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**Name of Organization:** University of Minnesota - Duluth

**Type of Organization:** College or University

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**Project Title:** Assessment of Mercury Contamination Sources: St. Louis River

**Project Category:** Pollution Prevention and Reduction - BNS

**Rank by Organization (if applicable):** 0

**Total Funding Requested (\$):** 86,489 **Project Duration:** 2 Years

**Abstract:**

The University of Minnesota - Duluth proposes to assess sources of mercury contamination in water for the lower St. Louis River. This will involve periodic sampling of tributary inputs along with areas above and below sites with known mercury contamination in the sediments. Water sampling will occur approximately once per month throughout a complete year, with a smaller follow-up sampling effort for selected sites and times in year two. Each input source will be quantified, using stream flow magnitudes and measured concentrations, in terms of percent contribution to the mercury concentration observed in the estuary. Samples will be analyzed for both total and methyl mercury components.

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**Geographic Areas Affected by the Project**

**States:**

- |   |                                     |              |
|---|-------------------------------------|--------------|
| <input type="checkbox"/> Illinois             | <input type="checkbox"/>            | New York     |
| <input type="checkbox"/> Indiana              | <input type="checkbox"/>            | Pennsylvania |
| <input type="checkbox"/> Michigan             | <input checked="" type="checkbox"/> | Wisconsin    |
| <input checked="" type="checkbox"/> Minnesota | <input type="checkbox"/>            | Ohio         |

**Lakes:**

- |  |                          |           |
|--|--------------------------|-----------|
| <input checked="" type="checkbox"/> Superior | <input type="checkbox"/> | Erie      |
| <input type="checkbox"/> Huron               | <input type="checkbox"/> | Ontario   |
| <input type="checkbox"/> Michigan            | <input type="checkbox"/> | All Lakes |

**Geographic Initiatives:**

- |  |                                  |                                     |                                      |   |
|--|----------------------------------|-------------------------------------|--------------------------------------|---|
| <input type="checkbox"/> Greater Chicago | <input type="checkbox"/> NE Ohio | <input type="checkbox"/> NW Indiana | <input type="checkbox"/> SE Michigan | <input type="checkbox"/> Lake St. Clair |
|--|----------------------------------|-------------------------------------|--------------------------------------|---|

**Primary Affected Area of Concern:** St. Louis River, MN

**Other Affected Areas of Concern:**

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***For Habitat Projects Only:***

**Primary Affected Biodiversity Investment Area:**

**Other Affected Biodiversity Investment Areas:**

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**Problem Statement:**

Mercury contamination in the lower St. Louis River has been documented in the fish, water, and sediments (Sorensen et al., 1999, 1992; Glass et al., 1992, 1990; Crane, 1997). This contamination has been recognized by the International Joint Commission in its designation of the lower St. Louis River as one of the "Areas of Concern" and by the Minnesota Department of Health in its fish consumption advisories (MDH, 1999).

Although an early limited effort (Glass et al., 1990) of assessing and identifying total mercury sources to the estuary proved very successful (discovery of a major point source which has now been substantially reduced), little effort has been extended since then to assess/identify other sources in the area. Even more surprising is that virtually no work has been done with regard to assessing methylmercury sources. This is an obvious oversight that must be addressed because methylmercury is approximately 1,000 times more bioaccumulatable than the inorganic forms (represented by total mercury measurements).

An assessment of mercury loading sources to the lower St. Louis River would: 1) provide information on which areas are higher priority for clean-up; and 2) provide a benchmark by which to assess the success of future clean-up efforts.

**Proposed Work Outcome:**

Year one

Tributary inputs to the lower St. Louis River will be sampled periodically (approximately once per month) through a full 12 month cycle. Approximately 15 inputs along with areas above and below river stretches with known mercury contamination in the sediments (e.g. the lower reservoirs) will be sampled. Water samples will be analyzed for both total and methyl mercury components as well as suspended solids, organic carbon, turbidity, color, pH, and electrical conductivity. Stream flow data will be obtained from Minnesota Power where possible and from field measurements (stream cross sectional area and velocity) for smaller tributaries. Preliminary results will be used to select sites for a smaller follow-up sampling effort in year two.

Year two

Each input source will be quantified as a function of season, using stream flow magnitudes and measured mercury concentrations (from year one), in terms of percent contributions to the mercury concentrations observed in the estuary. Similar computations will also be made for the other measured parameters (i.e. conductivity and suspended solids) in order to: 1) assess the accuracy of representing estuary conditions through a summation of the sources (i.e. using conductivity

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measurements); and 2) examine sedimentation/resuspension tendencies along the river course (using suspended particulate measurements).

Sources showing the most significant inputs will be resampled and reanalyzed three or four more times (year two) in order to assess year-to-year variabilities for a given time of year. In addition, new sites may be included for survey purposes if data from year one suggests additional undefined sources.

**Project Milestones:**

**Dates:**

Project Start	10/2000
Year 1 sampling and analyses	09/2001
Preliminary source assessment	12/2001
Year 2 sampling and analyses	07/2002
Final Assessment of Sources	07/2002
Draft Report	09/2002
Final Report	10/2002
Project End	10/2002

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Project Addresses Environmental Justice

**If So, Description of How:**

Project Addresses Education/Outreach

**If So, Description of How:**

The audiences for information generated by this project would include MPCA, MNDNR, MDH, WIDNR, and a number of federal government organizations responsible for the aquatic and related terrestrial resources of the three states bordering the Western Arm of Lake Superior. Other groups including the St. Louis River RAP Citizens Action Committee, the Western Lake Superior Sanitary District, and other public and private stake holders (mercury contributors) would be very interested in the results from the proposed work. The projects' findings would be presented at major national scientific meetings in North America.

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**Project Budget:**

	<b>Federal Share Requested (\$)</b>	<b>Applicant's Share (\$)</b>
<b>Personnel:</b>	48,738	8,240
<b>Fringe:</b>	13,132	2,274
<b>Travel:</b>	1,024	0
<b>Equipment:</b>	0	0
<b>Supplies:</b>	4,200	0
<b>Contracts:</b>	1,500	0
<b>Construction:</b>	0	0
<b>Other:</b>	0	0
<b>Total Direct Costs:</b>	68,594	10,514
<b>Indirect Costs:</b>	17,895	2,734
<b>Total:</b>	86,489	13,248
<b>Projected Income:</b>	86,489	13,248

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**Funding by Other Organizations (Names, Amounts, Description of Commitments):**

The Fond du Lac Band will provide some sampling assistance for areas within the reservation.

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**Description of Collaboration/Community Based Support:**

UMD will work with Fond du Lac Reservation staff who will help with sample collection for sources within the reservation. Stream-flow data for the St. Louis River will be obtained from Minnesota Power. The Western Lake Superior Sanitary district will provide discharge flow data for that source.