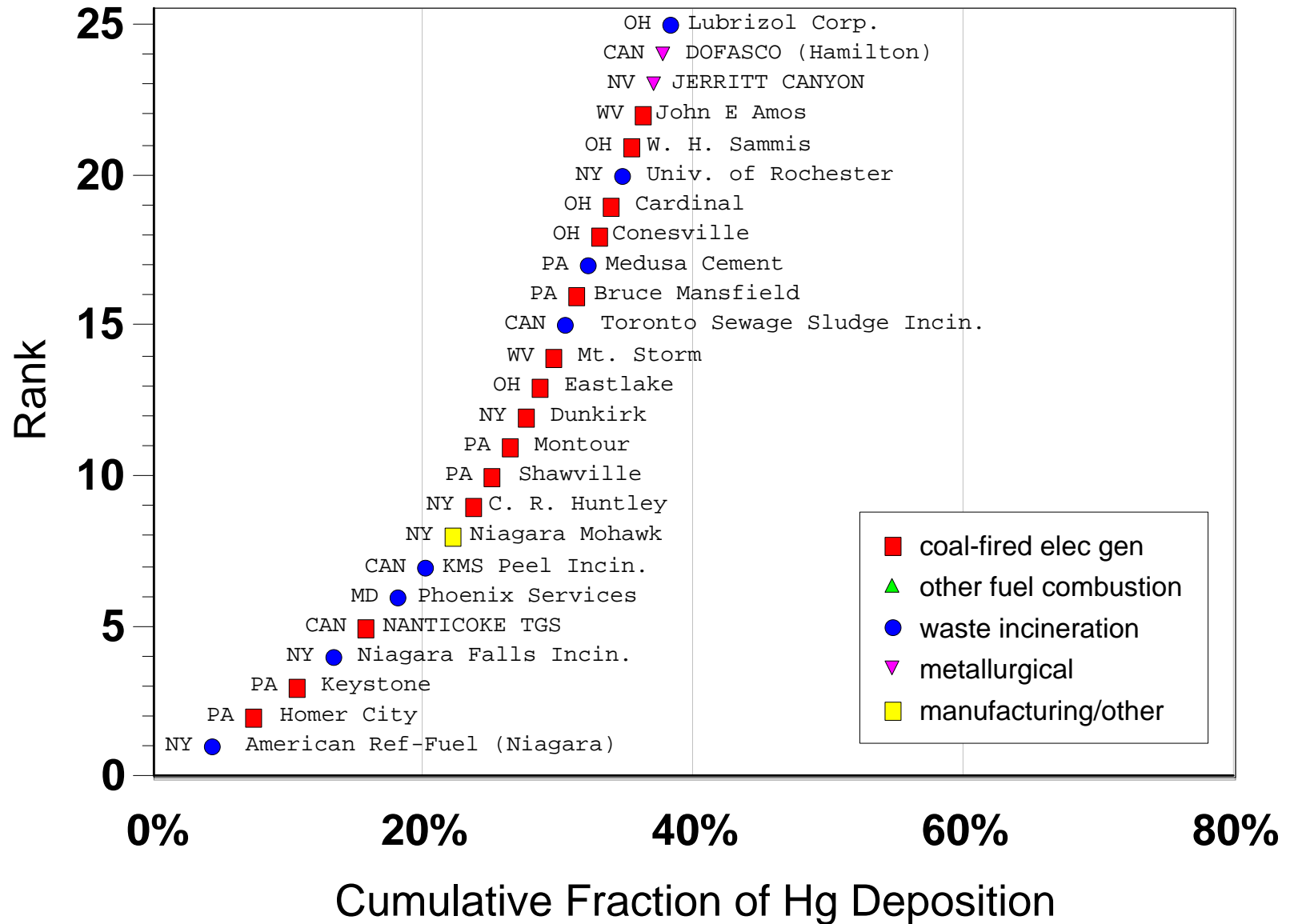
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Superior



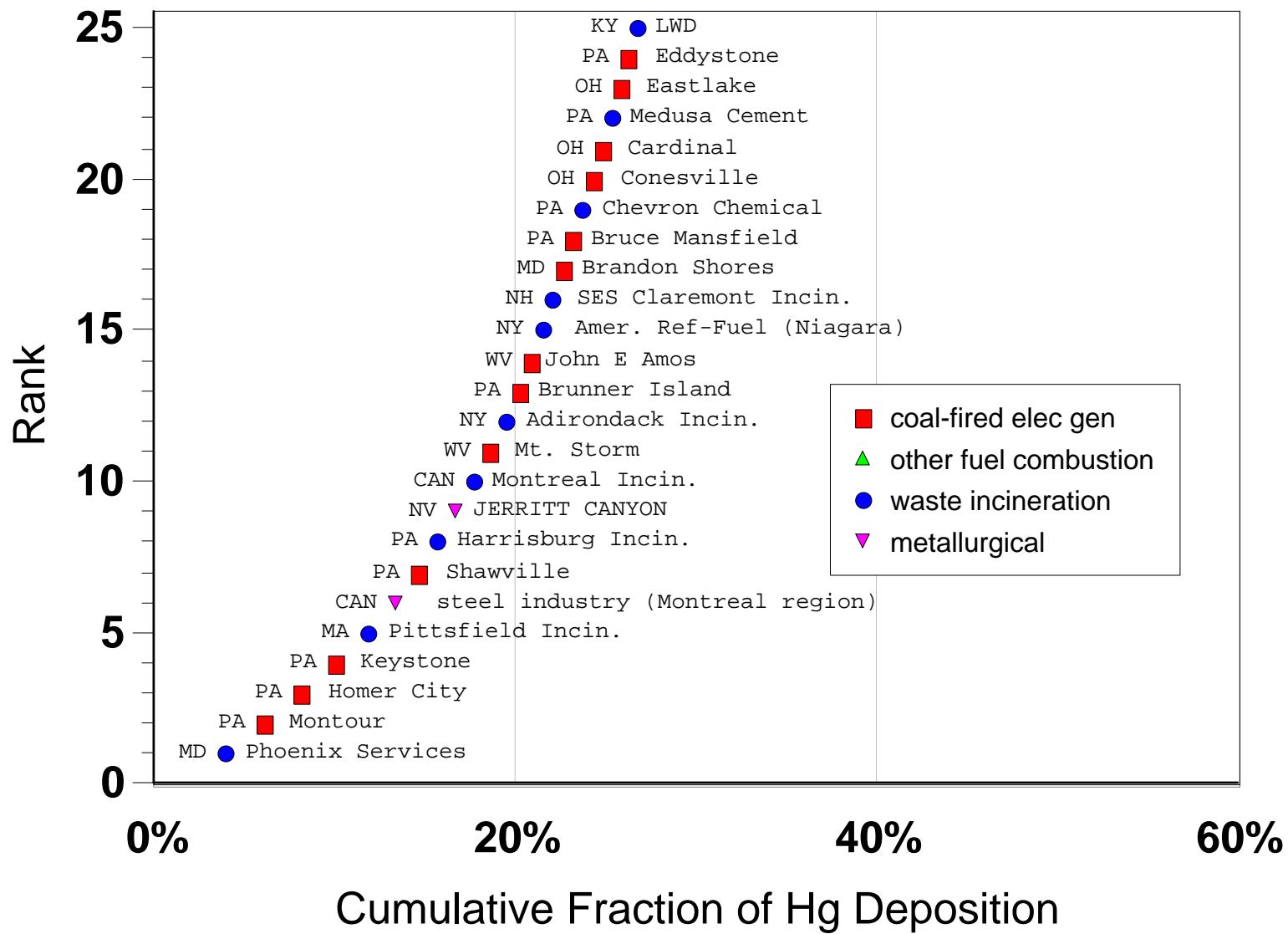
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Huron



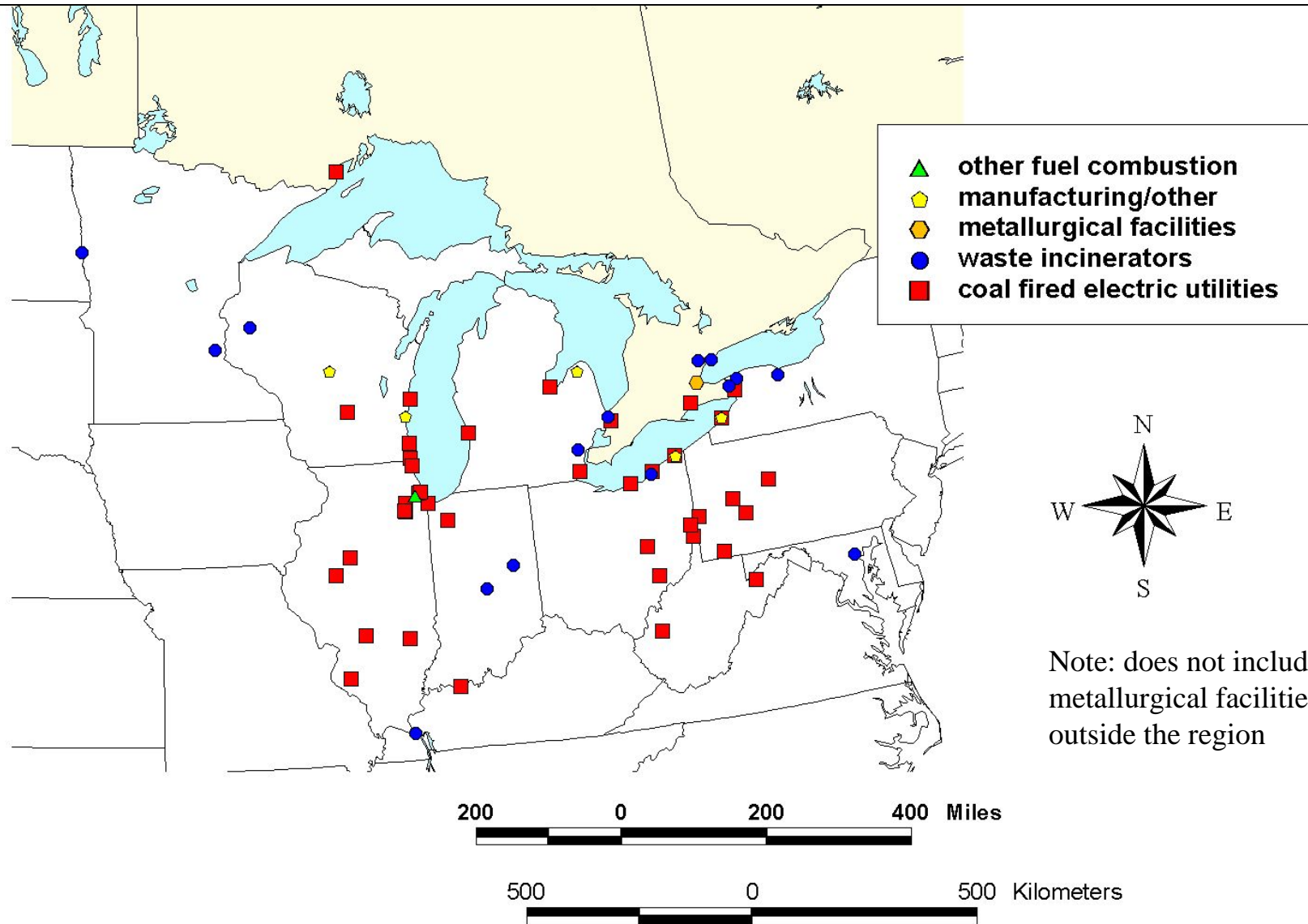
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Ontario



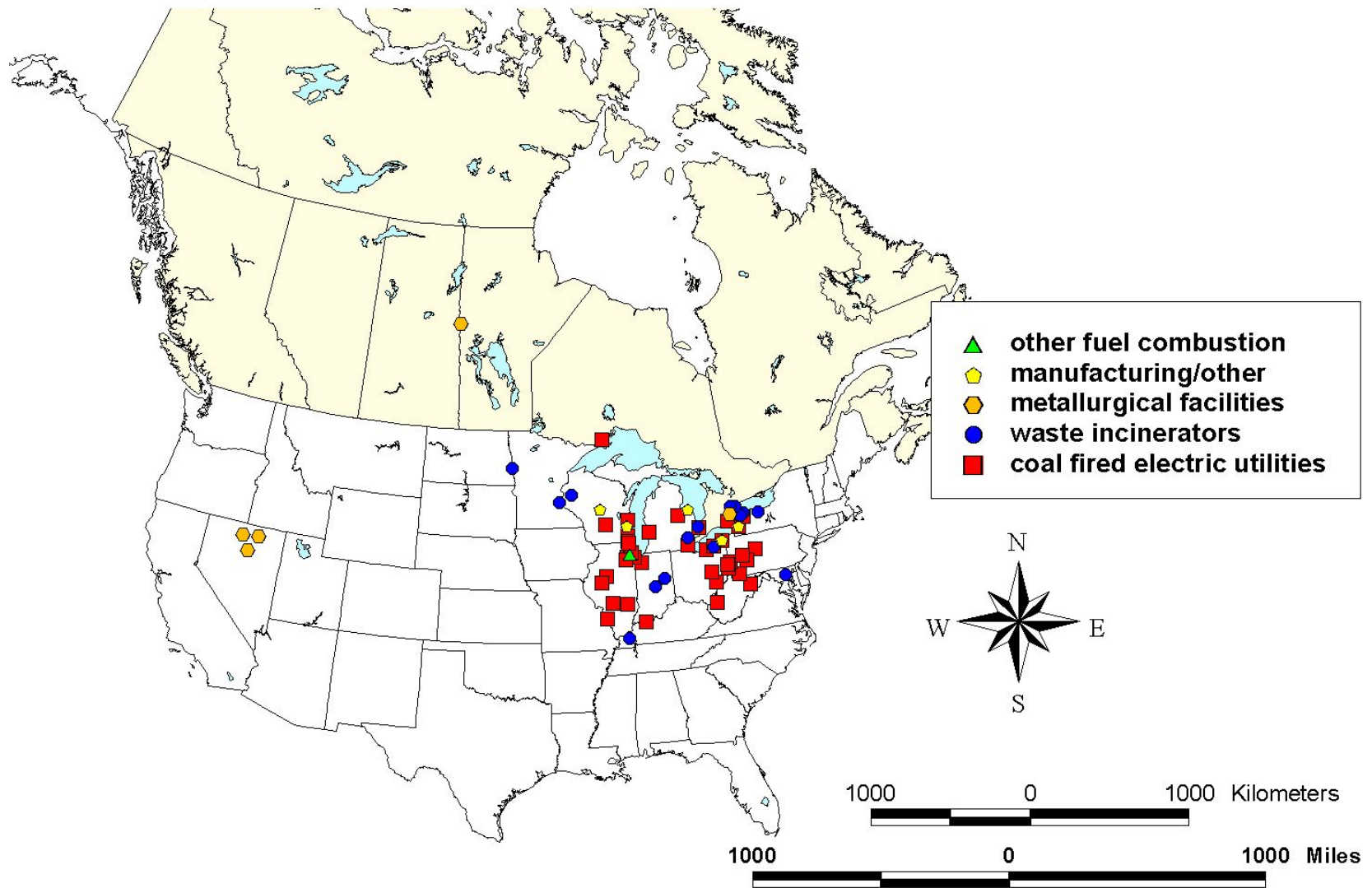
Top 25 Contributors to 1999 Hg Deposition Directly to Lake Champlain



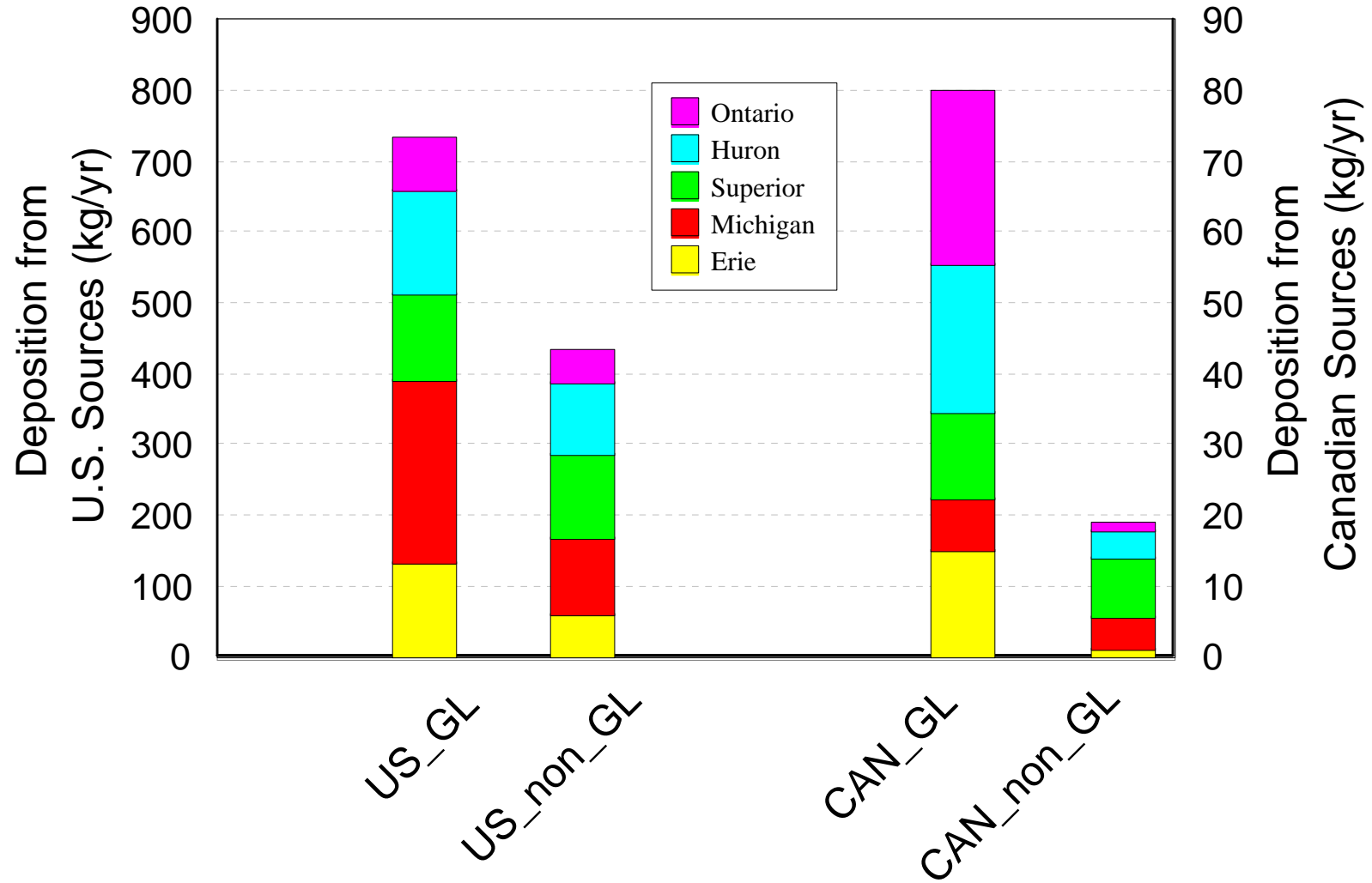
Emissions sources which are among the top-25 model-estimated contributors to one or more of the Great Lakes



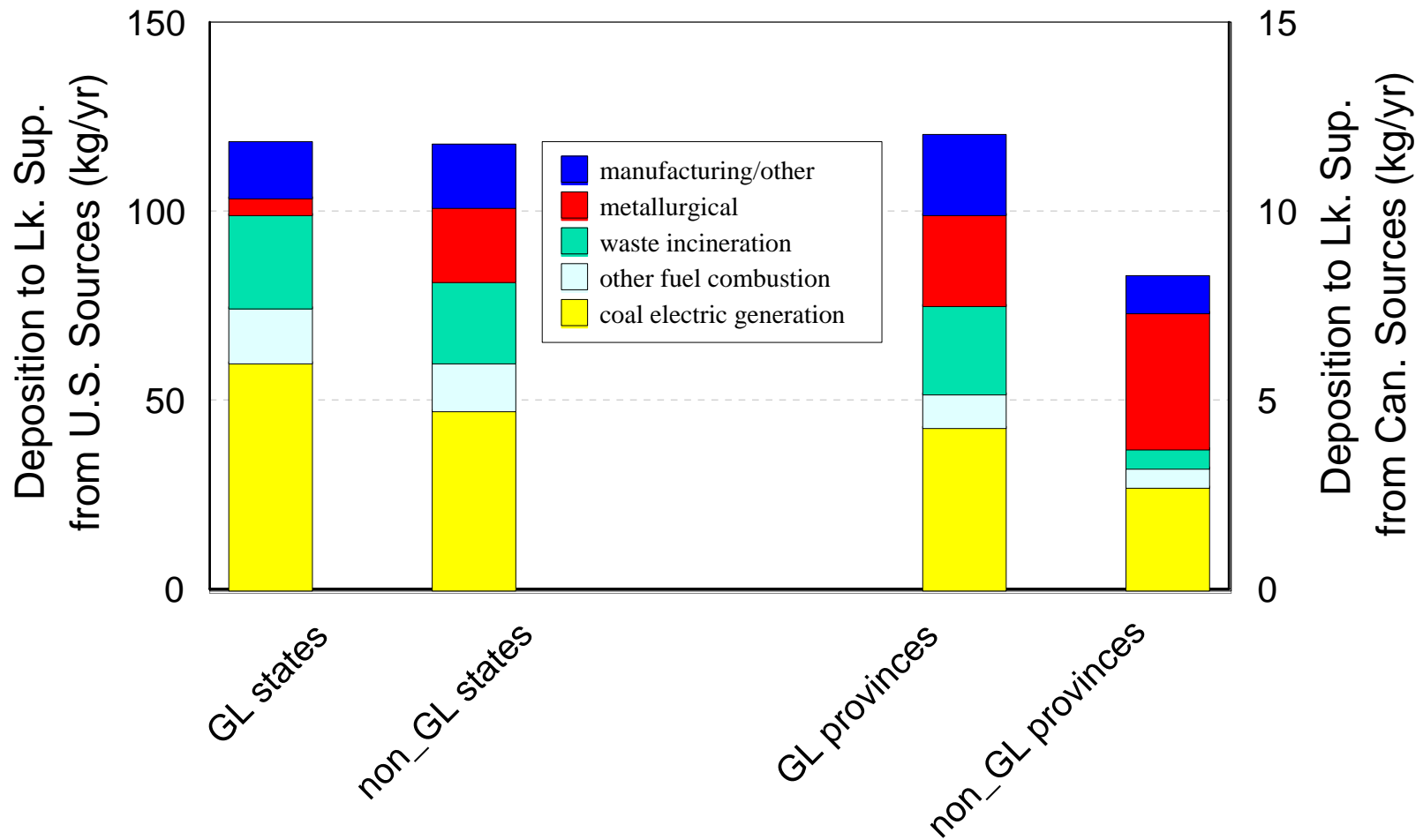
Emissions sources which are among the top-25 model-estimated contributors to one or more of the Great Lakes



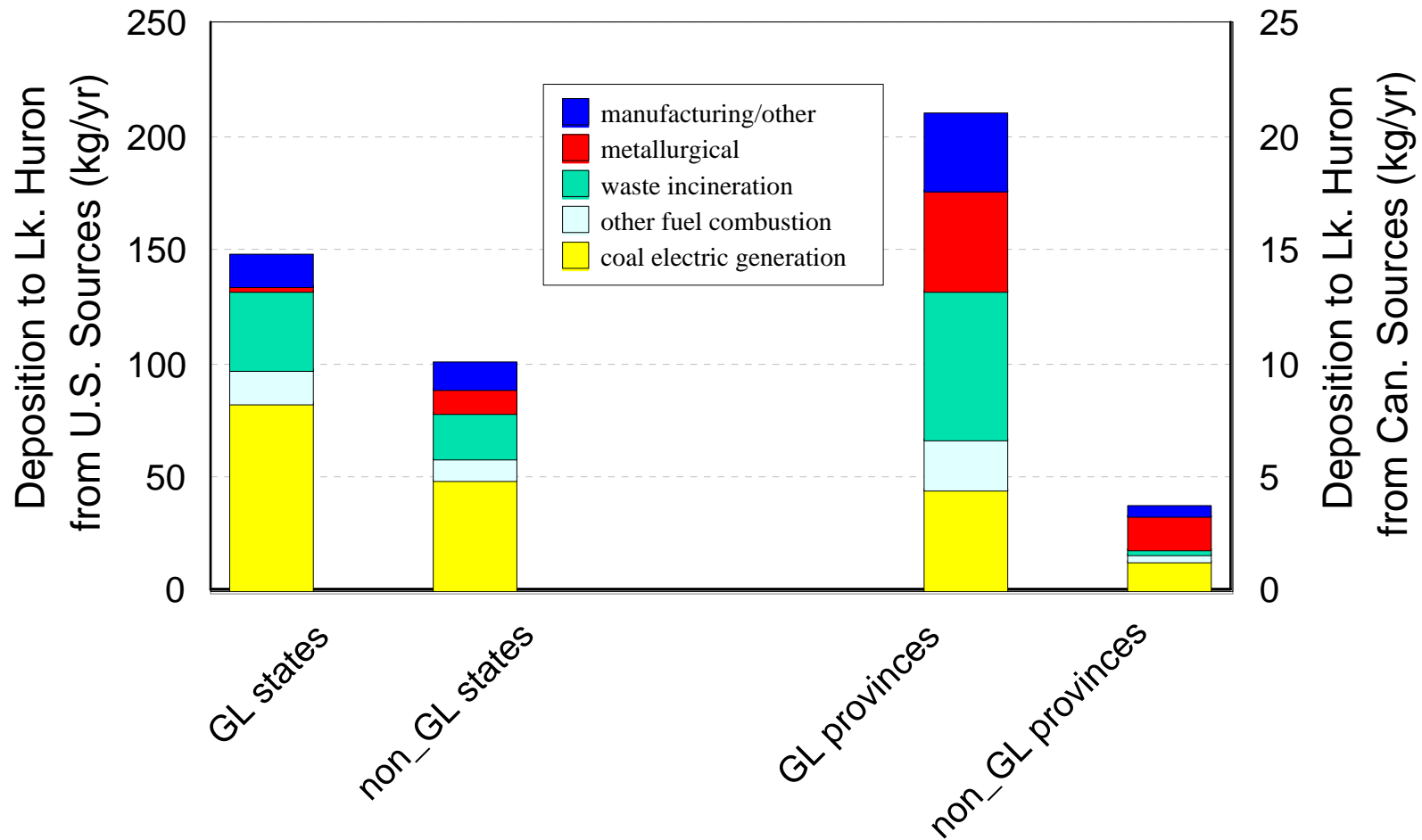
Model-Estimated Mercury Deposition to the Great Lakes
from U.S. and Canadian Anthropogenic Mercury Emissions
[Great Lakes States/Provinces vs. other States/Provinces]



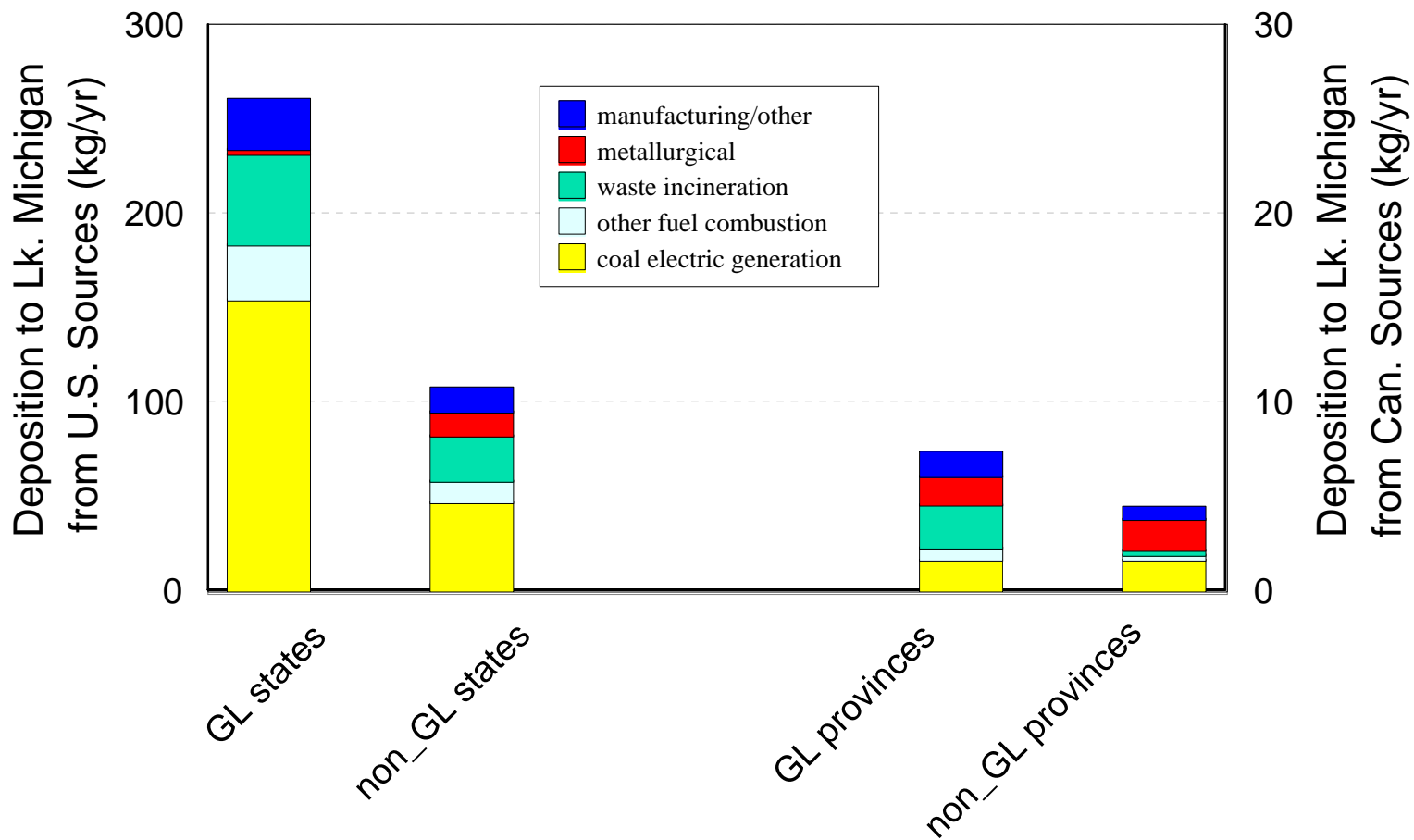
Model-Estimated Mercury Deposition to Lake Superior
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]



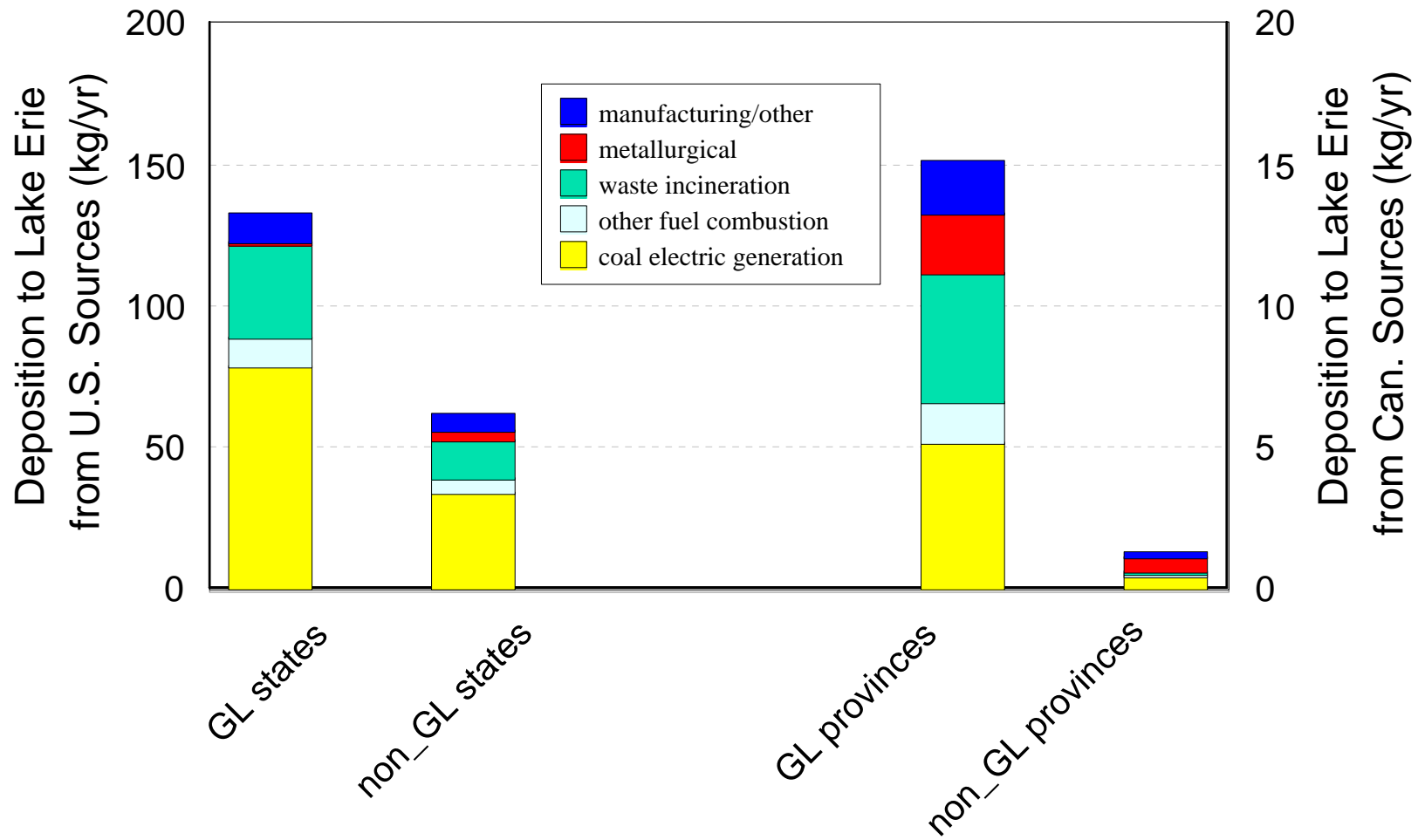
Model-Estimated Mercury Deposition to Lake Huron
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]



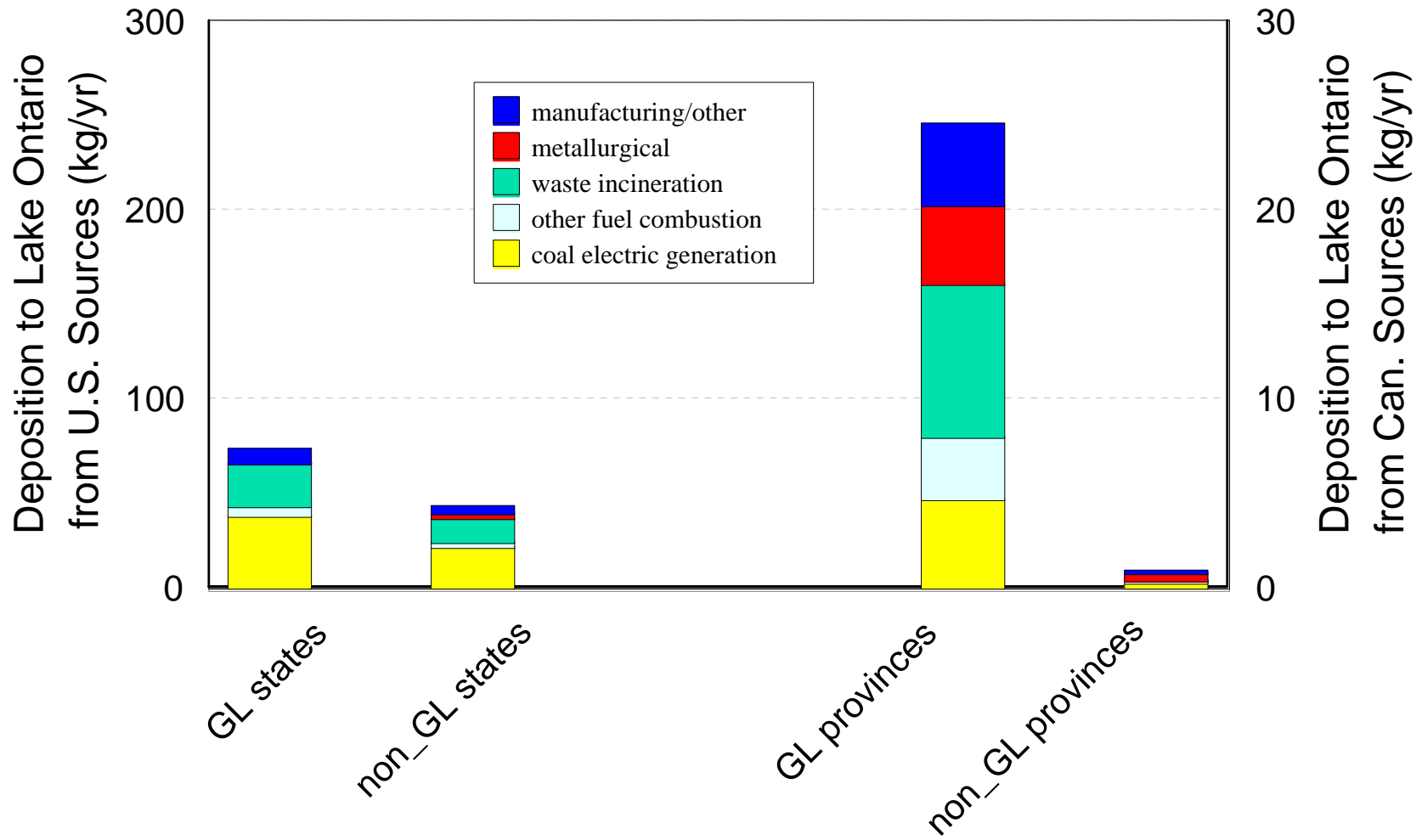
Model-Estimated Mercury Deposition to Lake Michigan
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]



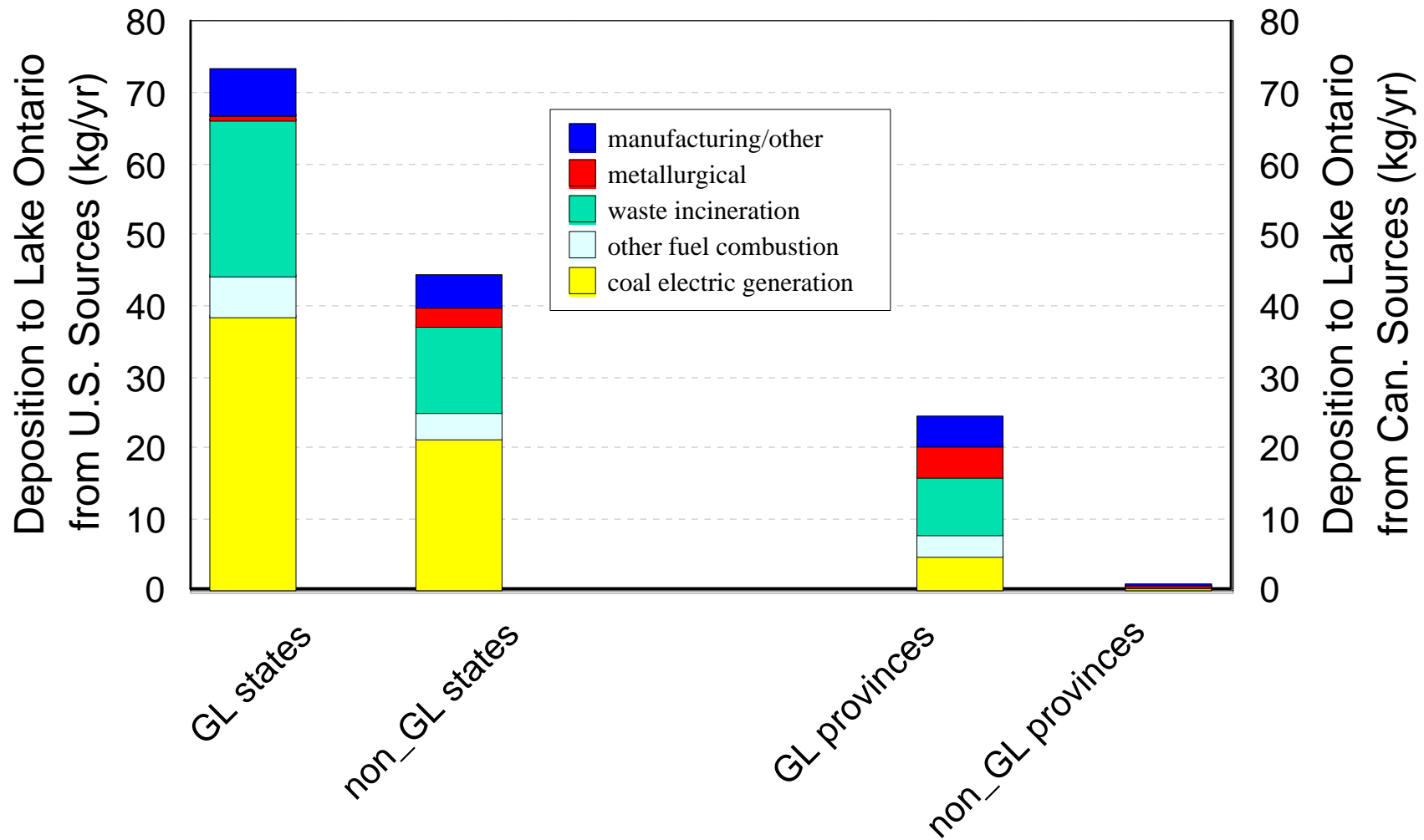
Model-Estimated Mercury Deposition to Lake Erie
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]



Model-Estimated Mercury Deposition to Lake Ontario
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]



Model-Estimated Mercury Deposition to Lake Ontario
 from Different Source Categories of US/Canadian
 Anthropogenic Mercury Emissions Sources
 [Great Lakes States/Provinces vs. other States/Provinces]
 [US SCALE = CAN SCALE]



**Additional
Detailed
Results for
Lake Erie**

Figure 30-A. Geographical Distribution of 1999 Deposition Contributions to Lake Erie

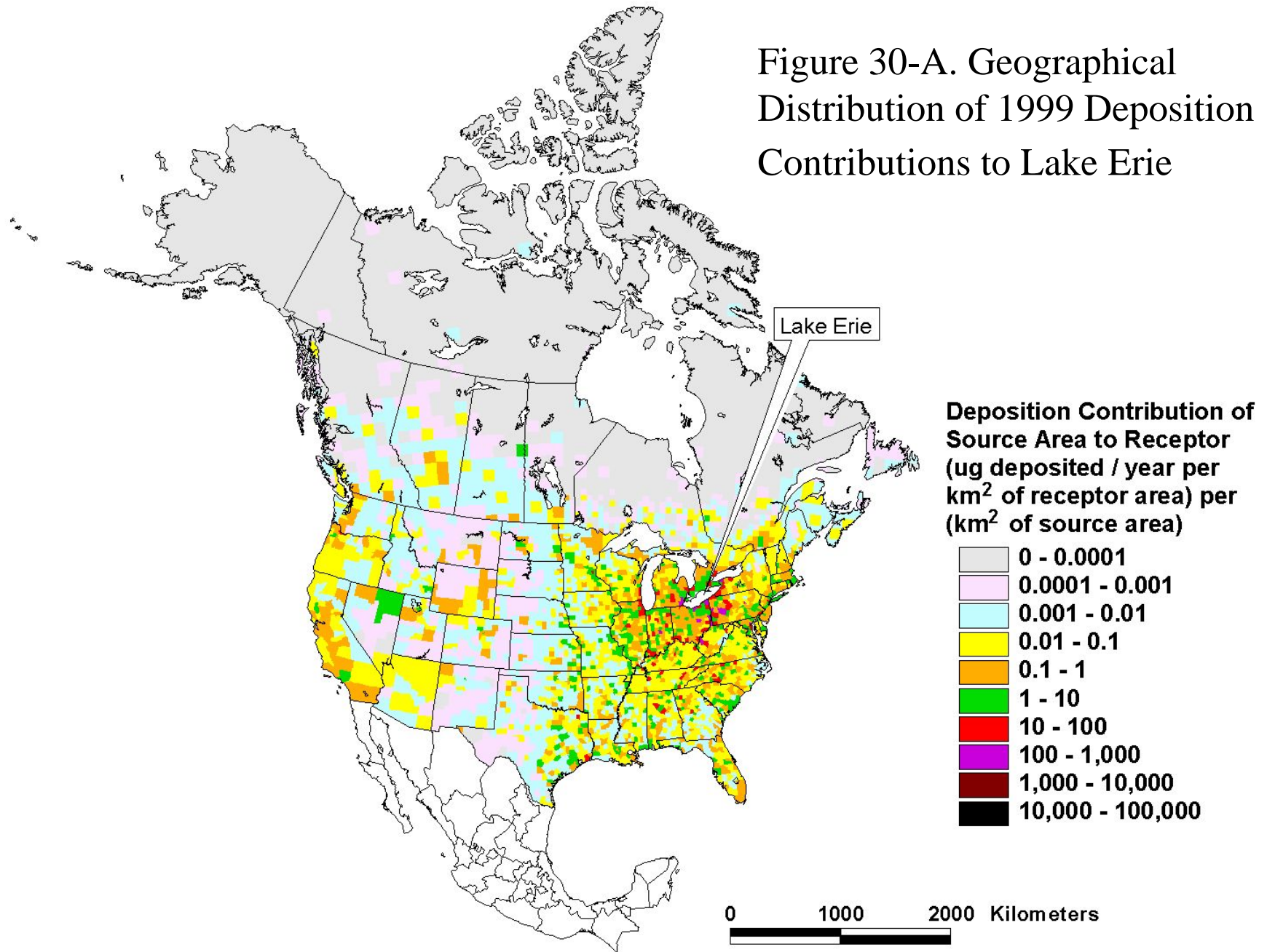


Figure 30-B. Geographical Distribution of 1999
Deposition Contributions to Lake Erie

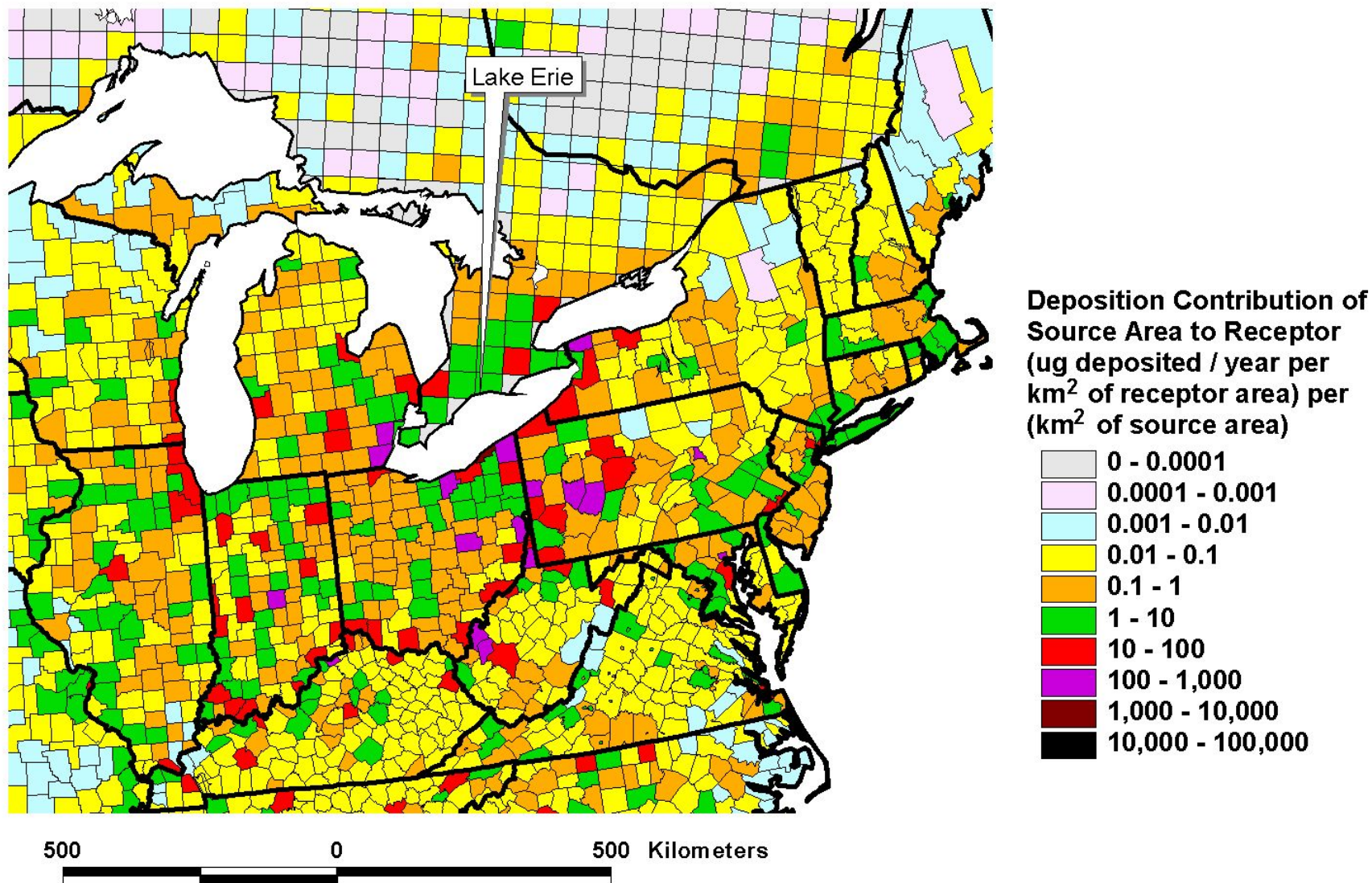
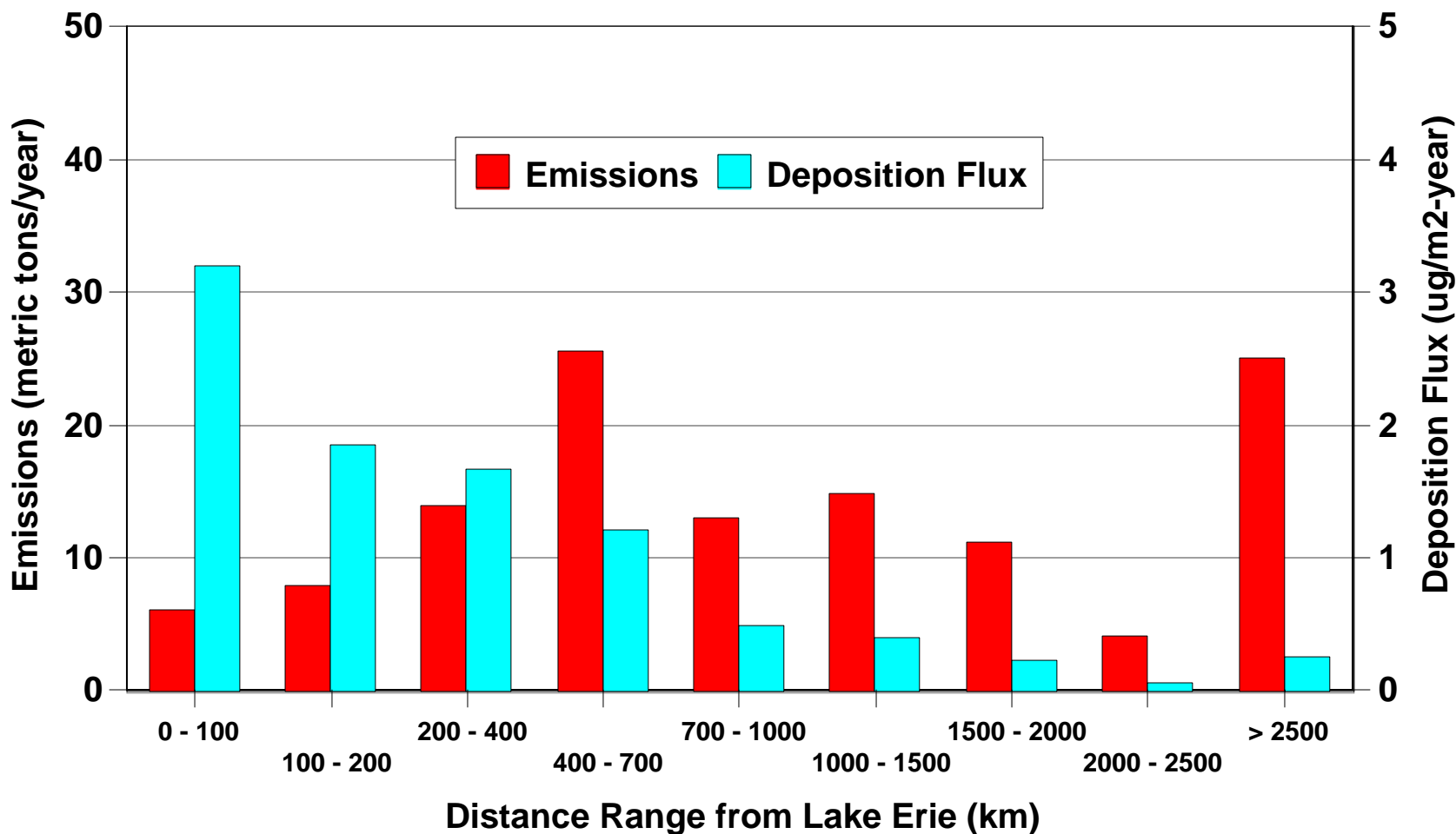


Figure 31. Emissions and deposition contributions from different distance ranges away from Lake Erie



**Additional
Detailed
Results for
Lake
Michigan**

Figure 35-A. Geographical Distribution of 1999 Direct Deposition Contributions to Lake Michigan (entire domain)

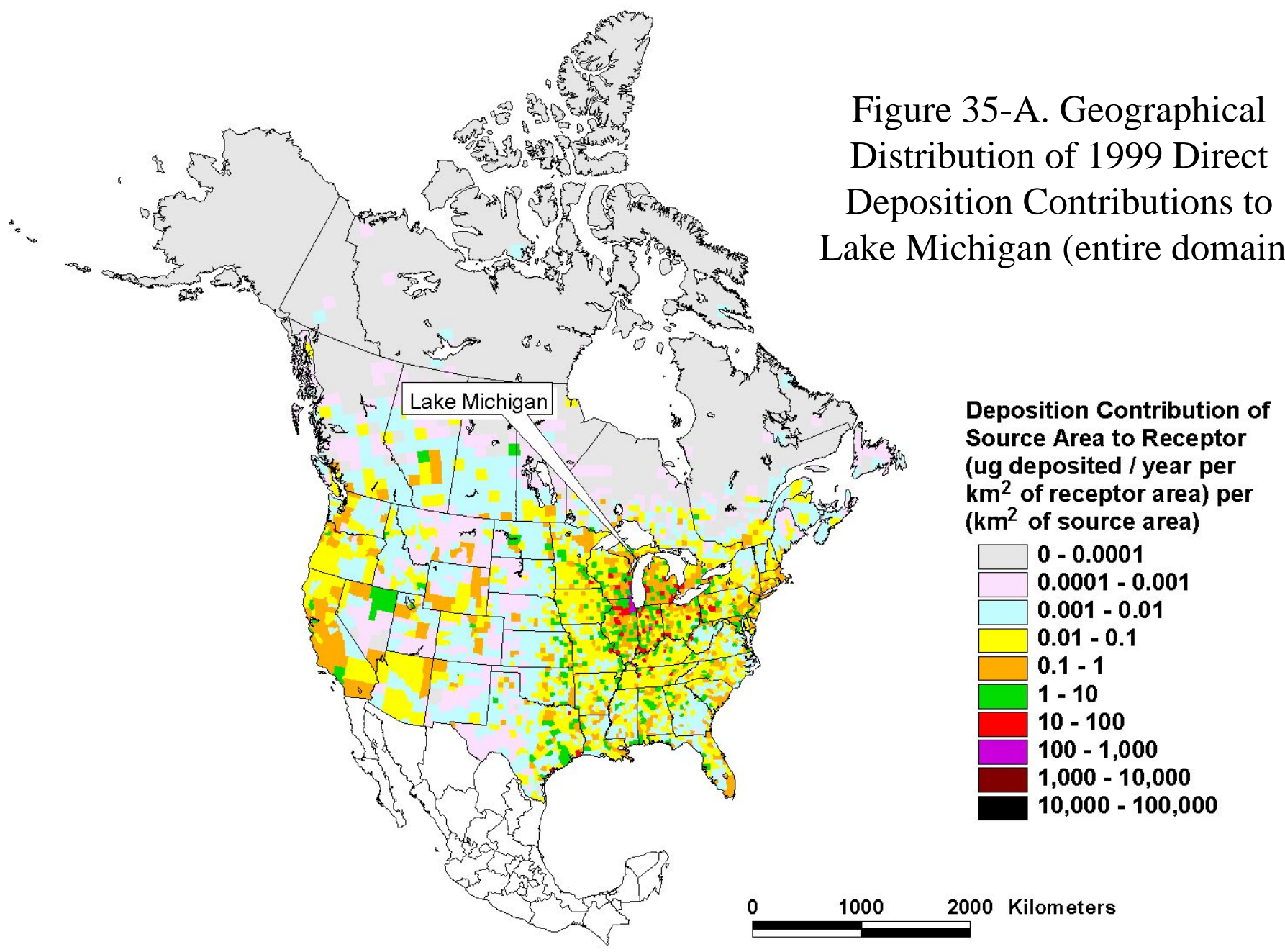


Figure 35-B. Geographical Distribution of 1999 Direct Deposition Contributions to Lake Michigan (regional view)

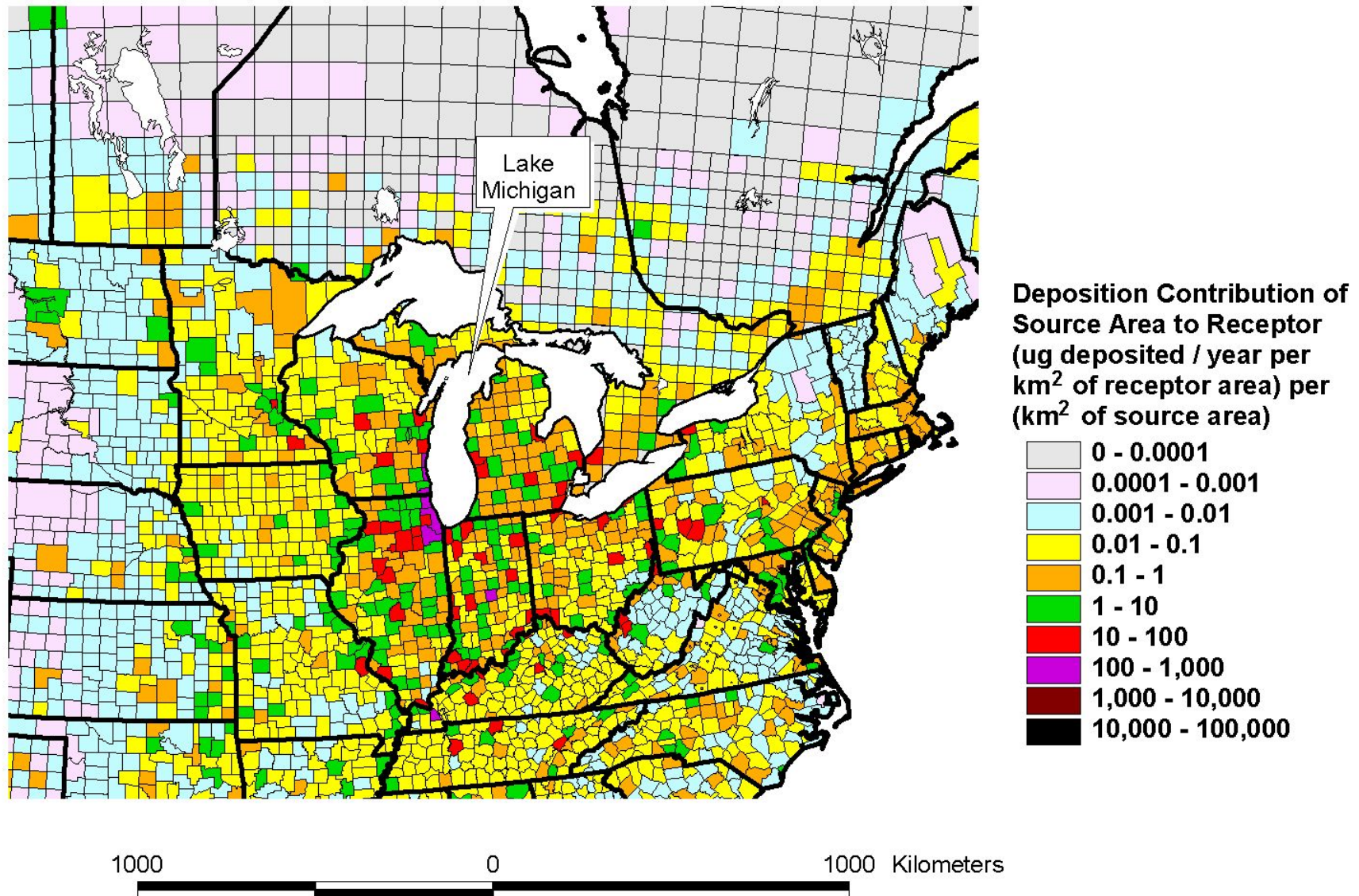


Figure 35-C. Geographical Distribution of 1999 Direct Deposition Contributions to Lake Michigan (more local view)

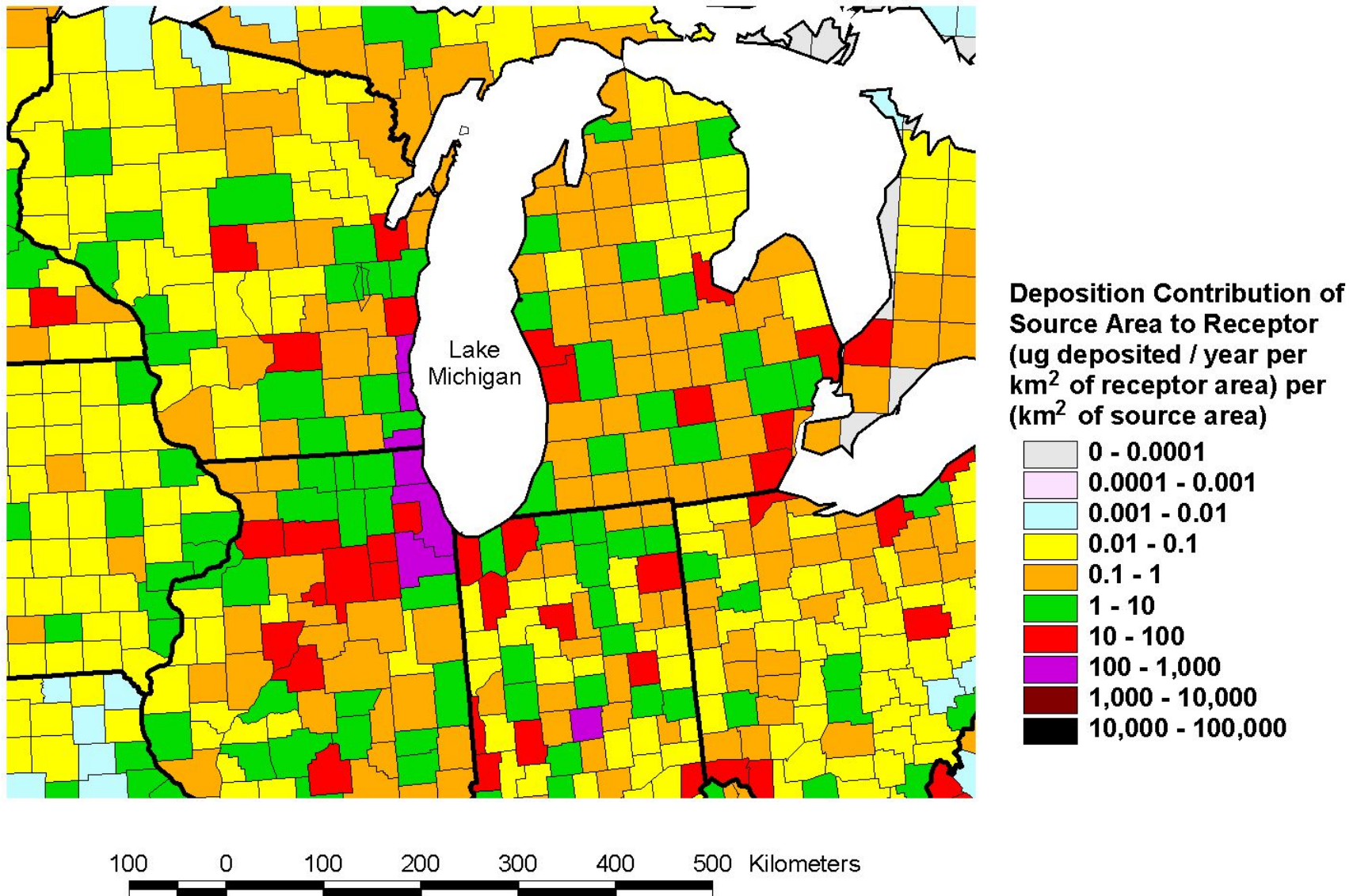


Figure 36. Emissions and Deposition Contributions from Different Distance Ranges Away From Lake Michigan

