St. Louis River Area of Concern
Sediment Characterization:
Final Report
St. Louis River Area of Concern Sediment Characterization

Final

Prepared for:
Minnesota Pollution Control Agency

July 11, 2013
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Introduction

The Minnesota Pollution Control Agency (MPCA) and Wisconsin Department of Natural Resources (WDNR) are two of the agencies currently working together to implement a comprehensive long-term plan to delist the St. Louis River Area of Concern (SLR AOC). Many of the Beneficial Use Impairments (BUIs) in the AOC are linked to the presence of sediment contaminants. The St. Louis River Sediment Characterization Project was undertaken to evaluate and summarize the levels of sediment contaminants throughout the AOC based on the significant amount of existing sediment contaminant data. This work was done to support the MPCA and WDNR in defining the general level of remedial action needed for sites across the AOC to support BUI removal strategies. It is important to note that the characterization was based solely on sediment contaminant data; multiple lines of evidence are used by the states when conducting site-specific investigations.

Teams of staff from MPCA and WDNR determined protocols for sediment characterization, dictated particular datasets to be used in the analysis, and oversaw development of project deliverables. These teams were termed the Minnesota Remedial Assessment Team (MNRAT) and Wisconsin Sediment Assessment Team (WISAT); together the teams constitute the Sediment Technical Team.

As part of the project, the AOC was divided into Sediment Assessment Areas (SAAs) for purposes of evaluation and to assist in the prioritization of remediation and restoration activities.

The work-products developed as part of the Sediment Characterization project were:

- Sediment Assessment Area Chemistry Characterization or “dashboards”
- Maps of sediment contaminants for multiple depth intervals
- Database queries to assist MPCA and WDNR in conducting independent analysis of the sediment contaminant levels in the AOC
- A memorandum describing a systematic approach to assign remedial categories to each SAA for Minnesota

This report documents the development of these work products. The dashboards, maps, and remedial categorization memorandum are included as appendices.
2 Dataset Description

2.1 Description of the Phase VII Database

The Minnesota Pollution Control Agency (MPCA), in cooperation with other agencies, including the Wisconsin Department of Natural Resources, updated the existing Phase VI St. Louis River Area of Concern Sediment and Biological Database. The Phase VI database included 53 studies with sediment chemistry results, dating back to 1992. Updates included incorporating database structural enhancements, eight new sediment-quality datasets, and four biological datasets to create Phase VII of the database. The sediment chemistry datasets added to create the Phase VII database were:

- St. Louis Bay 40th Ave, 2010
- Hog Island Post Remediation, 2006
- Howards Bay – St. Louis River AOC, 2010
- Lower St. Louis River, 2011
- Spirit Lake, 2011
- Upper St. Louis River, 2011
- St. Louis River WDNR Wisconsin Sampling, 2007
- St. Louis River Mud Lake/Radio Tower Bay, MPCA Sediment Chemistry, 2008

2.2 Sediment Assessment Area Delineation

Draft polygons representing the SAAs were received in GIS layers from MPCA and WDNR. The two datasets were merged and boundary lines were edited to achieve a seamless coverage of the AOC. Some assessment area names were edited to ensure uniqueness and an ID numbering scheme was established. Larger groups of assessment areas, called Geographic Zones, were established. The designated Geographic Zones are:

- Lake Superior
- Allouez Bay
- Superior Bay
- St. Louis Bay
- Lower St. Louis River
- Middle St. Louis River
- Upper S. Louis River
- Koppers/Crawford Creek

In total, 120 SAAs were delineated – 77 in Minnesota and 43 in Wisconsin. The decision was made to treat the Federal Navigation Channel separately. SAA borders were drawn to coincide with the navigation channel. Of the 120 SAAs, 18 are in the navigation channel.
2.3 Datasets Selected by Minnesota and Wisconsin

Not every dataset in the Phase VII database was used in the sediment chemistry characterizations. For Minnesota, two major sediment contaminant sampling efforts were undertaken in 2010 and 2011 by the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. Sampling was conducted according to a plan developed by MPCA to provide a screening level evaluation of sediment contamination across the Minnesota-side of the AOC. Therefore, MPCA decided to use primarily these recently collected samples for the sediment characterizations. MPCA staff conducted an evaluation and made decisions regarding the appropriate studies to use for each SAA. Table 1 shows the studies used for each SAA in Minnesota.

Fewer recently collected samples are available on the Wisconsin side of the AOC. WDNR made the decision to use all available samples for the sediment characterizations, with the exception of samples that represented pre-remedial conditions in Hog Island Inlet and at the SLRIDT Superfund Site.
### Table 1. Studies used for each Minnesota Sediment Assessment Area

<p>| SAA ID | SAA/Study ID | 4 | 6 | 9 | 10 | 11 | 18 | 19 | 42 | 44 | 45 | 46 | 51 | 52 | 54 | 67 | 69 | 72 | 73 | 74 | 76 |
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| 18     | Hearding Island | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 19     | North Park Point Bayside | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 20     | Minnesota Slip | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 21     | Slip 2 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 22     | Slip 3 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 23     | Slip C | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 24     | General Mills Elevator A Slip | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 25     | Cargill Elevator B1 Slip | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |</p>
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<td>Fond du Lac Indian Reservation Reach</td>
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</table>
3 Data Treatment Protocol

3.1 Protocol Development

A series of protocols were developed to determine appropriate approaches to data handling. The protocols were developed over the course of the project, starting at the project kickoff in October 2012 through the submittal of the draft work products delivered on April 1, 2013.

Meetings were held with the MNRAT and WISAT teams on October 15, 2012 to discuss the sediment characterization reports and to gather initial thoughts on characterization process protocols. At those meetings, it was suggested that more informed protocols could be developed after LimnoTech had the opportunity to work with the data, perform initial calculations, and develop example dashboard reports.

Additional data handling protocols were discussed over the course of several conference calls with the Sediment Technical Team.

The focus of sediment characterization efforts for the project was comparison to Consensus Based Sediment Quality Guidelines (CBSQs) established for the St. Louis River to represent levels of sediment contaminants that are toxic to benthic organisms. While Minnesota and Wisconsin each apply the CBSQs with slightly different approaches, the contaminant levels represented by the CBSQs for each state are generally the same.

The protocols used to develop the work products associated with the SLR Sediment Characterization project are as follows:

- For CBSQs, Level 1 and Level 2 Sediment Quality Targets (SQTs) were taken from Guidance for the Use and Application of Sediment Quality Targets for the Protection of Sediment-dwelling Organisms in Minnesota (Crane and Hennes, 2007). Threshold effect concentration (TEC), midpoint effect concentration (MEC), and probable effect concentration (PEC) values were taken from Consensus-Based Sediment Quality Guidelines Recommendations for Use & Application Interim Guidance (WDNR, 2003).
- For CBSQs, Level 1 and Level 2 Sediment Quality Targets (SQTs) were taken from Guidance for the Use and Application of Sediment Quality Targets for the Protection of Sediment-dwelling Organisms in Minnesota (Crane and Hennes, 2007). Threshold effect concentration (TEC), midpoint effect concentration (MEC), and probable effect concentration (PEC) values were taken from Consensus-Based Sediment Quality Guidelines Recommendations for Use & Application Interim Guidance (WDNR, 2003).
- Total polycyclic aromatic hydrocarbon (PAH) values were calculated using the 13 priority PAHs:
  - Acenaphthene
  - Acenaphthylene
  - Anthracene
  - Fluorene
  - 2-methylnaphthalene
  - Naphthalene
  - Phenanthrene
  - Benz(a)anthracene
  - Benzo(a)pyrene
  - Chrysene
  - Dibenz(a,h)anthracene
  - Fluoranthene
  - Pyrene
- Metals values were preferentially based on total metal measurements. For samples without a total metals measurement, the simultaneously extracted metal value was substituted.
- Total polychlorinated biphenyls (PCBs) were preferentially calculated as congener sums. For samples without a PCB congener measurement, the sum of Aroclors was substituted.
• Tetrachlorinated dibenzo-p-dioxin (TCDD) Toxic Equivalents (TEQ) values are calculated using Fish Ecological Risk Toxic Equivalency Factors (TEFs) based on 1998 World Health Organization (WHO).
• Contaminant concentrations were not normalized to total organic carbon (TOC) for any applications.
• Sediment samples were assigned to a single depth interval where the highest fraction of the sample occurs. Samples were assigned to the following depth intervals:
  o 0-15 cm (surface samples)
  o 15-50 cm
  o 50-100 cm
  o >100 cm
• Values below the detection limit were treated as follows:
  o TCDD TEQ values were calculated using a Kaplan-Meier estimator
  o PCB sums were calculated assuming non-detects are equal to zero
  o Metal concentrations were replaced with:
    ▪ Half the detection limit, if greater than 40% of measurements from the study are below detection limits
    ▪ The detection limit, if less than 40% of measurements from the study are below detection limits
  o PAH values were estimated based on log-log regressions with other PAH compounds – the predictors and R-squared values for each of the PAH17 compound are presented in Table 2.

Table 2. Predictors and R-squared values for regressions used to substitute for PAH17 compounds below the detection limits

<table>
<thead>
<tr>
<th>PAH Compound</th>
<th>Best predictor among PAH with &lt;20% non-detect</th>
<th>R-squared</th>
</tr>
</thead>
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<tr>
<td>2-methylnaphthalene</td>
<td>Phenanthrene</td>
<td>0.92</td>
</tr>
<tr>
<td>Acenaphthene</td>
<td>Pyrene</td>
<td>0.46</td>
</tr>
<tr>
<td>Acenaphylene</td>
<td>Benzo(a)pyrene</td>
<td>0.91</td>
</tr>
<tr>
<td>Anthracene</td>
<td>Fluoranthene</td>
<td>0.94</td>
</tr>
<tr>
<td>Benz(a)anthracene</td>
<td>Benzo(g,h,i)perylene</td>
<td>0.96</td>
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<tr>
<td>Benzo(a)pyrene</td>
<td>Benzo(a)anthracene</td>
<td>0.93</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>Benzo(g,h,i)perylene</td>
<td>0.98</td>
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<tr>
<td>Benzo(g,h,i)perylene</td>
<td>Benzo(a)anthracene</td>
<td>0.96</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>Chrysene</td>
<td>0.66</td>
</tr>
<tr>
<td>Chrysene</td>
<td>Benzo(g,h,i)perylene</td>
<td>0.95</td>
</tr>
<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>Benzo(a)anthracene</td>
<td>0.97</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>Phenanthrene</td>
<td>0.98</td>
</tr>
<tr>
<td>Fluorene</td>
<td>Phenanthrene</td>
<td>0.99</td>
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<td>Indeno(1,2,3-c,d)pyrene</td>
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<tr>
<td>Pyrene</td>
<td>Fluoranthene</td>
<td>0.98</td>
</tr>
</tbody>
</table>
4 Description of Deliverable

4.1 Sediment Assessment Area Dashboards

A series of chemistry characterizations or “dashboards” were developed for each of the St. Louis River SAAs. The dashboards were generated to provide screening-level displays of the sediment contaminant data available for individual assessment areas within the St. Louis River Area of Concern. They are intended to assist in decision-making related to restoration initiatives. However, they do not provide a final remedial category designation. The dashboards include the following components:

Mean Probable Effects Quotient (PEC-Q) Range Energy Star Diagram - The Mean PEC-Q is an integrated measurement of mixtures of sediment contaminants (metals, Total PAH, and Total PCB). It is an average of sediment chemical concentrations divided by their corresponding PECs or Level 2 SQTs. The graphic shows the mean of the Mean PEC-Q values for surface samples (0-15 cm) and subsurface samples (>15 cm) on a range of 0 to 1. The Minnesota diagrams are shown in a blue color scale, while the Wisconsin diagrams are shown using a red, yellow, and green scale.

Map of Core Locations - The map shows the locations of the available samples in the assessment area. Samples used to create the summary graphics are color coded based on the surface Mean PEC-Q. Areas of water depth greater than 8 feet are also shown, based on bathymetry data from U.S EPA (2006).

Study Information - This section lists the available studies for the SAA. The studies are divided into sediment chemistry studies used in the assessment, additional available sediment chemistry studies, and available biological studies.

Core profiles - The vertical profiles show color coded levels of Mean PEC-Q values and mercury concentrations from individual samples. Green indicates that the values are less than the Level 1 SQT or TEC, yellow shows that the values are greater than the Level 1 SQT or TEC but less than the Level 2 SQT or PEC, and red shows levels greater than the Level 2 SQT of PEC.

Data Summary – The data summary presents a table with a count of stations, samples, and results for several categories of sediment chemistry parameters: metals (without mercury), mercury, PCBs, PAHs, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F), pesticides, other chemicals, total organic carbon, and grain size distribution.

Bar Plots of Sediment Quality Target Exceedances - The bar plots show the percentages of surface samples exceeding Level 1 or TEC and Level 2 SQT or PEC for a number of parameters. Surface samples are limited to those that start at the surface and where the majority of the sample is found at a depth less than 15 cm.

Distributions of Contaminant Concentrations - The distributions of total PAHs, total PCBs, mercury, and PCDD/F toxic equivalents at various depths are shown with box-and-whisker plots. The Minnesota plots use a logarithmic scale and the Wisconsin plots use a linear scale.
4.2 Contaminant Concentration Maps

A series of maps were created to compare the levels of sediment contaminants to the CBSQGs. Because these maps were originally based on a request from the WISAT, the Wisconsin terminology for the CBSQGs was used. Samples were color-coded based on their concentrations compared to the TEC, MEC, and PEC.

The maps were created for the following parameters:

- Mean PEC-Q
- Total PCBs
- Total PAHs
- Mercury
- Lead
- TCDD toxic equivalents in wildlife

The maps were generated for each Geographic Zone for the 0-15 cm, 15-50 cm, 50-100 cm, and greater than 100 cm depth intervals. The maps are included as Appendix B of this report. The samples used to generate these maps are based on the same preferred studies described in Section 2.2 of this report.

4.3 Database Queries

As part of the Sediment Characterization project, a series of queries were added to the Phase VII database to assist MPCA and WDNR personnel in conducting additional investigations of the sediment contaminant levels in the AOC. Information related to the queries is stored in the query log table (aaa – QUERY_LOG) in the Phase VII database.

The queries added to the Phase VII database include:

- Total PAH13 –the sum of 13 priority PAH compounds (Crane and Hennes, 2007).
- Total PAH17–the sum of 17 EPA target PAH compounds
- Total PCBs (congeners)- the sum of PCBs for samples with congener and homolog results
- Total PCBs (Aroclors) – the sum of PCBs for samples with Aroclor results
- TCDD TEQ wildlife – TCDD Toxic Equivalent using 17 PCDD/F congeners and WHO-98 toxic equivalent factors (TEFs) for wildlife
- TCDD TEQ human health - TCDD Toxic Equivalent calculated using 17 PCDD/F congeners and WHO-98 toxic equivalent factors (TEFs) for wildlife
- Mean PEC-Q –Mean PEC-Q calculated based on methodology described in Guidance for the Use and Application of Sediment Quality Targets for the Protection of Sediment-dwelling Organisms in Minnesota (Crane and Hennes, 2007).
- Metals PEC-Q – metals component of Mean PEC-Q
- PCB PEC-Q– Total PCB component of Mean PEC-Q
- PAH13 PEC-Q - Total PAH component of Mean PEC-Q based 13 priority PAHs
- SeQI by sample –Canadian Sediment Quality Index (SeQI) for each sample (CCME, 2007)
- SeQI by assessment area- Canadian Sediment Quality Index (SeQI) for each assessment area (CCME, 2007)
- Total PAH34- the sum of 34 PAH compounds
- BaP PAH – Benzo(a)pyrene equivalent toxicity based on Minnesota Department of Health Guidance (MDH, 2001).
PAH_ESB34 – Equilibrium Partitioning Sediment Benchmark for PAH34
PEC-Q PAH17 - PAH component of Mean PEC-Q based on 17 EPA target PAH compounds
PEC-Q PAH34 - PAH component of Mean PEC-Q based on 34 PAH compounds

The calculated values resulting from the queries were also added to the chemistry results table (ptbl-CHEM) to be usable with MPCA Tableau applications.

4.4 Remedial Categorization Memorandum

As part of the Remedial Action Plan (RAP) process for the St. Louis River AOC, LimnoTech was asked by MPCA to categorize SAAs in Minnesota to assist in prioritizing future remediation and restoration activities. The levels of legacy contaminants St. Louis River AOC sediments in Minnesota are well characterized due to extensive sample collection efforts in 2010 and 2011, as well as many years of previous data collection efforts. As described above, the data from recent sampling efforts has recently been compiled and added to the St. Louis River AOC Phase VII database. The available data is sufficient to perform a screening-level analysis to prioritize SAAs within the AOC for remediation efforts based on BUIs linked with sediment contamination. The color scale developed by the MNRAT was adopted for the evaluation:

- Purple - Remedial action complete, monitoring of effectiveness underway or complete.
- Red - Remedial action needed.
- Red-Gray - Additional characterization and assessment needed to determine if remedial action is necessary.
- Yellow - Remediation generally not warranted but management actions must consider the presence of contaminants, especially bioaccumulative contaminants.
- Green - No known contamination. No remedial actions planned.
- Gray - Limited or no samples, but additional characterization and assessment are not needed.

The following approach was used to designate remedial categories for each of the Minnesota SAAs:

- Designations from MNRAT based on site specific knowledge were used as a basis for Red and Red-Gray SAAs.
- SAAs were designated as gray if the sampling data was sparse (fewer than 10 total samples and less than 1 sample per 20 acres).
- Screening level evaluations for three BUIs linked to sediment contamination were used to determine if additional SAAs should be categorized as Red.
- Assessment areas at the low end of the distribution of benthic toxicity screening parameters were categorized as Green.
- All SAAs that were not designated as Red, Green, Red-Gray, or Gray, were designated Yellow.

Table 3 presents the final color designations for each SAA in Minnesota. Further details about the selection of remedial categories for Minnesota is provided in Appendix C. WDNR independently evaluated the SAAs in Wisconsin to determine appropriate remedial categories. The WDNR designations are presented in Table 4. The remedial designations for both states are shown in Figures 1 through 7.
Table 3. Color designation for each of the Minnesota Sediment Assessment Areas in the St. Louis River AOC

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<tr>
<th>SAAID</th>
<th>SAA Name</th>
<th>Color Designation</th>
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<tbody>
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<td>1</td>
<td>Lake Superior - Minnesota</td>
<td>Gray</td>
</tr>
<tr>
<td>3</td>
<td>Minnesota Pocket</td>
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</tr>
<tr>
<td>10</td>
<td>Superior Bay - Minnesota</td>
<td>Yellow</td>
</tr>
<tr>
<td>18</td>
<td>Hearing Island</td>
<td>Yellow</td>
</tr>
<tr>
<td>19</td>
<td>North Park Point Bayside</td>
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</tr>
<tr>
<td>20</td>
<td>Minnesota Slip</td>
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</tr>
<tr>
<td>21</td>
<td>Slip 2</td>
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</tr>
<tr>
<td>22</td>
<td>Slip 3</td>
<td>Red-gray</td>
</tr>
<tr>
<td>23</td>
<td>Slip C</td>
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<tr>
<td>24</td>
<td>General Mills Elevator A Slip</td>
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<tr>
<td>25</td>
<td>Cargill Elevator B1 Slip</td>
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<tr>
<td>26</td>
<td>Cargill Elevator B2 / Northland Pier Slip</td>
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<td>27</td>
<td>Northland Pier / AGP Slip</td>
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<tr>
<td>28</td>
<td>Azcon Corp / Duluth Seaway Port Authority Garfield Slip C</td>
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<td>29</td>
<td>Duluth Seaway Port Authority Garfield Slip D / Clure Public Marine Terminal Berth 1</td>
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<tr>
<td>30</td>
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<td>21st Avenue</td>
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<td>Erie Pier Slip</td>
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<td>Ponds behind Erie Pier</td>
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<td>Grassy Point</td>
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<td>Belknap Flats</td>
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<td>C. Reiss Coal Dock Slip</td>
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<td>67</td>
<td>Bay between C. Reiss and SLRIDT 7 / W. Grassy Point Estuary Flats</td>
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<td>68</td>
<td>SLRIDT Superfund Site</td>
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<td>70</td>
<td>Kingsbury Bay</td>
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<td>71.1</td>
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<td>76</td>
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<tr>
<td>78</td>
<td>Spirit Lake / Devils Elbow</td>
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<tr>
<td>81</td>
<td>New Duluth Stretch</td>
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<td>Mud Lake West</td>
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<td>84</td>
<td>Middle St. Louis River - Minnesota</td>
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<td>85</td>
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<tr>
<td>89</td>
<td>North Bay</td>
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<td>90</td>
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<td>Perch Lake</td>
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<td>92</td>
<td>Rask Bay</td>
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<td>93</td>
<td>Chambers Grove Reach</td>
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<tr>
<td>94</td>
<td>Fond du Lac Reservoir</td>
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<td>95</td>
<td>Lower Jay Cooke State Park Reach</td>
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<tr>
<td>96</td>
<td>Middle Jay Cooke State Park Reach</td>
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<td>97</td>
<td>Oldenburg Point Rapids Reach</td>
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<td>98</td>
<td>Lower Thomson Reach</td>
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<td>Forbay Reservoir</td>
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<td>Scanlon to Thomson Whitewater Reach</td>
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<td>102</td>
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<td>103</td>
<td>NW Paper Company Reach</td>
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<td>104</td>
<td>Cloquet Reservoir</td>
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<td>105</td>
<td>Knife Falls Reservoir</td>
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<tr>
<td>106</td>
<td>Spafford Park Reach</td>
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<tr>
<td>107</td>
<td>Fond du Lac Indian Reservation Reach</td>
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Table 4. Color designation for each of the Wisconsin Sediment Assessment Areas in the St. Louis River AOC

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<th>Color Designation</th>
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<tbody>
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<td>5.2</td>
<td>Superior Bay Mouth</td>
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<td>6</td>
<td>Allouez Bay</td>
<td>Green</td>
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<tr>
<td>7</td>
<td>Bunge Dock Slip</td>
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<tr>
<td>8</td>
<td>Burlington Northern Docks</td>
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<td>9</td>
<td>Nemadji River Mouth / Loonsfoot Landing</td>
<td>Yellow</td>
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<tr>
<td>11</td>
<td>Newton Creek / Hog Island Inlet</td>
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</tr>
<tr>
<td>12</td>
<td>Lakehead Dock Slip / Elevator M Slip</td>
<td>Yellow</td>
</tr>
<tr>
<td>13</td>
<td>Barkers Island and Vicinity</td>
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<td>14</td>
<td>Pickle Pond</td>
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<td>15</td>
<td>Connors Point Waterfront</td>
<td>Yellow</td>
</tr>
<tr>
<td>16</td>
<td>Superior Light &amp; Power MGP Site / Coal Slip</td>
<td>Red</td>
</tr>
<tr>
<td>17</td>
<td>Cutler-Magner Limestone Slip</td>
<td>Yellow</td>
</tr>
<tr>
<td>34</td>
<td>Koppers/Crawford Creek</td>
<td>Red</td>
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<td>47</td>
<td>St. Louis Bay Flats</td>
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<tr>
<td>48</td>
<td>Howards Bay West</td>
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<td>48.1</td>
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<td>50</td>
<td>Howards Bay East</td>
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<td>50.1</td>
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<td>51</td>
<td>Cummings Avenue Slip</td>
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<td>52</td>
<td>Hughitt Slip</td>
<td>Red-Gray</td>
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<tr>
<td>53</td>
<td>Tower Bay Slip</td>
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<tr>
<td>54</td>
<td>Peavey Grain Globe Elevator Slip</td>
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<tr>
<td>55</td>
<td>General Mills S and X Superior Terminal Slip</td>
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<tr>
<td>56</td>
<td>Hallet 8 / C. Reiss Berwin Slip / BP Amoco / Midwest Energy</td>
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<tr>
<td>57</td>
<td>Estuary Flats</td>
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<td>64.2</td>
<td>St. Louis Bay South</td>
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<td>64.3</td>
<td>SLRIDT Wisconsin</td>
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<td>73</td>
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<td>79</td>
<td>Little Pokegama River/Bay</td>
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<td>SAA Name</td>
<td>Color Designation</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------</td>
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</tr>
<tr>
<td>86</td>
<td>St. Louis River Upstream of Oliver Bridge</td>
<td>Green</td>
</tr>
<tr>
<td>87</td>
<td>Red River Bay</td>
<td>Green</td>
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</tbody>
</table>
Figure 1. Remedial categories in Allouez Bay
Figure 2. Remedial categories in Koppers/Crawford Creek
Figure 3. Remedial categories in Superior Bay
Figure 4. Remedial categories in St. Louis Bay
Figure 5. Remedial categories in the Lower St. Louis River
Figure 6. Remedial categories in the Middle St. Louis River
Figure 7. Remedial categories in the Upper St. Louis River
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5

References


Note: Minnesota and Wisconsin chose different color schemes for the Mean PEC-Q diagrams.
The Mean PEC-Q is an integrated measurement of mixtures of sediment contaminants (metals, Total PAH, and Total PCB) divided by their corresponding Probable Effects Concentrations (PECs) or Level II Sediment Quality Targets (SQTs). A Mean PEC-Q value is calculated for each sample. The graphic shows the mean of the Mean PEC-Q values for surface samples (0-15 cm) and subsurface samples (>15 cm). The number of samples is listed on the right side of the graphic. Minnesota dashboards use a blue color scale, while Wisconsin uses a red, yellow, and green scale.

### Core Profiles

The vertical profiles show color coded levels of Mean PEC-Q values and Mercury concentrations from individual samples. Green indicates that the values are less than the Threshold Effects Concentration (TEC) or Level I SQT; yellow shows that the values are greater than the TEC but less than the PEC or Level II SQT, and red shows levels greater than the PEC. Stations are ordered from west to east.

Mercury concentrations are shown because they are not included in the calculation of the Mean PEC-Q. Due to space constraints, only stations with more than one sample are shown for assessment areas with greater than XX stations.

### Results Exceeding Thresholds (0-15 cm samples)

The bar plots show the percentages of surface samples exceeding sediment threshold concentrations for a number of parameters. Surface samples are limited to those that start at the surface and where the majority of the sample is found at a depth less than 15 cm. One bar plot is generated for metals and another for organic contaminants.

For assessment areas in Minnesota, the percentages exceeding the Level I and Level II SQTs are shown. For assessment areas in Wisconsin, the percentages exceeding the TEC, the midpoint effects concentration (MEC), and the PEC are shown. For each parameter, the number of surface samples used to make the calculation is shown at the bottom of each bar.

### Map of Assessment Area Cores

The map shows the locations of the available samples in the assessment area. Samples used to create the summary graphics are shown as purple dots and labeled. Other samples are shown as gray dots. Areas with a water depth greater than 8 ft are shown in blue.

### Mean PEC-Q

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Low</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>0-15</td>
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<td>2</td>
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### Data Summary

This section presents a table with a count of stations, samples, and results for several categories of sediment chemistry parameters: metals (without mercury), mercury, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), pesticides, other chemicals, total organic carbon, and grain size distribution. The other chemicals category includes parameters such as diesel range organics and semi-volatiles (not including PAHs). The table shows the totals used in the assessment summary and, in parentheses, the totals available for the assessment area.

### Distributions of Constituent Concentrations

The distributions of Total PAHs, Total PCBs, Mercury, and PCDD/F toxic equivalents at various depths are shown with box-and-whisker plots. Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range (25th to 75th percentiles). Individual samples outside the whiskers are shown as open circles.

All samples are assigned to one of the following depth categories 0-15 cm, 15-50 cm, 50-100 cm, and >100 cm. Samples that span more than one depth interval are assigned to the interval where the highest fraction of the sample occurs. Minnesota plots use a logarithmic scale and Wisconsin plots use a linear scale.

### Sediment Assessment Summary Protocols for All Figures

- In general, recent studies were used to generate the summaries for assessment areas in Minnesota, based on selection by MPCA personnel. All available data was used to generate the summaries for assessment areas in Wisconsin.
- Level I and Level II SQTs were taken from Guidance for the Use and Application of Sediment Quality Targets for the Protection of Sediment-dwelling Organisms in Minnesota (Crane and Henness, 2007).
- TEC, MEC, and PEC values were taken from Consensus-Based Sediment Quality Guidelines Recommendations for Use & Application Interim Guidance (WDNR, 2003).
- Total PAH values are calculated with the 13 priority PAHs.
- Metals values are preferentially based on total metal measurements. For samples that do not have a total measurement, the simultaneously extracted metal value was substituted.
- Total PCBs are preferentially calculated as congener sums. For samples without a PCB congener measurement, the sum of Aroclors was substituted.
- Dioxin TEO values are calculated using Fish Ecological Risk Toxic equivalency factors (TEFs) based on 1998 World Health Organization values.
- Values below the detection limit are treated as follows: Dioxin TEO values are calculated using a Kaplan-Meier estimator. PAH values are estimated based on regressions with other PAH compounds. PCB sums are calculated assuming non-detects are equal to zero. Metal concentrations are replaced with: Half the detection limit, if greater than 40% of measurements from the study are below detection limits. The detection limit is the highest percentage of measurements from the study below detection limits.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Nemadji Shoal, 2001 (1 stations)
- Duluth-Superior Harbor Study, 1995 (3)

Other chemical studies:
- Nemadji Shoal, 2001; Duluth-Superior Harbor Study, 1995 (3).

Macro-invertebrate studies:

Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

Data Summary

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<td>PCBs</td>
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<td>PCDD/Fs</td>
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<td>Other parameters</td>
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<tr>
<td>Grain size</td>
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</table>

Distributions of Constituent Concentrations

- Level I SQT
- Level II SOT

No samples analyzed for PAHs

No PCBs detected in 0 analyzed samples

No samples analyzed for mercury

No samples analyzed for PCDD/F TEQ.

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
- Nemadji Shoal, 2001 (1 stations); Duluth-Superior Harbor Study, 1995 (3).

Macro-invertebrate studies:

Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

No surface samples available
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Sediment Assessment Area Chemistry Characterization

**Assessment Area #2 (Lake Superior - Wisconsin)**

**Geographic zone:** Lake Superior  
**Date Generated:** 6/28/2013

The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

Available data in studies used for characterization

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<th>Number of Results</th>
</tr>
</thead>
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<tr>
<td>Mercury</td>
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<td>PAHs</td>
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<td>Grain size</td>
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### Distributions of Constituent Concentrations

![Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.](image)

**Constituent**

- **TEC**
- **MEC**
- **PEC**

### Results Exceeding Thresholds (0-15 cm samples)

- **No samples analyzed for PAHs**
- **No PCBs detected in 0 analyzed samples**
- **No samples analyzed for mercury**
- **No samples analyzed for PCDD/F TEQ**

**Assessment Area #2 (Lake Superior - Wisconsin)**

**Geographic zone:** Lake Superior

**Date Generated:** 6/28/2013

No data available for core profile
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

**Available data in studies used for characterization**

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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<td>Pesticides</td>
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<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>0(0)</td>
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</tbody>
</table>

### Distributions of Constituent Concentrations

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.

- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ
- No surface samples available

### Core Profiles

No data available for core profile
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (3 stations); R-EMAP Study, 1996 (1); USACE DACW35-93-D-0005 DELIVERY ORDER 29 (1).

Other chemical studies:
- R-EMAP Study, 1995 (3 stations); R-EMAP Study, 1996 (1); USACE DACW35-93-D-0005 DELIVERY ORDER 29 (1).

Macro-invertebrate studies:

Fish tissue studies:
- Maps show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.

### Data Summary

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tbody>
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<td>Mercury</td>
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<td>PCDD/Fs</td>
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### Results Exceeding Thresholds (0-15 cm samples)

- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No surface samples available
- No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (7 stations)
- R-EMAP Study, 1996 (2)
- Nemadji Shoal, 2001 (4)
- USACE DACW35-93-D-0005 DELIVERY ORDER 29 (4)
- USACE DACW35-91-D-0001 DELIVERY ORDER 40 (3)
- Wisconsin Sampling, 2007 (1)

Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - R-EMAP Study, 1996
  - Nemadji Shoal, 2001
  - USACE DACW35-93-D-0005 DELIVERY ORDER 29
  - USACE DACW35-91-D-0001 DELIVERY ORDER 40
  - Wisconsin Sampling, 2007

Other parameters:
- TOC
- Grain size
- Other parameters

Sediment Assessment Area Chemistry Characterization

Assessment Area #5.1 (Superior Bay NC)
Geographic zone: Superior Bay
Date Generated: 6/28/2013

Mean PEC-Q

Distributions of Constituent Concentrations

Data Summary

Available data in studies used for characterization
(All available data)

### Constituent
- **Metals (without Hg)**
- **Mercury**
- **PAHs**
- **PCBs**
- **PCDD/Fs**
- **Pesticides**
- **Other parameters**

### Results Exceeding Thresholds (0-15 cm samples)

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<tr>
<th>Constituent</th>
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<th>Number of Samples</th>
<th>Number of Results</th>
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<td>21 (21)</td>
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### Metal Results

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<td>Zn</td>
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### PAHs, PCBs, & PCDD/Fs

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<th>% &gt; MEC</th>
<th>% &gt; PEC</th>
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<td>Total PCBs</td>
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<tr>
<td>PCDD/Fs</td>
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No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Mean PEC-Q**

Insufficient results available for PEC-Q calculation.

**Data Summary**

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<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tr>
<td>Mercury</td>
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<td>PAHs</td>
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<td>0(0)</td>
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<tr>
<td>PCBs</td>
<td>0(0)</td>
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<td>0(0)</td>
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<td>PCDD/Fs</td>
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<td>Pesticides</td>
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**Distributions of Constituent Concentrations**

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<th>MEC</th>
<th>PEC</th>
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</tr>
<tr>
<td>Mercury</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PAHs</td>
<td></td>
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</tr>
<tr>
<td>PCBs</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>PCDD/Fs</td>
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<tr>
<td>Pesticides</td>
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<tr>
<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td></td>
<td></td>
<td></td>
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</table>

**Results Exceeding Thresholds (0-15 cm samples)**

No surface samples available.

**No samples analyzed for mercury**

**No samples analyzed for PCDD/F TEQ**

**No PCBs detected in 0 analyzed samples**

**No samples analyzed for PAHs**

**No data available for core profile**

**Map of Assessment Area Cores**

**Labeled Stations Used in Characterization**

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
- Other chemical studies:
- Macro-invertebrate studies:
- Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Assessment Area # 5 (Superior Bay - Wisconsin)**

**Geographic zone:** Superior Bay  
**Date Generated:** 6/28/2013

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### Studies with Samples in Sediment Assessment Area:

**Chemical studies used in the characterization:**

- Other chemical studies:
- Macro-invertebrate studies:
- Fish tissue studies:

---

### Distribution of Constituent Concentrations

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
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<td>Metals (without Hg)</td>
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<td>Mercury</td>
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<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
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<td>0(0)</td>
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<td>Pesticides</td>
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<td>Grain size</td>
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</table>

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**Results Exceeding Thresholds (0-15 cm samples)**

- No surface samples available

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**Sediment Assessment Area Chemistry Characterization**

---

**Mean PEC-Q**

Insufficient results available for PEC-Q calculation

---

**No samples analyzed for PAHs**

---

**No PCBs detected in 0 analyzed samples**

---

**No samples analyzed for mercury**

---

**No samples analyzed for PCDD/F TEQ**

---

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (8 stations)
- Bioaccumulation Study, 1999 (1)
- Duluth-Superior Harbor Study, 1993 (1)

Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - Bioaccumulation Study, 1999
  - Duluth-Superior Harbor Study, 1993

Fish tissue studies:

### Data Summary
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tbody>
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<td>Metals (without Hg)</td>
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<tr>
<td>Mercury</td>
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<td>PAHs</td>
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### Results Exceeding Thresholds (0-15 cm samples)

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<td>60 %</td>
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<tr>
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<td>Zn</td>
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<td>60 %</td>
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### Distributions of Constituent Concentrations

- Total PAHs
- Total PCBs
- Total PCDD/Fs

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Mean PEC-Q**

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**Studies with Samples in Sediment Assessment Area:**

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations)
- R-EMAP Study, 1996 (1)
- Wisconsin Sampling, 2007 (7)

Other chemical studies:
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

**Mercury (mg/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.

**Total PAHs (ug/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
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No samples analyzed for PCDD/F TEQ.

**Total PCBs**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

No samples analyzed for PCDD/F TEQ.

**PCDD/Fs**

<table>
<thead>
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<th>Depth (cm)</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (1 stations);
- Duluth-Superior Harbor Study, 1993 (1); Wisconsin Sampling, 2007 (6).

**Other chemical studies:**

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)
- No PCBs detected in 0 analyzed samples

### Data Summary

Available data in studies used for characterization

#### (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>7(7)</td>
<td>11(11)</td>
<td>123(123)</td>
</tr>
<tr>
<td>Mercury</td>
<td>8(8)</td>
<td>15(15)</td>
<td>15(15)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(7)</td>
<td>11(11)</td>
<td>289(289)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6(6)</td>
<td>10(10)</td>
<td>10(10)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>8(8)</td>
<td>15(15)</td>
<td>130(130)</td>
</tr>
<tr>
<td>TOC</td>
<td>8(8)</td>
<td>15(15)</td>
<td>15(15)</td>
</tr>
<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>11(11)</td>
<td>27(27)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

**Metals**
- % > TEC: 0 %
- % > MEC: 0 %
- % > PEC: 0 %

**PAHs, PCBs, & PCDD/Fs**
- No samples analyzed for PCDD/F TEQ

---

### Maps and Diagrams

- Map of Assessment Area Cores
- Labeled Stations Used in Characterization
- Studies with Samples in Sediment Assessment Area
- Chemical studies used in the characterization: R-EMAP Study, 1995 (1 stations); Duluth-Superior Harbor Study, 1993 (1); Wisconsin Sampling, 2007 (6).
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)
  - No PCBs detected in 0 analyzed samples
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations); R-EMAP Study, 1996 (1)
- Duluth-Superior Harbor Study, 1993 (1)
- Hog Island Inlet Study, 2002 (3)
- Newton Creek Study, 1993-94 (6)
- Hog Island Post Remediation, 2006 (1)
- Wisconsin Sampling, 2007 (20)

### Other chemical studies:
- Macro-invertebrate studies:
- Other parameters:
  - TOC (29 stations)
  - Grain size (27 stations)

### Data Summary
Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>24(24)</td>
<td>46(46)</td>
<td>304(304)</td>
</tr>
<tr>
<td>Mercury</td>
<td>24(24)</td>
<td>48(48)</td>
<td>48(48)</td>
</tr>
<tr>
<td>PAHs</td>
<td>24(24)</td>
<td>44(44)</td>
<td>885(885)</td>
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<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>6(6)</td>
<td>6(6)</td>
<td>102(102)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>13(13)</td>
<td>24(24)</td>
<td>24(24)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>30(30)</td>
<td>56(56)</td>
<td>667(667)</td>
</tr>
<tr>
<td>TOC</td>
<td>29(29)</td>
<td>50(50)</td>
<td>50(50)</td>
</tr>
<tr>
<td>Grain size</td>
<td>27(27)</td>
<td>47(47)</td>
<td>95(95)</td>
</tr>
</tbody>
</table>

### Total PAHs (ug/kg)
- 24(24) 46(46) 304(304)
- 1

### Metals
- As
- Cd
- Cr
- Cu
- Pb
- Hg
- Ni
- Zn
- Metals
- % >TEC % >MEC % >PEC

### PCDD/F TEQ (pg/g)
- Total PAHs
- Total PCBs
- Total PCDD/Fs

### Results Exceeding Thresholds (0-15 cm samples)
- Mercury (mg/kg)
  - >100 (29)
  - 50-100 (12)
  - 15-50 (9)
  - 0-15 (6)
  - >15 (2)

### Fish tissue studies:
- Macro-invertebrate studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>8(23)</td>
<td>16(31)</td>
<td>160(259)</td>
</tr>
<tr>
<td>Mercury</td>
<td>8(24)</td>
<td>16(34)</td>
<td>16(34)</td>
</tr>
<tr>
<td>PAHs</td>
<td>8(14)</td>
<td>16(22)</td>
<td>288(390)</td>
</tr>
<tr>
<td>PCBs</td>
<td>8(8)</td>
<td>16(16)</td>
<td>112(112)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>200(200)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>8(8)</td>
<td>208(208)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>8(24)</td>
<td>16(35)</td>
<td>641(720)</td>
</tr>
<tr>
<td>TOC</td>
<td>8(24)</td>
<td>16(35)</td>
<td>16(35)</td>
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<tr>
<td>Grain size</td>
<td>8(23)</td>
<td>16(31)</td>
<td>16(125)</td>
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Potential Impairment

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 cm</td>
<td>0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1</td>
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</tr>
</tbody>
</table>

Sediment Assessment Area Chemistry Characterization

Assessment Area # 10 (Superior Bay - Minnesota)

Geographic zone: Superior Bay

Date Generated: 6/28/2013

Available data in studies used for characterization

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>8(23)</td>
<td>16(31)</td>
<td>160(259)</td>
</tr>
<tr>
<td>Mercury</td>
<td>8(24)</td>
<td>16(34)</td>
<td>16(34)</td>
</tr>
<tr>
<td>PAHs</td>
<td>8(14)</td>
<td>16(22)</td>
<td>288(390)</td>
</tr>
<tr>
<td>PCBs</td>
<td>8(8)</td>
<td>16(16)</td>
<td>112(112)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>200(200)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>8(8)</td>
<td>208(208)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>8(24)</td>
<td>16(35)</td>
<td>641(720)</td>
</tr>
<tr>
<td>TOC</td>
<td>8(24)</td>
<td>16(35)</td>
<td>16(35)</td>
</tr>
<tr>
<td>Grain size</td>
<td>8(23)</td>
<td>16(31)</td>
<td>16(125)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations

<table>
<thead>
<tr>
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<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 cm</td>
<td>0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1</td>
<td></td>
</tr>
</tbody>
</table>

Mean PEC-Q

<table>
<thead>
<tr>
<th>Mean PEC-Q (mg/kg)</th>
<th>Mean PEC-Q (mg/kg)</th>
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</thead>
<tbody>
<tr>
<td>&lt;0.1</td>
<td>&gt;0.1</td>
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<tr>
<td>0.1-0.6</td>
<td>&gt;0.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mercur (mg/kg)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
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<tbody>
<tr>
<td>&lt;0.1</td>
<td>&gt;0.1</td>
<td></td>
</tr>
<tr>
<td>0.1-1.1</td>
<td>&gt;1.1</td>
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<table>
<thead>
<tr>
<th>Total PAHs (ug/kg)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>&gt;100</td>
<td></td>
</tr>
<tr>
<td>50-100</td>
<td>&gt;50</td>
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<tr>
<td>0-15</td>
<td>&gt;0</td>
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<table>
<thead>
<tr>
<th>Total PCBs (ug/kg)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
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<tbody>
<tr>
<td>&lt;100</td>
<td>&gt;100</td>
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</tr>
<tr>
<td>50-100</td>
<td>&gt;50</td>
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<tr>
<td>0-15</td>
<td>&gt;0</td>
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<table>
<thead>
<tr>
<th>PCDD/F TEQ (pg/g)</th>
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<th>Level II SQT</th>
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<tbody>
<tr>
<td>&lt;50</td>
<td>&gt;50</td>
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<tr>
<td>15-50</td>
<td>&gt;15</td>
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<td>0-15</td>
<td>&gt;0</td>
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<table>
<thead>
<tr>
<th>Metals</th>
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<th>Level II SQT</th>
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<td>8</td>
</tr>
<tr>
<td>Cd</td>
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<td>8</td>
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<td>Cr</td>
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<td>Cu</td>
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<td>4</td>
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<td>Zn</td>
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</table>

<table>
<thead>
<tr>
<th>PAHs, PCBs, &amp; PCDD/Fs</th>
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<th>Level II SQT</th>
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<tbody>
<tr>
<td>As</td>
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<td>8</td>
</tr>
<tr>
<td>Cd</td>
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<td>8</td>
</tr>
<tr>
<td>Zn</td>
<td>8</td>
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<table>
<thead>
<tr>
<th>Total PAHs</th>
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<th>Level II SQT</th>
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</tbody>
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<table>
<thead>
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<th>Total PCBs</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCDD/F TEQ</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Hog Island Post Remediation, 2006 (9 stations).
- R-EMAP Study, 1995 (2 stations); R-EMAP Study, 1996 (2 stations); Hog Island Inlet Study, 2002 (17); Newton Creek Study, 2002 (14); Newton Creek Study, 1993-94 (68); Hog Island Inlet/Newton Creek 2004 (29); Newton Creek Segments B and C 2000 (12); Wisconsin Sampling, 2007 (1).

**Macro-invertebrate studies:**

**Fish tissue studies:**
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ

### Data Summary

**Available data in studies used for characterization**

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>9(123)</td>
<td>14(216)</td>
<td>14(760)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(92)</td>
<td>0(153)</td>
<td>0(153)</td>
</tr>
<tr>
<td>PAHs</td>
<td>9(114)</td>
<td>14(197)</td>
<td>252(3649)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(2)</td>
<td>0(2)</td>
<td>0(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(5)</td>
<td>0(5)</td>
<td>0(5)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>9(153)</td>
<td>14(290)</td>
<td>140(3227)</td>
</tr>
<tr>
<td>TOC</td>
<td>9(86)</td>
<td>14(118)</td>
<td>14(118)</td>
</tr>
<tr>
<td>Grain size</td>
<td>9(84)</td>
<td>0(165)</td>
<td>0(230)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

**Metals**

<table>
<thead>
<tr>
<th>Concentration</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cd</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cr</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cu</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pb</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hg</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ni</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zn</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**PAHs, PCBs, & PCDD/Fs**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No samples analyzed for PCDD/F TEQ</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- **Total PAHs (ug/kg)**
- **Total PCBs**
- **PCDD/Fs**

No PCBs detected in 0 analyzed samples

No samples analyzed for mercury

No samples analyzed for PCDD/F TEQ

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Lakehead Dock, 1995 (1 station)
- Newton Creek Study, 1993-94 (2)
- Wisconsin Sampling, 2007 (13)

**Other chemical studies:**
- Fish tissue studies: Results Exceeding Thresholds (0-15 cm samples)

**Data Summary**
Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>14(14)</td>
<td>25(25)</td>
<td>213(213)</td>
</tr>
<tr>
<td>Mercury</td>
<td>14(14)</td>
<td>25(25)</td>
<td>25(25)</td>
</tr>
<tr>
<td>PAHs</td>
<td>14(14)</td>
<td>25(25)</td>
<td>575(575)</td>
</tr>
<tr>
<td>PCBs</td>
<td>12(12)</td>
<td>21(21)</td>
<td>231(231)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>12(12)</td>
<td>21(21)</td>
<td>32(32)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>15(15)</td>
<td>26(26)</td>
<td>322(322)</td>
</tr>
<tr>
<td>TOC</td>
<td>14(14)</td>
<td>23(23)</td>
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<tr>
<td>Grain size</td>
<td>14(14)</td>
<td>25(25)</td>
<td>25(25)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**
- Metals
- PAHs, PCBs, & PCDD/Fs

**No samples analyzed for PCDD/F TEQ**

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- Mercury (mg/kg)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations); Hotspot Study, 1994 (8)
- Duluth-Superior Harbor Study, 1993 (1); IT Interlake, 1994 (1); Wisconsin Sampling, 2007 (42).

Other chemical studies:
- Fish tissue studies:

### Mean PEC-Q

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>43(43)</td>
<td>69(69)</td>
<td>694(694)</td>
</tr>
<tr>
<td>Mercury</td>
<td>52(52)</td>
<td>90(90)</td>
<td>90(90)</td>
</tr>
<tr>
<td>PAHs</td>
<td>44(44)</td>
<td>73(73)</td>
<td>1906(1906)</td>
</tr>
<tr>
<td>PCBs</td>
<td>37(37)</td>
<td>66(66)</td>
<td>1895(1895)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>7(7)</td>
<td>9(9)</td>
<td>153(153)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>42(42)</td>
<td>66(66)</td>
<td>95(95)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>91(91)</td>
<td>1135(1135)</td>
</tr>
<tr>
<td>TOC</td>
<td>52(52)</td>
<td>88(88)</td>
<td>88(88)</td>
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<td>Grain size</td>
<td>51(51)</td>
<td>86(86)</td>
<td>310(310)</td>
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</table>

### Mean PEC-Q (PQ)

#### Mercury (Hg, mg/kg)

<table>
<thead>
<tr>
<th>Depths (cm)</th>
<th>0-15</th>
<th>15-50</th>
<th>&gt;50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
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<td>100</td>
<td>15</td>
</tr>
<tr>
<td>Samples</td>
<td>120</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
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<td>29</td>
<td>7</td>
</tr>
<tr>
<td>Cd</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hg</td>
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<td></td>
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<tr>
<td>Ni</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zn</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### PAHs, PCBs, & PCDD/Fs

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PAHs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total PCBs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

#### Total PAHs (ug/kg)

<table>
<thead>
<tr>
<th>Depths (cm)</th>
<th>0-15</th>
<th>15-50</th>
<th>&gt;50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>0</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>Samples</td>
<td>120</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Total PCBs (ug/kg)

<table>
<thead>
<tr>
<th>Depths (cm)</th>
<th>0-15</th>
<th>15-50</th>
<th>&gt;50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>0</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>Samples</td>
<td>120</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Assessment Area # 14 (Pickle Pond)

**Geographic zone:** Superior Bay  
**Date Generated:** 6/28/2013

**Sediment Assessment Area Chemistry Characterization**

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6(6)</td>
<td>6(6)</td>
<td>54(54)</td>
</tr>
<tr>
<td>Mercury</td>
<td>6(6)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6(6)</td>
<td>6(6)</td>
<td>228(228)</td>
</tr>
<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>6(6)</td>
<td>66(66)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6(6)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>6(6)</td>
<td>6(6)</td>
<td>90(90)</td>
</tr>
<tr>
<td>TOC</td>
<td>6(6)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
<tr>
<td>Grain size</td>
<td>6(6)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
</tbody>
</table>

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization: Wisconsin Sampling, 2007 (6 stations).
- Other chemical studies:
  - Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

**Mercury (mg/kg)**

0-15 cm (6 stations)

- TEC: 0.18
- MEC: 1.1
- PEC: >1.1

**Total PAHs (μg/kg)**

0-15 cm (6 stations)

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations); Hotspot Study, 1994 (1); Duluth-Superior Harbor Study, 1993 (1); Fraser Shipyards/Howard’s Pocket, 2002 (1); Wisconsin Sampling, 2007 (34).

Other chemical studies:
- Fish tissue studies: Results Exceeding Thresholds (0-15 cm samples)

### Data Summary

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>27(27)</td>
<td>50(50)</td>
<td>487(487)</td>
</tr>
<tr>
<td>Mercury</td>
<td>29(29)</td>
<td>55(55)</td>
<td>55(55)</td>
</tr>
<tr>
<td>PAHs</td>
<td>27(27)</td>
<td>50(50)</td>
<td>1202(1202)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>5(5)</td>
<td>251(251)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>25(25)</td>
<td>47(47)</td>
<td>69(69)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>29(29)</td>
<td>55(55)</td>
<td>617(617)</td>
</tr>
<tr>
<td>TOC</td>
<td>27(27)</td>
<td>52(52)</td>
<td>52(52)</td>
</tr>
<tr>
<td>Grain size</td>
<td>29(29)</td>
<td>55(55)</td>
<td>147(147)</td>
</tr>
</tbody>
</table>

### Sediment Assessment Area Chemistry Characterization

**Assessment Area # 15 (Connors Point Waterfront)**

**Geographic zone:** Superior Bay

**Date Generated:** 6/28/2013

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
  - R-EMAP Study, 1995
  - Hotspot Study, 1994
  - Duluth-Superior Harbor Study, 1993
  - Fraser Shipyards/Howard’s Pocket, 2002
  - Wisconsin Sampling, 2007

- Other chemical studies:

- Fish tissue studies: Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- Other chemical studies:
- Fish tissue studies:
  - Mercury, Metals (without Hg)
  - PAHs, PCBs, PCDD/Fs

### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
- Other chemical studies:
- Fish tissue studies:
  - Mercury, Metals (without Hg)
  - PAHs, PCBs, PCDD/Fs

### Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>(2)</td>
<td>(4)</td>
<td>(36)</td>
</tr>
<tr>
<td>Mercury</td>
<td>(3)</td>
<td>(6)</td>
<td>(6)</td>
</tr>
<tr>
<td>PAHs</td>
<td>(2)</td>
<td>(4)</td>
<td>(152)</td>
</tr>
<tr>
<td>PCBs</td>
<td>(1)</td>
<td>(2)</td>
<td>(149)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>(2)</td>
<td>(4)</td>
<td>(4)</td>
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<tr>
<td>Other parameters</td>
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<td>(6)</td>
</tr>
<tr>
<td>Grain size</td>
<td>(3)</td>
<td>(6)</td>
<td>(26)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- Metals
- Mercury (mg/kg)
- PAHs, PCBs, & PCDD/Fs

### Distributions of Constituent Concentrations

- Total PAHs (ug/kg)
- PCDD/F TEQ

### Available data in studies used for characterization

- (All available data)

### Potential Impairment

<table>
<thead>
<tr>
<th>Level</th>
<th>0-15 cm (2)</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>100%</td>
</tr>
<tr>
<td>High</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Other parameters

- No PCBs detected in 0 analyzed samples
- No samples analyzed for PCDD/F TEQ

### Map of Assessment Area Cores

- Labeled Stations Used in Characterization

- Depth (cm)
- Total PAHs (ug/kg)
- Mercury (mg/kg)
- Total PCBs
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- Wisconsin Sampling, 2007 (7 stations).
- Other chemical studies:
  - Fish tissue studies:

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals
- As
- Cd
- Cr
- Cu
- Pb
- Hg
- Ni
- Zn

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>5(5)</td>
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<tr>
<td>Mercury</td>
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<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>5(5)</td>
<td>10(10)</td>
<td>10(10)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>TOC</td>
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<td>24(24)</td>
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<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>12(12)</td>
<td>24(24)</td>
</tr>
</tbody>
</table>

#### PAHs, PCBs, & PCDD/Fs

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Total PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- **Total PAHs (µg/kg)**
- **Mercury (mg/kg)**

### Data Summary

Available data in studies used for characterization

**All available data**

### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Wisconsin Sampling, 2007 (7 stations).
- Other chemical studies:
  - Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization: Superior Bay - 21st Ave., 2008&10 (7 stations).


Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

Mean PEC-Q

<table>
<thead>
<tr>
<th>Core Profiles</th>
<th>Mean PEC-Q(PQ)</th>
<th>Mercury (Hg, mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-6-M1</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>Hi-100</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>SB-45</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>Hi-R-1</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>Hi-B-1-M1</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>Hi-R-2</td>
<td>PQ</td>
<td>Hg</td>
</tr>
<tr>
<td>Hi-R-3</td>
<td>PQ</td>
<td>Hg</td>
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</tbody>
</table>

Data Summary

Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>7(16)</td>
<td>14(23)</td>
<td>140(233)</td>
</tr>
<tr>
<td>Mercury</td>
<td>7(18)</td>
<td>14(27)</td>
<td>14(27)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(16)</td>
<td>14(23)</td>
<td>502(647)</td>
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<tr>
<td>PCBs</td>
<td>7(15)</td>
<td>14(22)</td>
<td>98(154)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>150(150)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>6(6)</td>
<td>150(150)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>7(18)</td>
<td>14(27)</td>
<td>527(617)</td>
</tr>
<tr>
<td>TOC</td>
<td>7(10)</td>
<td>14(19)</td>
<td>14(19)</td>
</tr>
<tr>
<td>Grain size</td>
<td>7(17)</td>
<td>14(24)</td>
<td>24(103)</td>
</tr>
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Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>PAHs, PCBs, &amp; PCDD/Fs</td>
<td>7</td>
<td>7</td>
</tr>
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</table>

Distributions of Constituent Concentrations

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Total PAHs (ug/kg)</th>
<th>Total PCBs (ug/kg)</th>
<th>PCDD/F TEQ (pg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Superior Bay - 21st Ave., 2008&10 (14 stations).
- Other chemical studies: R-EMAP Study, 1995 (1 stations); R-EMAP Study, 1996 (1).

**Macro-invertebrate studies:**

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)

---

**Data Summary**

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>14(16)</td>
<td>28(30)</td>
<td>280(290)</td>
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<tr>
<td>Mercury</td>
<td>14(16)</td>
<td>28(30)</td>
<td>28(30)</td>
</tr>
<tr>
<td>PAHs</td>
<td>14(16)</td>
<td>28(30)</td>
<td>1088(1124)</td>
</tr>
<tr>
<td>PCBs</td>
<td>14(14)</td>
<td>28(28)</td>
<td>196(196)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>6(6)</td>
<td>12(12)</td>
<td>300(300)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6(6)</td>
<td>12(12)</td>
<td>300(300)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>14(16)</td>
<td>28(30)</td>
<td>1064(1084)</td>
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<td>TOC</td>
<td>14(16)</td>
<td>28(30)</td>
<td>56(70)</td>
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</table>

**Distributions of Constituent Concentrations**

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **PCDD/F TEQ (pg/g)**

**Potential Impairment**

- Low
- High

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 cm</td>
<td>0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1</td>
<td></td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- **Metals**
  - As
  - Cd
  - Cr
  - Cu
  - Pb
  - Hg
  - Ni
  - Zn

- **PAHs, PCBs, & PCDD/Fs**

---

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
  - Superior Bay - 21st Ave., 2008&10 (14 stations).
- Other chemical studies: R-EMAP Study, 1995 (1 stations); R-EMAP Study, 1996 (1).
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- MN Slip Sed. Remediation Scoping, 1999 (18 stations); Minnesota Slip Samples, 1998 (3); Minnesota Slip MPCA 2004 (8).
- Other chemical studies: R-EMAP Study, 1995 (1 stations); Hotspot Study, 1994 (5); R-EMAP Study, 1996 (1); Bioaccumulation Study, 1999 (2); Duluth-Superior Harbor Study, 1993 (1).

**Macro-invertebrate studies:**

**Fish tissue studies:**

---

### Data Summary

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>29(31)</td>
<td>110(112)</td>
<td>375(385)</td>
</tr>
<tr>
<td>Mercury</td>
<td>29(39)</td>
<td>110(138)</td>
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</tr>
<tr>
<td>PAHs</td>
<td>29(38)</td>
<td>91(105)</td>
<td>1638(1870)</td>
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<tr>
<td>PCBs</td>
<td>17(24)</td>
<td>21(43)</td>
<td>1911(3372)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>29(39)</td>
<td>110(138)</td>
<td>920(1118)</td>
</tr>
<tr>
<td>TOC</td>
<td>29(39)</td>
<td>105(133)</td>
<td>105(133)</td>
</tr>
<tr>
<td>Grain size</td>
<td>21(28)</td>
<td>71(93)</td>
<td>691(885)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- **Mercury (mg/kg):**
  - Level I SQT: 0-0.1
  - Level II SQT: 0.1-0.5
  - >0.5: 0%

- **Total PAHs (ug/kg):**
  - >15 cm: 0%

- **Total PCBs (ug/kg):**
  - >15 cm: 0%

- **PCDD/Fs:**
  - No samples analyzed for PCDD/F TEQ

---

### Distributions of Constituent Concentrations

**Mean PEC-Q**

- Low: 0-0.1
- Medium: 0.1-0.5
- High: >0.5

**Mercury (Hg, mg/kg):**

- Level I SQT: 0-0.1
- Level II SQT: 0.1-0.5
- >0.5: 0%

---

**Bioavailability:**

- No samples analyzed for PCDD/F TEQ

---

**Light gray area:**

- 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Studies with Samples in Sediment Assessment Area:**

Chemical studies used in the characterization:
- Superior Bay - 21st Ave., 2008&10 (4 stations).

Other chemical studies:
- Superior Bay - 21st Ave., 2008&10.

Macro-invertebrate studies:
- Superior Bay - 21st Ave., 2008&10.

Fish tissue studies:
- Superior Bay - 21st Ave., 2008&10.

### Data Summary

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>4(4)</td>
<td>8(8)</td>
<td>80(80)</td>
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<tr>
<td>Mercury</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>144(144)</td>
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<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>56(56)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>4(4)</td>
<td>104(104)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>4(4)</td>
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<td>TOC</td>
<td>4(4)</td>
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<td>8(8)</td>
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<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

**Metals**

- %>Level I SQT: 4
- %>Level II SQT: 4

**PAHs, PCBs, & PCDD/Fs**

- %>Level I SQT: 4
- %>Level II SQT: 2

**Mercury (mg/kg)**

- 0.01 to 0.1: 4
- 0.1 to 1: 4
- 1 to 10: 4
- 10 to 100: 1
- >100: 0

**Total PAHs (ug/kg)**

- 0-15: 4
- >15: 4

**Total PCBs (ug/kg)**

- 0-15: 4
- >15: 4

**PCDD/F TEQ (pg/g)**

- 0-15: 4
- >15: 2

---

**Results Exceeding Thresholds (0-15 cm samples):**

- Metals: 4
- PAHs, PCBs, & PCDD/Fs: 4
- Mercury: 4
- Total PAHs: 4
- Total PCBs: 4
- PCDD/F TEQ: 2

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Mean PEC-Q

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Potential Impairment</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;15 cm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Studies with Samples in Sediment Assessment Area:

**Chemical studies used in the characterization:**

Superior Bay - 21st Ave., 2008&10 (4 stations).

**Other chemical studies:**

- Fish tissue studies:

### Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>4(4)</td>
<td>8(8)</td>
<td>80(80)</td>
</tr>
<tr>
<td>Mercury</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>144(144)</td>
</tr>
<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>56(56)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>4(4)</td>
<td>104(104)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>4(4)</td>
<td>8(8)</td>
<td>324(324)</td>
</tr>
<tr>
<td>TOC</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- ** Metals**: (100000 cm)
- **Total PAHs (ug/kg)**: (1000 cm)
- **Total PCBs (ug/kg)**: (1000 cm)
- **PCDD/F TEQ (pg/g)**: (1000 cm)

### Results Exceeding Thresholds (0-15 cm samples)

- **%>Level I SQT**
- **%>Level II SQT**

### As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>0.10</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>1.00</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>10.00</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>100.00</td>
<td>80%</td>
<td>80%</td>
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</table>

### Total PAHs, Total PCBs, PCDD/Fs

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Total PAHs</th>
<th>Total PCBs</th>
<th>PCDD/Fs TEQ</th>
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</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
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</tr>
<tr>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

**Stress values:**
- Mean PEC-Q (0.1-1.1)
- TOC (0.01-0.50)
- Grain size (0.01-10.00)
- Metals (0.01-50.00)

**Legend:**
- '<=' sign indicates values below the threshold.
- '>' sign indicates values above the threshold.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Assessment Study of Slip C, 1997 (14 stations); Superior Bay - 21st Ave., 2008&10 (10).
- Other chemical studies: R-EMAP Study, 1995 (2 stations); Hotspot Study, 1994 (7); Bioaccumulation Study, 1999 (2); Duluth-Superior Harbor Study, 1993 (4).

Macro-invertebrate studies:

Fish tissue studies:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>24(26)</td>
<td>61(63)</td>
<td>241(251)</td>
</tr>
<tr>
<td>Mercury</td>
<td>24(39)</td>
<td>61(104)</td>
<td>61(104)</td>
</tr>
<tr>
<td>PAHs</td>
<td>24(35)</td>
<td>48(66)</td>
<td>1288(1582)</td>
</tr>
<tr>
<td>PCBs</td>
<td>13(22)</td>
<td>26(56)</td>
<td>674(2814)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>6(6)</td>
<td>12(12)</td>
<td>300(300)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6(6)</td>
<td>12(12)</td>
<td>300(300)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>24(39)</td>
<td>61(104)</td>
<td>1179(1451)</td>
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<tr>
<td>TOC</td>
<td>24(39)</td>
<td>49(92)</td>
<td>49(92)</td>
</tr>
<tr>
<td>Grain size</td>
<td>24(33)</td>
<td>49(78)</td>
<td>272(529)</td>
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</table>

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Mean PEC-Q(PQ)</th>
<th>&lt; 0.1</th>
<th>0.1-0.6</th>
<th>&gt; 0.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury (mg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total PAHs (ug/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total PCBs (ug/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCDD/F TEQ (pg/g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt; Level I SQT</th>
<th>% &gt; Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>PAHs, PCBs, &amp; PCDD/Fs</td>
<td>24</td>
<td>6</td>
</tr>
</tbody>
</table>

Abbildung: sediment-areas.png
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Superior Bay - 21st Ave., 2008&10 (6 stations).
- Other chemical studies: Assessment Study of Slip C, 1997 (3 stations).

Macro-invertebrate studies:

Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

Potential Impairment

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>0</td>
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</tr>
<tr>
<td>Cd</td>
<td>0</td>
<td>0.1</td>
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<td>Cr</td>
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<td>0.1</td>
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<tr>
<td>Cu</td>
<td>0</td>
<td>0.1</td>
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<tr>
<td>Pb</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Hg</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Ni</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Zn</td>
<td>0</td>
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</tr>
<tr>
<td>Metals (without Hg)</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
<tr>
<td>Mercury</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
<tr>
<td>TOC</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
<tr>
<td>Grain size</td>
<td>6(9)</td>
<td>12(15)</td>
</tr>
</tbody>
</table>

Sediment Assessment Area Chemistry Characterization

Assessment Area # 24 (General Mills Elevator A Slip)
Geographic zone: Superior Bay
Date Generated: 6/28/2013

Data Summary
Available data in studies used for characterization
(All available data)

Constituent | Number of Stations | Number of Samples | Number of Results |
------------|--------------------|-------------------|------------------|
Metals      | 6(9)               | 12(15)            | 120(123)         |
Mercury     | 6(9)               | 12(15)            | 12(15)           |
PAHs        | 6(9)               | 12(15)            | 464(518)         |
PCBs        | 6(6)               | 12(12)            | 84(84)           |
PCDD/Fs     | 2(2)               | 4(4)              | 100(100)         |
Pesticides  | 2(2)               | 4(4)              | 100(100)         |
Other parameters | 6(9)       | 12(15)            | 381(408)         |
TOC         | 6(9)               | 12(15)            | 12(15)           |

Results Exceeding Thresholds (0-15 cm samples)

Metals

PCBs, PAHs, & PCDD/Fs

PCDD/F TEQ

Percentage of samples exceeding Level I SQT and Level II SQT for each constituent.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Studies with Samples in Sediment Assessment Area:**
Chemical studies used in the characterization:
Superior Bay - 21st Ave., 2008&10 (6 stations).

Other chemical studies:
Macro-invertebrate studies:
Superior Bay - 21st Ave., 2008&10.

Fish tissue studies:

**Data Summary**
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6(6)</td>
<td>11(11)</td>
<td>111(111)</td>
</tr>
<tr>
<td>Mercury</td>
<td>6(6)</td>
<td>11(11)</td>
<td>11(11)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>41(41)</td>
</tr>
<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>11(11)</td>
<td>77(77)</td>
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<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>7(7)</td>
<td>175(175)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>7(7)</td>
<td>153(153)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>6(6)</td>
<td>11(11)</td>
<td>515(515)</td>
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<tr>
<td>TOC</td>
<td>6(6)</td>
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<td>11(11)</td>
</tr>
<tr>
<td>Grain size</td>
<td>6(6)</td>
<td>11(11)</td>
<td>21(21)</td>
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**Results Exceeding Thresholds (0-15 cm samples)**

**Core Profiles**

**Mean PEC-Q**

<table>
<thead>
<tr>
<th>Potential Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
<tr>
<td>0-15 cm</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mercury (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=0.1</td>
</tr>
<tr>
<td>0.1-0.6</td>
</tr>
<tr>
<td>&gt;0.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCDD/F TEQ (pg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=0.1</td>
</tr>
<tr>
<td>0.1-1.1</td>
</tr>
<tr>
<td>&gt;1.1</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (>15 cm samples)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Total PAHs (ug/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td></td>
</tr>
<tr>
<td>&gt;15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAHs, PCBs, &amp; PCDD/Fs</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=0.1</td>
</tr>
<tr>
<td>0.1-1.1</td>
</tr>
<tr>
<td>&gt;1.1</td>
</tr>
</tbody>
</table>

**Distributions of Constituent Concentrations**

**Chemical studies used in the characterization:**
Superior Bay - 21st Ave., 2008&10.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:** Superior Bay - 21st Ave., 2008&10 (8 stations).

**Other chemical studies:**
- Other parameters: Superior Bay - 21st Ave., 2008&10.

**Macro-invertebrate studies:** Superior Bay - 21st Ave., 2008&10.

**Fish tissue studies:**

---

**Map of Assessment Area Cores**

**Labeled Stations Used in Characterization**

**Studies with Samples in Sediment Assessment Area:**

**Chemical studies used in the characterization:**
- Superior Bay - 21st Ave., 2008&10 (8 stations).
- Other chemical studies:
  - Superior Bay - 21st Ave., 2008&10.
  - Other parameters: Superior Bay - 21st Ave., 2008&10.

**Macro-invertebrate studies:**
- Superior Bay - 21st Ave., 2008&10.

**Fish tissue studies:**
- Superior Bay - 21st Ave., 2008&10.

---

**Data Summary**

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>8(8)</td>
<td>15(15)</td>
<td>151(151)</td>
</tr>
<tr>
<td>Mercury</td>
<td>8(8)</td>
<td>15(15)</td>
<td>15(15)</td>
</tr>
<tr>
<td>PAHs</td>
<td>8(8)</td>
<td>15(15)</td>
<td>567(567)</td>
</tr>
<tr>
<td>PCBs</td>
<td>8(8)</td>
<td>15(15)</td>
<td>105(105)</td>
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<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>200(200)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>5(5)</td>
<td>9(9)</td>
<td>203(203)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>8(8)</td>
<td>15(15)</td>
<td>680(680)</td>
</tr>
<tr>
<td>TOC</td>
<td>8(8)</td>
<td>15(15)</td>
<td>15(15)</td>
</tr>
<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>14(14)</td>
<td>27(27)</td>
</tr>
</tbody>
</table>

---

**Results Exceeding Thresholds (0-15 cm samples)**

- **% Level I SQT**: 7, 7, 7, 7, 7, 7, 7
- **% Level II SQT**: 7, 7, 7, 7, 7, 7, 7

---

**Distributions of Constituent Concentrations**

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **PCDD/F TEQ (pg/g)**

---

**Potential Impairment**

- Low: 0-15 cm (7)
- High: 0-15 cm (7)
- 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

---

**Potential Impairment**

- Level I SQT: 7, 7
- Level II SQT: 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**As**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Cd**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Cr**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Cu**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Pb**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Hg**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Ni**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Zn**

- Level I SQT: 7
- Level II SQT: 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Total PAHs**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Total PCBs**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**PCDD/F TEQ**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**PAHs, PCBs, & PCDD/Fs**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Mercury (mg/kg)**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**PCDD/F (pg/g)**

- Level I SQT: 7, 7, 7, 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Grain size**

- Level I SQT: 7, 7, 7, 7
- Level II SQT: 7, 7, 7, 7
- 0 % 20 % 40 % 60 % 80 % 100 %

---

**Depth (cm)**

- Level I SQT: 0.01, 0.05, 0.10, 0.15, 0.20, 0.25, 0.50, 1.00, 10.00, 100.00
- Level II SQT: 0.01, 0.05, 0.10, 0.15, 0.20, 0.25, 0.50, 1.00, 10.00, 100.00
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Superior Bay - 21st Ave., 2008&10 (6 stations).
- Dakota Pier Samples, 1998 (3 stations).

Other chemical studies:
- Dakota Pier Samples, 1998
- Superior Bay - 21st Ave., 2008&10.

Macro-invertebrate studies:
- Dakota Pier Samples, 1996; Superior Bay - 21st Ave., 2008&10.

Fish tissue studies:

### Mean PEC-Q

#### Potential Impairment

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Core Profiles

#### Mean PEC-Q (PQ)

- Mean PEC-Q (PQ) for different cores:
  - RP-L-70: 0.1
  - RP-M-33: 0.05
  - RP-G-16: 0.01
  - RP-L-77: 0.02

#### Mercury (mg/kg)

- Samples: 6
- Depth (cm): 0.01, 0.10, 1.00, 10.00, 100.00
- Percent Level I SQT: 50, 20, 40, 60, 80, 100

### Map of Assessment Area Cores

#### Labeled Stations Used in Characterization

#### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Superior Bay - 21st Ave., 2008&10 (6 stations).

- Other chemical studies:
  - Dakota Pier Samples, 1998 (3 stations).

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

- As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
- % Level I SQT: 0, 20, 40, 60, 80, 100

#### Total PAHs

- ug/kg
- Level I SQT: 0-100
- Level II SQT: 100-1000

#### Total PCBs

- ug/kg
- Level I SQT: 0-100
- Level II SQT: 100-1000

#### PCDD/F TEQ

- pg/g
- Level I SQT: 0-100
- Level II SQT: 100-1000
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization: Superior Bay - 21st Ave., 2008&10 (7 stations).
Other chemical studies:
Fish tissue studies:

### Table: Mean PEC-Q

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>7(7)</td>
<td>14(14)</td>
<td>140(140)</td>
</tr>
<tr>
<td>Mercury</td>
<td>7(7)</td>
<td>14(14)</td>
<td>14(14)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(7)</td>
<td>14(14)</td>
<td>540(540)</td>
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<tr>
<td>PCBs</td>
<td>7(7)</td>
<td>14(14)</td>
<td>98(98)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>4(4)</td>
<td>99(99)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>14(14)</td>
<td>433(433)</td>
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<td>TOC</td>
<td>7(7)</td>
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<td>14(14)</td>
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<tr>
<td>Grain size</td>
<td>7(7)</td>
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<td>14(14)</td>
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<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>14(14)</td>
<td>28(28)</td>
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<tr>
<td>TOC</td>
<td>7(7)</td>
<td>14(14)</td>
<td>14(14)</td>
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<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>14(14)</td>
<td>28(28)</td>
</tr>
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</table>

### Map of Assessment Area Cores
Labeled Stations Used in Characterization

### Core Profiles

#### Mean PEC-Q (PQ)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
<th>Level III SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAHs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>PCBs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>Metals (without Hg)</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>Other parameters</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>TOC</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
<tr>
<td>Grain size</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
<td></td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

- As: 7
- Cd: 7
- Cr: 7
- Cu: 7
- Pb: 7
- Hg: 7
- Ni: 7
- Zn: 7

#### Total PAHs

- Level I SQT: 7
- Level II SQT: 7

#### Total PCBs

- Level I SQT: 7
- Level II SQT: 7

#### PCDD/F TEQ

- Level I SQT: 7
- Level II SQT: 7

### Data Summary

Available data in studies used for characterization (All available data)

- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size
- TOC
- Grain size
- TOC
- Grain size

### Distributions of Constituent Concentrations

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

Scores show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Superior Bay - 21st Ave., 2008&10 (7 stations).

**Other chemical studies:**
- Fish tissue studies:

**Potential Impairment**

- Level I SQT: Low
- Level II SQT: High

**Depth (cm)**

- 0-15 cm
- >15 cm

**Constituent**
- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- Grain size

**Mean PEC-Q**

- Low
- Potential Impairment
- High

**Core Profiles**

- RP-35
- RP-M-19
- RP-I-39
- RP-M-20
- RP-I-101
- RP-I-41

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

**Data Summary**

Available data in studies used for characterization

**Constituent**
- Number of Stations
- Number of Samples
- Number of Results

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>7(7)</td>
<td>13(13)</td>
<td>131(131)</td>
</tr>
<tr>
<td>Mercury</td>
<td>7(7)</td>
<td>13(13)</td>
<td>13(13)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(7)</td>
<td>13(13)</td>
<td>479(479)</td>
</tr>
<tr>
<td>PCBs</td>
<td>7(7)</td>
<td>13(13)</td>
<td>91(91)</td>
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<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>3(3)</td>
<td>75(75)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>3(3)</td>
<td>53(53)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>7(7)</td>
<td>13(13)</td>
<td>364(364)</td>
</tr>
<tr>
<td>TOC</td>
<td>7(7)</td>
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<td>25(25)</td>
</tr>
<tr>
<td>Grain size</td>
<td>7(7)</td>
<td>13(13)</td>
<td></td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- Metals
- PAHs, PCBs, PCDD/Fs

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization: Superior Bay - 21st Ave., 2008&10 (7 stations).
- Other chemical studies:
  - Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Superior Bay - 21st Ave., 2008&10 (5 stations).

**Other chemical studies:**
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>5(5)</td>
<td>9(9)</td>
<td>91(91)</td>
</tr>
<tr>
<td>Mercury</td>
<td>5(5)</td>
<td>9(9)</td>
<td>9(9)</td>
</tr>
<tr>
<td>PAHs</td>
<td>5(5)</td>
<td>9(9)</td>
<td>327(327)</td>
</tr>
<tr>
<td>PCBs</td>
<td>5(5)</td>
<td>9(9)</td>
<td>63(63)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>3(3)</td>
<td>75(75)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>3(3)</td>
<td>53(53)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>5(5)</td>
<td>9(9)</td>
<td>296(296)</td>
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<td>TOC</td>
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<td>17(17)</td>
</tr>
<tr>
<td>Grain size</td>
<td>5(5)</td>
<td>9(9)</td>
<td>17(17)</td>
</tr>
</tbody>
</table>

**Distributions of Constituent Concentrations**

**Metal concentrations**
- Mercury (mg/kg)
  - >100
  - 50-100
  - 15-50
  - 0-15

**PAHs, PCBs, & PCDD/Fs concentrations**
- Total PAHs (ug/kg)
  - >100
  - 50-100
  - 15-50
  - 0-15

**Results are shown at 25% percentile, median, and 75% percentile values**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:

- Duluth-Superior Harbor Study, 1995 (1 station).

### Macro-invertebrate studies:


### Fish tissue studies:


### Other chemical studies:

- Duluth-Superior Harbor Study, 1995 (1 stations).

### Data Summary

#### Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>Mercury</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>PAHs</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>PCBs</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0/0</td>
<td>0/0</td>
<td>0/18</td>
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<tr>
<td>Other parameters</td>
<td>0/0</td>
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<td>0/0</td>
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<tr>
<td>TOC</td>
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<td>0/0</td>
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</tr>
<tr>
<td>Grain size</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- No surface samples available

### Distributions of Constituent Concentrations

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.

- None of the samples analyzed for PAHs exceed the threshold.
- No PCBs detected in 0 analyzed samples.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (7 stations)
- USACE DACW35-95-D-0002 DELIVERY ORDER 28 (5)
- USACE DACW35-93-D-0005 DELIVERY ORDER 29 (5)
- Duluth-Superior Harbor Study, 1995
- Superior Bay - 21st Ave., 2008&10 (1)

Other chemical studies:
- No surface data

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization:

Results Exceeding Thresholds (0-15 cm samples)
- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ
- No surface samples available

No data for core profile

Core Profiles

Map of Assessment Area Cores
Labeled Stations Used in Characterization

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization:

Results Exceeding Thresholds (0-15 cm samples)
- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ
- No surface samples available
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:

- R-EMAP Study, 1995 (1 stations);
- R-EMAP Study, 1996 (1);
- SLRIDT Reference Sites SEG 2004 (6).

### Macro-invertebrate studies:


### Fish tissue studies:

- Results Exceeding Thresholds (0-15 cm samples)

### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Other chemical studies:
    - R-EMAP Study, 1995 (1 stations);
    - R-EMAP Study, 1996 (1);
    - SLRIDT Reference Sites SEG 2004 (6).

- Macro-invertebrate studies:

### Core Profiles

- No data available for core profile
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
Koppers Industries Study, 1999 (41 stations).

Other chemical studies:
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

Macro-invertebrate studies:

Fish tissue studies:
- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

Assessment Area # 34 (Koppers/Crawford Creek)
Geographic zone: Koppers/Crawford Creek
Date Generated: 6/28/2013

No data available for core profile

Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

- **Available data in studies used for characterization**

  (All available data)

- **Constituent**
- **Number of Stations**
- **Number of Samples**
- **Number of Results**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(47)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(5)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(112)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(50)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(50)</td>
</tr>
<tr>
<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(27)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- **No samples analyzed for PAHs**
- **No samples analyzed for mercury**
- **No samples analyzed for PCDD/F TEQ**

**Insufficient results available for PEC-Q calculation**

**No surface samples available**

**No PCBs detected in 0 analyzed samples**

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 35 (North Channel - Interstate)**

- **Geographic zone:** St. Louis Bay
- **Date Generated:** 6/28/2013

**Studies with Samples in Sediment Assessment Area:**

- **Chemical studies used in the characterization:**
  - Other chemical studies: R-EMAP Study 1995 (1 station); USACE DAWC5193-D-0005 DELIVERY ORDER 29 (2); Superior Bay - 21st Ave., 2008 & 10 (1).
  - Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples):**

- No samples analyzed for mercury.
- No samples analyzed for PCDD/F TEQ.
- No samples analyzed for PCBs.

---

**Distributions of Constituent Concentrations**

**Mean PEC-Q**

**No data available for core profile**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Superior Bay - 21st Ave., 2008&10 (2 stations).
- Other chemical studies:
  - Mercury
  - PAHs
  - PCBs
  - PCDD/Fs
  - Pesticides
  - Other parameters
  - TOC
  - Grain size

**Macro-invertebrate studies:**

**Fish tissue studies:**

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization:
  - Superior Bay - 21st Ave., 2008&10 (2 stations).

**Other chemical studies:**
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

**Mean PEC-Q**

- **Depth (cm)**: 0-15, >15
- **Potential Impairment**: Low, Potential, High

**Core Profiles**
- PO
- Hg

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization:
  - Superior Bay - 21st Ave., 2008&10 (2 stations).

**Other chemical studies:**
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

**Mean PEC-Q (PQ)**

- **PQ TF-1A**: Hg

**Tissue studies:**

**Distributions of Constituent Concentrations**

**Data Summary**
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>2(2)</td>
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<td>30(30)</td>
</tr>
<tr>
<td>Mercury</td>
<td>2(2)</td>
<td>3(3)</td>
<td>3(3)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>3(3)</td>
<td>114(114)</td>
</tr>
<tr>
<td>PCBs</td>
<td>2(2)</td>
<td>3(3)</td>
<td>21(21)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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<tr>
<td>Pesticides</td>
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<td>0(0)</td>
<td>0(0)</td>
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<tr>
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<td>52(52)</td>
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<tr>
<td>TOC</td>
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</table>

**Total PAHs (ug/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
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<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Total PCBs (ug/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
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<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Mercury (mg/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Total PAHs & PCBs**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
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</tr>
<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Studies with Samples in Sediment Assessment Area:**
- PQ TF-1A, PQ TF-8A

**Results Exceeding Thresholds (0-15 cm samples):**
- % > Level I SQT
- % > Level II SQT

**Potency Impairment**

<table>
<thead>
<tr>
<th>Level I SQT</th>
<th>Level II SQT</th>
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</thead>
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<td>Low</td>
<td>High</td>
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**Mercury (Hg, mg/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
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<tr>
<td>1000</td>
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<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Total PAHs**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
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<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
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<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Total PCBs**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**PCDD/F TEQ**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
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<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples):**
- % > Level I SQT
- % > Level II SQT

**PAHs, PCBs, & PCDD/Fs**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% Level I SQT</th>
<th>% Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>1000</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>10000</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**No samples analyzed for PCDD/F TEQ.**

Bars show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Sediment Assessment Area Chemistry Characterization

#### Assessment Area #37 (Slip near 21st Ave W)
- **Geographic zone:** St. Louis Bay
- **Date Generated:** 6/28/2013

The chemical studies used in the characterization:
- Superior Bay - 21st Ave., 2008&10 (1 station).
- Other chemical studies:
  - Mercury
  - PAHs
  - PCBs
  - PCDD/Fs
  - Pesticides
  - Other parameters
  - TOC
  - Grain size

### Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>20(20)</td>
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<tr>
<td>Mercury</td>
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<td>2(2)</td>
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<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>80(80)</td>
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<tr>
<td>PCBs</td>
<td>1(1)</td>
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<td>14(14)</td>
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<td>PCDD/Fs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>50(50)</td>
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<td>Pesticides</td>
<td>1(1)</td>
<td>2(2)</td>
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<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>1(1)</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- Metals: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
- PAHs, PCBs, & PCDD/Fs

### Distributions of Constituent Concentrations

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **PCDD/F TEQ (pg/g)**

---

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization: Superior Bay - 21st Ave., 2008&10 (23 stations).
- Other chemical studies: R-EMAP Study, 1995 (3 stations); Hotspot Study, 1994 (9); R-EMAP Study, 1996 (2); Toxaphene Study, 1996 (8); PBDE Study, 2001 (1); Duluth-Superior Harbor Study, 1993 (6); USACE DACW35-91-D-0001 DELIVERY ORDER 40 (3).
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>23</td>
<td>46</td>
<td>460</td>
</tr>
<tr>
<td>Mercury</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>PAHs</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>PCBs</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>13</td>
<td>26</td>
<td>59</td>
</tr>
<tr>
<td>Pesticides</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>Other parameters</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>TOC</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
<tr>
<td>Grain size</td>
<td>23</td>
<td>46</td>
<td>152</td>
</tr>
</tbody>
</table>

**Sediment Assessment Area Chemistry Characterization Data Summary**

<table>
<thead>
<tr>
<th>Available data in studies used for characterization</th>
<th>(All available data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical studies used in the characterization</td>
<td>Superior Bay - 21st Ave., 2008&amp;10 (23 stations).</td>
</tr>
<tr>
<td>Other chemical studies</td>
<td>R-EMAP Study, 1995 (3 stations); Hotspot Study, 1994 (9); R-EMAP Study, 1996 (2); Toxaphene Study, 1996 (8); PBDE Study, 2001 (1); Duluth-Superior Harbor Study, 1993 (6); USACE DACW35-91-D-0001 DELIVERY ORDER 40 (3).</td>
</tr>
<tr>
<td>Fish tissue studies</td>
<td>Fond du Lac Fish Tissue Study 2000.</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Assessment Area # 39 (Interstate Island Off-Channel) Geographic zone: St. Louis Bay Date Generated: 6/28/2013

Mean PEC-Q

Chemical studies used in the characterization:

- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

Other chemical studies:

- Total PAHs
- Total PCBs
- PCDD/F TEQ

Results Exceeding Thresholds (0-15 cm samples)

- No samples analyzed for PAHs
- No PCBs detected in analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ

Insufficient results available for PEC-Q calculation

Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>TOC</td>
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</tr>
<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- St. Louis Bay 40th Ave., 2010 (2 stations).
- Other chemical studies: Hotspot Study, 1994 (4 stations); Duluth-Superior Harbor Study, 1993 (1; USACE DACW35-91-D-0001 DELIVERY ORDER 40 (2).

### Macro-invertebrate studies:
- Hotspot Study, 1994; Duluth-Superior Harbor Study, 1993; USACE DACW35-91-D-0001 DELIVERY ORDER 40; St. Louis Bay 40th Ave., 2010.

### Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization:
St. Louis Bay 40th Ave., 2010 (3 stations).

Other chemical studies:
R-EMAP Study, 1995 (1 stations); R-EMAP Study, 1996 (1).

Macro-invertebrate studies:
R-EMAP Study, 1995; R-EMAP Study, 1996; St. Louis Bay 40th Ave., 2010; 21st Ave Macroinvertebrate Survey, 2011.

Fish tissue studies:
Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 station); USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2); SLRIDT Reference Sites SEG 2004 (4).

### Macro-invertebrate studies:

### Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

### Studies with Samples in Sediment Assessment Area:
- No data available for core profile

### Data Summary

**Mean PEC-Q**

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(87)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(8)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(134)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(40)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(45)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(95)</td>
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<td>TOC</td>
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<td>0(0)</td>
<td>0(8)</td>
</tr>
<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(23)</td>
</tr>
</tbody>
</table>

**Distributions of Constituent Concentrations**

- - - Level I SQT
- - - - Level II SQT

No samples analyzed for PAHs

No PCBs detected in 0 analyzed samples

No surface samples available

No samples analyzed for mercury

No samples analyzed for PCDD/F TEQ

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations also affect remediation and restoration decision-making.

**Data Summary**

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>4(4)</td>
<td>21(21)</td>
<td>462(462)</td>
</tr>
<tr>
<td>Mercury</td>
<td>4(4)</td>
<td>21(21)</td>
<td>21(21)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>21(21)</td>
<td>379(379)</td>
</tr>
<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>21(21)</td>
<td>398(398)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>25(25)</td>
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<tr>
<td>Pesticides</td>
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<td>21(21)</td>
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<td>Other parameters</td>
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<td>21(21)</td>
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<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>17(17)</td>
<td>119(119)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- **Toxicity categories**
  - Level I SQT
  - Level II SQT

- **Constituents**
  - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
  - PAHs, PCBs, & PCDD/Fs
  - TOC
  - Grain size

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- Mercury (mg/kg)
- PCDD/F TEQ (pg/g)

---

### Chemical Studies

- **Mean PEC-Q**
- **Map of Assessment Area Cores Labeled Stations Used in Characterization**
- **Core Profiles**
- **Studies with Samples in Sediment Assessment Area:**
  - Chemical studies used in the characterization: St. Louis Bay 40th Ave., 2010 (4 stations).
  - Other chemical studies:
    - Macro-invertebrate studies:
      - R-EMAP Study, 1995, St. Louis Bay 40th Ave., 2010.
    - Fish tissue studies:
  - Other potential impairments:
    - Mercury (mg/kg)
    - Total PAHs (ug/kg)
    - Total PCBs (ug/kg)
    - PCDD/F TEQ (pg/g)

---

**Assessment Area # 43(DM&IR)**

- **Geographic zone:** St. Louis Bay
- **Date Generated:** 6/28/2013
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

This table summarizes the available data for various chemicals in the sediment assessment area:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
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<tr>
<td>Mercury</td>
<td>18(23)</td>
<td>64(66)</td>
<td>76(76)</td>
</tr>
<tr>
<td>PAHs</td>
<td>18(22)</td>
<td>62(70)</td>
<td>1164(1292)</td>
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<tr>
<td>PCBs</td>
<td>18(18)</td>
<td>64(64)</td>
<td>2039(2039)</td>
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<tr>
<td>PCDD/Fs</td>
<td>7(7)</td>
<td>7(7)</td>
<td>175(175)</td>
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<td>Pesticides</td>
<td>5(5)</td>
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<td>105(105)</td>
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<tr>
<td>Other parameters</td>
<td>18(23)</td>
<td>75(87)</td>
<td>1045(1133)</td>
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<td>TOC</td>
<td>15(20)</td>
<td>54(66)</td>
<td>54(66)</td>
</tr>
<tr>
<td>Grain size</td>
<td>18(22)</td>
<td>61(68)</td>
<td>427(490)</td>
</tr>
</tbody>
</table>

The following studies were conducted in the sediment assessment area:

- **Chemical studies in the characterization:**
  - St. Louis Bay 40th Ave., 2010 (18 stations).
  - Hotspot Study, 1994 (4 stations); Duluth-Superior Harbor Study, 1993 (1).

- **Macro-invertebrate studies:**

- **Fish tissue studies:**
  - Results Exceeding Thresholds (0-15 cm samples)
    - Metals
    - PAHs, PCBs, & PCDD/Fs
    - Toxicity Equivalents (TEQs)

The distributions of constituent concentrations are shown in the graphs, with whiskers extending to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- St. Louis Bay 40th Ave., 2010 (4 stations)
- Hotspot Study, 1994 (5 stations)
- Duluth-Superior Harbor Study, 1993 (1)

### Macro-invertebrate studies:
- Hotspot Study, 1994
- Duluth-Superior Harbor Study, 1993
- St. Louis Bay 40th Ave., 2010
- 40th Ave Macroinvertebrate Survey, 2010

### Fish tissue studies:
- Fond du Lac Fish Tissue Study 2000

### Data Summary

#### Available data in studies used for characterization

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>4(9)</td>
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<td>220(245)</td>
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<tr>
<td>Mercury</td>
<td>4(5)</td>
<td>10(14)</td>
<td>10(14)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>9(9)</td>
<td>153(153)</td>
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<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>10(10)</td>
<td>299(299)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>25(25)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>4(10)</td>
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<td>TOC</td>
<td>4(10)</td>
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<tr>
<td>Grain size</td>
<td>3(8)</td>
<td>7(12)</td>
<td>49(94)</td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- **Metals**
  - Mercury (mg/kg)
  - Total PAHs (ug/kg)
  - Total PCBs (ug/kg)
  - PCDD/F TEQ (pg/g)

### Results Exceeding Thresholds (0-15 cm samples)

- **PAHs, PCBs, & PCDD/Fs**
  - Levels I SQT
  - Levels II SQT
  - Potential Impairment
  - Mean PEC-Q (PQ)
  - Hg
  - TOC

### Mean PEC-Q

- Low Potential Impairment
- High Potential Impairment

### Core Profiles

- SLS10-3-12
- SLS10-3-13
- SLS10-3-14
- SLS16-3-15

### Toxicity Study

- Potential Impairment
- Low
- High

- Depth (cm)
- SQT Level I
- SQT Level II
- Toxicity

### Maps

- Assessment Area Cores
- Labeled Stations Used in Characterization
- Sediment Assessment Area cores
- Distribution of constituent concentrations
- Core profiles

---

**Assessment Area # 45 (Bay NE Side of Erie Pier)**

Geographic zone: St. Louis Bay
Date Generated: 6/28/2013

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**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization: St. Louis Bay 40th Ave., 2010 (4 stations).
- Other chemical studies: Hotspot Study, 1994 (5 stations); Duluth-Superior Harbor Study, 1993 (1).
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies
- **R-EMAP Study, 1995** (2 stations)
- **USACE DACW35-93-D-0005 DELIVERY ORDER 29** (4)
- **USACE DACW35-93-D-0005 DELIVERY ORDER 16** (1)
- **SLRIDT Reference Sites SEG 2004** (3)

### Macro-invertebrate Studies
- **R-EMAP Study, 1995**
- **USACE DACW35-93-D-0005 DELIVERY ORDER 29**
- **USACE DACW35-93-D-0005 DELIVERY ORDER 16**
- **SLRIDT Reference Sites SEG 2004**

### Fish Tissue Studies
- **Results Exceeding Thresholds (0-15 cm samples)**

#### Data Summary
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>10(10)</td>
<td>11(11)</td>
<td>112(112)</td>
</tr>
<tr>
<td>Mercury</td>
<td>10(10)</td>
<td>11(11)</td>
<td>11(11)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(7)</td>
<td>7(7)</td>
<td>115(115)</td>
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<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>5(5)</td>
<td>38(38)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
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<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
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<tr>
<td>Grain size</td>
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<td>6(6)</td>
<td>46(46)</td>
</tr>
</tbody>
</table>

### Sediment Assessment Area Chemistry Characterization

#### Results Exceeding Thresholds (0-15 cm samples)
- **% >TEC**
- **% >MEC**
- **% >PEC**

#### Distributions of Constituent Concentrations
- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **PCDD/F TEQ**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- R-EMAP Study, 1995 (2 stations)
- Duluth-Superior Harbor Study, 1993 (1)
- USACE DACW35-93-D-0005 DELIVERY ORDER 16 (1)
- St. Louis Bay 40th Ave., 2010 (5)
- Wisconsin Sampling, 2007 (8)

### Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - Duluth-Superior Harbor Study, 1993
  - USACE DACW35-93-D-0005 DELIVERY ORDER 16
  - St. Louis Bay 40th Ave., 2010
  - Wisconsin Sampling, 2007
  - 21st Ave Macroinvertebrate Survey, 2011

### Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

### Core Profiles

### Potential Impairment

### Studies with Samples in Sediment Assessment Area:

### Map of Assessment Area Cores

### Labeled Stations Used in Characterization

### Studies with Samples in Sediment Assessment Area:

### Chemical studies used in the characterization:
- R-EMAP Study, 1995 (2 stations)
- Duluth-Superior Harbor Study, 1993 (1)
- USACE DACW35-93-D-0005 DELIVERY ORDER 16 (1)
- St. Louis Bay 40th Ave., 2010 (5)
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### Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - Duluth-Superior Harbor Study, 1993
  - USACE DACW35-93-D-0005 DELIVERY ORDER 16
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  - Wisconsin Sampling, 2007
  - 21st Ave Macroinvertebrate Survey, 2011

### Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)
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### Chemical Studies Used in the Characterization:
- R-EMAP Study, 1995 (1 station); Hotspot Study, 1994 (1); USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2); Howards Bay - St. Louis River AOC, 2010 (1); Wisconsin Sampling, 2007 (1).

### Other Chemical Studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995; Hotspot Study, 1994; USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2); Howards Bay - St. Louis River AOC, 2010 (1); Wisconsin Sampling, 2007 (1).

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals
- % > TEC
- % > MEC
- % > PEC

#### PAHs, PCBs, & PCDD/Fs
- No samples analyzed for PCDD/F TEQ.

#### Mercury (mg/kg)
- % > TEC
- % > MEC
- % > PEC

### Distributions of Constituent Concentrations

#### Total PAHs (ug/kg)
- No PCBs detected in 0 analyzed samples.

### Data Summary

Available data in studies used for characterization:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6(6)</td>
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<td>10(107)</td>
</tr>
<tr>
<td>Mercury</td>
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<td>9(9)</td>
<td>9(9)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
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<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

### Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 station); Hotspot Study, 1994 (1); USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2); Howards Bay - St. Louis River AOC, 2010 (1); Wisconsin Sampling, 2007 (1).

#### Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995; Hotspot Study, 1994; USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2); Howards Bay - St. Louis River AOC, 2010 (1); Wisconsin Sampling, 2007 (1).

#### Fish tissue studies:
- No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Mean PEC-Q

[Map of Assessment Area Cores]

Labeled Stations Used in Characterization

Core Profiles

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
Howards Bay - St. Louis River AOC, 2010 (3 stations); Wisconsin Sampling, 2007 (7).

Other chemical studies:

Macro-invertebrate studies:
Howards Bay - St. Louis River AOC, 2010; Wisconsin Sampling, 2007.

Fish tissue studies:

Results Exceeding Thresholds (0-15 cm samples)

No PCBs detected in 1 analyzed samples

<table>
<thead>
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<th>Number of Samples</th>
<th>Number of Results</th>
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<td>318(318)</td>
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<tr>
<td>Mercury</td>
<td>10(10)</td>
<td>20(20)</td>
<td>20(20)</td>
</tr>
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<td>PAHs</td>
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<td>PCBs</td>
<td>1(1)</td>
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<td>9(9)</td>
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<td>PCDD/Fs</td>
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<td>0(0)</td>
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<td>TOC</td>
<td>10(10)</td>
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<td>Grain size</td>
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<td>19(19)</td>
<td>83(83)</td>
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Data Summary

Available data in studies used for characterization
(All available data)

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>10(10)</td>
<td>20(20)</td>
<td>318(318)</td>
</tr>
<tr>
<td>Mercury</td>
<td>10(10)</td>
<td>20(20)</td>
<td>20(20)</td>
</tr>
<tr>
<td>PAHs</td>
<td>10(10)</td>
<td>20(20)</td>
<td>485(485)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>9(9)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>10(10)</td>
<td>19(19)</td>
<td>200(200)</td>
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<tr>
<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>10(10)</td>
<td>19(19)</td>
<td>83(83)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations

No PCDD/Fs analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization: Hotspot Study, 1994 (1 stations); Howards Bay - St. Louis River AOC, 2010 (3).

Other chemical studies:

Data Summary
Available data in studies used for characterization
(All available data)

### Constituent
- **Metals (without Hg)**
  - Number of Stations: 4
  - Number of Samples: 12
  - Number of Results: 219
- **Mercury**
  - Number of Stations: 4
  - Number of Samples: 12
  - Number of Results: 12
- **PAHs**
  - Number of Stations: 3
  - Number of Samples: 9
  - Number of Results: 219
- **PCBs**
  - Number of Stations: 3
  - Number of Samples: 3
  - Number of Results: 27
- **PCDD/Fs**
  - Number of Stations: 0
  - Number of Samples: 0
  - Number of Results: 0
- **Pesticides**
  - Number of Stations: 3
  - Number of Samples: 9
  - Number of Results: 192

### Other parameters
- **TOC**
  - Number of Stations: 4
  - Number of Samples: 12
  - Number of Results: 12
- **Grain size**
  - Number of Stations: 4
  - Number of Samples: 12
  - Number of Results: 90

### Results Exceeding Thresholds (0-15 cm samples)

- **Mercury (Hg, mg/kg)**
  - <=0.1: 2
  - 0.18-1.1: 2
  - >1.1: 2

### Distributions of Constituent Concentrations

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **Total PCDD/Fs**

### Maps
- **Map of Assessment Area Cores**
- **Labeled Stations Used in Characterization**
- **Core Profiles**

---

**Notes:**
- Histograms show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Howards Bay - St. Louis River AOC, 2010 (12 stations)
- Wisconsin Sampling, 2007 (4)

**Other chemical studies:**
- Macro-invertebrate studies:
  - Howards Bay - St. Louis River AOC, 2010; Wisconsin Sampling, 2007
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**
- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

**Data Summary**
Available data in studies used for characterization (All available data)

<table>
<thead>
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<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<td>Metals (without Hg)</td>
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<td>36(36)</td>
<td>747(747)</td>
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<tr>
<td>Mercury</td>
<td>16(16)</td>
<td>36(36)</td>
<td>36(36)</td>
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<tr>
<td>PAHs</td>
<td>16(16)</td>
<td>36(36)</td>
<td>850(850)</td>
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<tr>
<td>PCBs</td>
<td>7(7)</td>
<td>7(7)</td>
<td>63(63)</td>
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<td>PCDD/Fs</td>
<td>0(0)</td>
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<td>0(0)</td>
</tr>
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<td>Pesticides</td>
<td>16(16)</td>
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<td>36(36)</td>
<td>654(654)</td>
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<td>TOC</td>
<td>16(16)</td>
<td>36(36)</td>
<td>232(232)</td>
</tr>
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<td>Grain size</td>
<td>16(16)</td>
<td>36(36)</td>
<td></td>
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</tbody>
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**Distributions of Constituent Concentrations**
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- Mercury (mg/kg)

**Results Exceeding Thresholds (0-15 cm samples)**
- PAHs, PCBs, & PCDD/Fs
- Metals
- Total PAHs
- Total PCBs
- Mercury

**Results Exceeding Thresholds (0-15 cm samples)**
- No samples analyzed for PCDD/F TEQ

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Mean PEC-Q**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>9(9)</td>
<td>15(15)</td>
<td>178(178)</td>
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<tr>
<td>Mercury</td>
<td>9(9)</td>
<td>15(15)</td>
<td>15(15)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6(6)</td>
<td>6(6)</td>
<td>113(113)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>3(3)</td>
<td>21(21)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>5(5)</td>
<td>5(5)</td>
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<td>362(362)</td>
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<td>Grain size</td>
<td>9(9)</td>
<td>15(15)</td>
<td>105(105)</td>
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</table>

**Chemical studies used in the characterization:**
- Hotspot Study, 1994 (3 stations)
- R-EMAP Study, 1996 (1)
- Fraser Shipyards/Howard's Pocket, 2002 (3)
- Howards Bay - St. Louis River AOC, 2010 (2)

**Macro-invertebrate studies:**
- Hotspot Study, 1994
- R-EMAP Study, 1996
- Fraser Shipyards/Howard's Pocket, 2002
- Howards Bay - St. Louis River AOC, 2010

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)

**Distributions of Constituent Concentrations**

**Data Summary**

Available data in studies used for characterization (All available data)

**Constituent**
- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

**Mercury (Hg, mg/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>&lt;=0.1</th>
<th>0.1-0.6</th>
<th>&gt;0.6</th>
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</thead>
<tbody>
<tr>
<td>0-15</td>
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<td>5</td>
<td>3</td>
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</table>

**Total PAHs (ug/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
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</thead>
<tbody>
<tr>
<td>0.1-0.6</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total PCBs (ug/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>0.1-0.6</td>
<td>5</td>
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</tbody>
</table>

**PCDD/Fs TEQ**

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>0.1-0.6</td>
<td>5</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

Metals
- As
- Cd
- Cr
- Cu
- Pb
- Hg
- Ni
- Zn

PAHs, PCBs, & PCDD/Fs

**No samples analyzed for PCDD/F TEQ**

Charts show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations); Hotspot Study, 1994 (10); Duluth-Superior Harbor Study, 1993 (2); Fraser Shipyards/Howard’s Pocket, 2002 (10); Howards Bay – St. Louis River AOC, 2010 (14); Wisconsin Sampling, 2007 (6).

Other chemical studies:

Data Summary
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Mercury</td>
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<td>82(82)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>55(55)</td>
<td>1219(1219)</td>
</tr>
<tr>
<td>PCBs</td>
<td>19(19)</td>
<td>19(19)</td>
<td>151(151)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
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<td>0(0)</td>
</tr>
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<td>Pesticides</td>
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<td>Other parameters</td>
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<td>TOC</td>
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<td>72(72)</td>
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<tr>
<td>Grain size</td>
<td>41(41)</td>
<td>78(78)</td>
<td>470(470)</td>
</tr>
</tbody>
</table>

Other parameters:
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/Fs (pg/NQ)

Results Exceeding Thresholds (0-15 cm samples)

Metal As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

% >TEC = Metal % exceed Threshold of Effect
% >MEC = Metal % exceed Medium Effect
% >PEC = Metal % exceed Predicted Effect

No samples analyzed for PCDD/F TEQ

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Studies with Samples in Sediment Assessment Area:**

Chemical studies used in the characterization:
- Howards Bay - St. Louis River AOC, 2010 (3 stations); Wisconsin Sampling, 2007 (1).

Other chemical studies:
- Fish tissue studies:
  - Mercury
  - PAHs
  - PCBs
  - PCDD/Fs
  - Pesticides
  - Other parameters
  - TOC
  - Grain size

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Mercury</td>
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<td>11(11)</td>
<td>11(11)</td>
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<tr>
<td>PAHs</td>
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<td>429(429)</td>
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<td>PCBs</td>
<td>4(4)</td>
<td>11(11)</td>
<td>101(101)</td>
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<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
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<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
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<td>TOC</td>
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<td>11(11)</td>
<td>11(11)</td>
</tr>
<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>11(11)</td>
<td>72(72)</td>
</tr>
</tbody>
</table>

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- Mercury (mg/kg)
- Total PCDD/F TEQ

**Core Profiles**

<table>
<thead>
<tr>
<th>Core Profiles</th>
<th>Mean PEC-Q/PQ</th>
<th>Mercury (Hg, mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;=0.1</td>
<td>0.1-0.6</td>
</tr>
<tr>
<td>HB10-1-21 PQ</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HB10-1-24 PQ</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HB2A_GENES PQ</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HB10-1-29 PQ</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Studies with Samples in Sediment Assessment Area:**

Chemical studies used in the characterization:

Other chemical studies:

Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

- **Mercury (Hg, mg/kg):**
  - <=0.18
  - 0.18-1.1
  - >1.1

- **Total PAHs (ug/kg):**
  - >100
  - 50-100
  - 15-50
  - 0-15

- **Total PCBs (ug/kg):**
  - >100
  - 50-100
  - 15-50
  - 0-15

**No samples analyzed for PCDD/F TEQ.**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization:
Duluth-Superior Harbor Study, 1993 (1 stations); Wisconsin Sampling, 2007 (3).

Other chemical studies:
Macro-invertebrate studies:

Fish tissue studies:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(3)</td>
<td>7(7)</td>
<td>70(70)</td>
</tr>
<tr>
<td>Mercury</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(3)</td>
<td>7(7)</td>
<td>158(158)</td>
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<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>7(7)</td>
<td>7(7)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>4(4)</td>
<td>8(8)</td>
<td>75(75)</td>
</tr>
<tr>
<td>TOC</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
<tr>
<td>Grain size</td>
<td>3(3)</td>
<td>7(7)</td>
<td>14(14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean PEC-Q</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Potential Impairment</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>High</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>

No PCBs detected in 0 analyzed samples.

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
Wisconsin Sampling, 2007 (2 stations).

Other chemical studies:
Macro-invertebrate studies:

Fish tissue studies:

### Data Summary

Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>2(2)</td>
<td>2(2)</td>
<td>32(32)</td>
</tr>
<tr>
<td>Mercury</td>
<td>2(2)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>76(76)</td>
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<td>PCBs</td>
<td>2(2)</td>
<td>2(2)</td>
<td>22(22)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>2(2)</td>
<td>2(2)</td>
<td>30(30)</td>
</tr>
<tr>
<td>TOC</td>
<td>2(2)</td>
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<tr>
<td>Grain size</td>
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<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>22</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAHs, PCBs, &amp; PCDD/Fs</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

---

### Distributions of Constituent Concentrations

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **Mercury (mg/kg)**
- **PCDD/F TEQ**

---

**Notes:**
- Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(3)</td>
<td>6(6)</td>
<td>61(61)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(3)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>138(138)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>66(66)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>6(6)</td>
<td>9(9)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>3(3)</td>
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<td>TOC</td>
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<td>6(6)</td>
</tr>
<tr>
<td>Grain size</td>
<td>3(3)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
</tbody>
</table>

### Maps of Assessment Area Cores

**Labeled Stations Used in Characterization**

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization: Wisconsin Sampling, 2007 (3 stations).
- Other chemical studies:
  - Fish tissue studies:

### Core Profiles

**Mean PEC-Q**

<table>
<thead>
<tr>
<th>Level</th>
<th>Potential Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.1-0.6</td>
</tr>
<tr>
<td>High</td>
<td>&gt;0.6</td>
</tr>
</tbody>
</table>

**Depth**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>TEC</th>
<th>MEC</th>
<th>PEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>120</td>
<td>120</td>
<td>240</td>
<td>360</td>
</tr>
</tbody>
</table>

**Chemical studies used in the characterization:**

- Wisconsin Sampling, 2007 (3 stations).
- Other chemical studies:
  - Fish tissue studies:

**Graphs:**

- **Total PAHs (ug/kg)**
- **Total PCBs (ug/kg)**
- **Mercury (mg/kg)**
- **PCDD/F TEQ**

**No samples analyzed for PCDD/F TEQ.**

![Map of Assessment Area Cores](image)

*Legend:*

- Green: PEC-Q >0.6
- Yellow: PEC-Q 0.1-0.6
- Red: PEC-Q <0.1
- Other color shades

---

**Potential Impairment:**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>0</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>&gt;15</td>
<td>0</td>
<td>0.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples):**

- **Metals:**
  - As
  - Cd
  - Cr
  - Cu
  - Pb
  - Hg
  - Ni
  - Zn

- **PAHs, PCBs, & PCDD/Fs**

---

*Note:* Results show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization: Wisconsin Sampling, 2007 (6 stations).

Other chemical studies:
Fish tissue studies:

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>140 (140)</td>
</tr>
<tr>
<td>Mercury</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>14 (14)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>316 (316)</td>
</tr>
<tr>
<td>PCBs</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>154 (154)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>20 (20)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>174 (174)</td>
</tr>
<tr>
<td>TOC</td>
<td>6 (6)</td>
<td>14 (14)</td>
<td>28 (28)</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Study Details

**Assessment Area #57.1 (Estuary Flats NC)**

*Geographic zone:* St. Louis Bay  
*Date Generated:* 6/28/2013

### Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>1(1)</td>
<td>11(11)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
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<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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</tr>
<tr>
<td>Grain size</td>
<td>1(1)</td>
<td>1(1)</td>
<td>8(8)</td>
</tr>
</tbody>
</table>

### Chemical Studies

- **USACE DACW35-93-D-0005 DELIVERY ORDER 29 (1 stations).**
- **Other chemical studies:**
  - Fish tissue studies:

### Depth Profiles

- **Total PAHs (ug/kg):**
  - No samples analyzed for PCDD/F TEQ.

- **Mercury (mg/kg):**
  - No surface samples available.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (4 stations)
- Duluth-Superior Harbor Study, 1993 (1)
- Wisconsin Sampling, 2007 (14)

Other chemical studies:
- Fish tissue studies:
  - Mercury (Hg, mg/kg): 0-0.1, 0.1-0.6, >0.6
  - Total PAHs (ug/kg): 0-15, 15-50, 50-100
  - Total PCBs (ug/kg): 0-15, 15-50, 50-100
  - PCDD/Fs
  - Pesticides
  - Other parameters
  - Grain size

Data Summary
Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>18(18)</td>
<td>22(22)</td>
<td>252(252)</td>
</tr>
<tr>
<td>Mercury</td>
<td>19(19)</td>
<td>26(26)</td>
<td>26(26)</td>
</tr>
<tr>
<td>PAHs</td>
<td>17(17)</td>
<td>21(21)</td>
<td>627(627)</td>
</tr>
<tr>
<td>PCBs</td>
<td>14(14)</td>
<td>18(18)</td>
<td>198(198)</td>
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<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>14(14)</td>
<td>18(18)</td>
<td>32(32)</td>
</tr>
<tr>
<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>18(18)</td>
<td>22(22)</td>
<td>64(64)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Metals</th>
<th>PAHs, PCBs, &amp; PCDD/Fs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>15-50</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>&gt;50</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

Potential Impairment

- Low: 0-0.1
- High: >0.6

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Mean PEC-Q

<table>
<thead>
<tr>
<th>Core Profile</th>
<th>Mean PEC-Q/QQ</th>
<th>Mercury (Hg, mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 cm</td>
<td>0.1</td>
<td>&lt;0.18</td>
</tr>
<tr>
<td>&gt;15 cm</td>
<td>&gt;0.6</td>
<td>&gt;0.18</td>
</tr>
</tbody>
</table>

### Map of Assessment Area Cores

Labeled Stations Used in Characterization

### Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
St. Louis Bay 40th Ave., 2010 (1 stations).

Other chemical studies:

Macro-invertebrate studies:
St. Louis Bay 40th Ave., 2010.

Fish tissue studies:

### Data Summary

Available data in studies used for characterization

#### (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>44(44)</td>
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<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>34(34)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>18(18)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
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<td>0(0)</td>
<td>0(0)</td>
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<td>32(32)</td>
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<td>2(2)</td>
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<td>1(1)</td>
<td>2(2)</td>
<td>14(14)</td>
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### Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Total PAHs</th>
<th>Total PCBs</th>
<th>PCDD/F TEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**

- St. Louis Bay 40th Ave., 2010 (6 stations).
- Other chemical studies:
  - Mercury (Hg, mg/kg): <=0.18, 0.18-1.1, >1.1
  - Depth (cm): 10, 100, 1000, 10000, 100000

**Macro-invertebrate studies:**


**Fish tissue studies:**

- Results Exceeding Thresholds (0-15 cm samples):%

**Data Summary**

Available data in studies used for characterization

**Constituent** | **Number of Stations** | **Number of Samples** | **Number of Results**
--- | --- | --- | ---
Metals (without Hg) | 6(6) | 12(12) | 264(264)
Mercury | 6(6) | 12(12) | 12(12)
PAHs | 6(6) | 12(12) | 248(248)
PCBs | 6(6) | 12(12) | 526(526)
PCDD/Fs | 2(2) | 2(2) | 50(50)
Pesticides | 2(2) | 2(2) | 42(42)
Other parameters | 6(6) | 18(18) | 204(204)
TOC | 6(6) | 10(10) | 10(10)
Grain size | 5(5) | 6(6) | 42(42)

**TOC**

| Constituent | **Number of Stations** | **Number of Samples** | **Number of Results** |
--- | --- | --- | ---
Metals | 6(6) | 10(10) | 10(10)
Grain size | 5(5) | 6(6) | 42(42)

**Depth (cm)**

- Total PAHs (µg/kg)
- Total PCBs (µg/kg)
- PCDD/F TEQ (pg/g)

**Potential Impairment**

- Low
- High
- Level I SQT
- Level II SQT

**Mean PEC-Q (PQ)**

| Level | Low | Potential Impairment | High |
--- | --- | --- | ---
0-15 cm | 0.1 | 0.6 | 0.6 |
>15 cm | 0.1 | 0.6 | 0.6 |

**Distributions of Constituent Concentrations**

- Level I SQT
- Level II SOT

| Constituent | **Number of Stations** | **Number of Samples** | **Number of Results** |
--- | --- | --- | ---
PAHs, PCBs, & PCDD/Fs | 2(2) | 2(2) | 50(50)

**Results Exceeding Thresholds (0-15 cm samples):**

| Constituent | % > Level I SQT | % > Level II SQT |
--- | --- | ---
As | 7 | 7
Cd | 7 | 7
Cr | 7 | 7
Cu | 7 | 7
Pb | 7 | 7
Hg | 7 | 7
Ni | 7 | 7
Zn | 7 | 7

**Fish tissue studies:**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies

- **St. Louis Bay 40th Ave., 2010 (18 stations).**
- **Other chemical studies:**
  - Hotspot Study, 1994 (6 stations); Duluth-Superior Harbor Study, 1993 (1).
  - Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

### Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>18(24)</td>
<td>69(81)</td>
<td>1518(1576)</td>
</tr>
<tr>
<td>Mercury</td>
<td>18(25)</td>
<td>69(83)</td>
<td>69(83)</td>
</tr>
<tr>
<td>PAHs</td>
<td>18(24)</td>
<td>67(79)</td>
<td>1249(1441)</td>
</tr>
<tr>
<td>PCBs</td>
<td>18(18)</td>
<td>69(69)</td>
<td>2084(2084)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>7(7)</td>
<td>7(7)</td>
<td>175(175)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>5(5)</td>
<td>5(5)</td>
<td>105(105)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>18(25)</td>
<td>73(87)</td>
<td>1131(1255)</td>
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<tr>
<td>TOC</td>
<td>18(25)</td>
<td>67(81)</td>
<td>67(81)</td>
</tr>
<tr>
<td>Grain size</td>
<td>18(24)</td>
<td>65(77)</td>
<td>455(563)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- **Depth (cm):** 0.01, 0.10, 1.00, 10.00, 100.00
- **Total PAHs (μg/kg):**
  - Level I SQT: 0-15 cm samples, 0.18-1.1, >1.1
  - Level II SQT: 0-15 cm samples, 0-1.1, >1.1
- **Total PCBs (μg/kg):**
  - Level I SQT: 0-15 cm samples, 0-150, 15-50, 50-100, >100
  - Level II SQT: 0-15 cm samples, 0-150, 15-50, 50-100, >100
- **PCDD/F TEQ (pg/g):**
  - 0-15 cm samples, 0.01-5.00

### Potential Impairment

- **Low:** 0-0.1, **High:** 0.1-1.0

### Results

- **Metals (%>Level I SQT) (%>Level II SQT):** 16, 18
- **PAHs, PCBs, & PCDD/Fs:**
  - Level I SQT: 16, 18
  - Level II SQT: 16, 18

### Distributions of Constituent Concentrations

- **Depth (cm):** 0.01, 0.10, 1.00, 10.00, 100.00
- **Total PAHs (μg/kg):**
  - 0-15 cm samples, 0-15, 15-50, 50-100, >100
- **Total PCBs (μg/kg):**
  - 0-15 cm samples, 0-150, 15-50, 50-100, >100
- **PCDD/F TEQ (pg/g):**
  - 0-15 cm samples, 0.01-5.00

---

**Map of Assessment Area Cores Labeled Stations Used in Characterization**

Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization: St. Louis Bay 40th Ave., 2010 (18 stations).
- Other chemical studies: Hotspot Study, 1994 (6 stations); Duluth-Superior Harbor Study, 1993 (1).
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:

Other chemical studies:
- R-EMAP Study, 1995 (1 stations);
- USACE DACW35-93-D-0005 DELIVERY ORDER 29 (1).

Macro-invertebrate studies:

Fish tissue studies:
- No data available for core profile.

**Data Summary**

Available data in studies used for characterization

(All available data)

### Constituent

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(16)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
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<td>0(16)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(11)</td>
</tr>
<tr>
<td>TOC</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(2)</td>
</tr>
<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(15)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- No data available for core profile.
- No samples analyzed for PAHs.
- No PCBs detected in 0 analyzed samples.
- No samples analyzed for mercury.
- No samples analyzed for PCDD/F TEQ.
- No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (1 stations); St. Louis Bay 40th Ave., 2010 (1).
- Other chemical studies:
  - R-EMAP Study, 1995; St. Louis Bay 40th Ave., 2010.
  - Macro-invertebrate studies: R-EMAP Study, 1995; St. Louis Bay 40th Ave., 2010.
  - Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

No samples analyzed for PAHs

No PCBs detected in 0 analyzed samples

No samples analyzed for mercury

No samples analyzed for PCDD/F TEQ
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies Used in Characterization
- St. Louis Bay 40th Ave., 2010 (21 stations)
- Other chemical studies: R-EMAP Study, 1995 (2 stations); R-EMAP Study, 1996 (2 stations)
- Macro-invertebrate studies: R-EMAP Study, 1995; R-EMAP Study, 1996; St. Louis Bay 40th Ave., 2010
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)

### Sediment Assessment Area Chemistry Characterization

#### Data Summary
Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>21</td>
<td>81</td>
<td>1782</td>
</tr>
<tr>
<td>Mercury</td>
<td>21</td>
<td>81</td>
<td>1782</td>
</tr>
<tr>
<td>PAHs</td>
<td>21</td>
<td>81</td>
<td>1782</td>
</tr>
<tr>
<td>PCBs</td>
<td>21 (21)</td>
<td>81 (81)</td>
<td>1782</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>8</td>
<td>8</td>
<td>8</td>
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<td>Pesticides</td>
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<tr>
<td>Other parameters</td>
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<tr>
<td>Grain size</td>
<td>21</td>
<td>81</td>
<td>1782</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals
- Arsenic
- Cadmium
- Chromium
- Copper
- Lead
- Mercury
- Nickel
- Zinc

#### PAHs, PCBs, & PCDD/Fs
- Total PAHs
- Total PCBs
- PCDD/F TEQ

#### Potential Impairment
- Low
- High

<table>
<thead>
<tr>
<th>Level</th>
<th>0-15 cm</th>
<th>&gt;15 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I SQT</td>
<td>0 1 2 3 4</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>Level II SQT</td>
<td>0 5 10 15 20</td>
<td>0 5 10 15 20</td>
</tr>
</tbody>
</table>

### Sediment Assessment Area Chemistry Characterization

#### Mean PEC-Q
- Low
- Potential Impairment
- High

#### Core Profiles
- Mean PEC-Q (PQ)
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- Mercury (mg/kg)
- PCDD/F TEQ (pg/g)

#### Distributions of Constituent Concentrations
- Level I SQT
- Level II SQT

Stem show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- Duluth-Superior Harbor Study, 1993 (1 station)
- USACE DACW35-93-D-0005 DELIVERY ORDER 29 (2)
- IT Interlake, 1999 (2)

### Other chemical studies:
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

### Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>2(2)</td>
<td>2(2)</td>
<td>22(22)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(3)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>5(5)</td>
<td>83(83)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>9(9)</td>
<td>55(55)</td>
</tr>
<tr>
<td>TOC</td>
<td>3(3)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>5(5)</td>
<td>19(19)</td>
</tr>
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</table>

### Data Summary

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>2(2)</td>
<td>2(2)</td>
<td>22(22)</td>
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<tr>
<td>Mercury</td>
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<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>5(5)</td>
<td>83(83)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
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<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>TOC</td>
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</tr>
<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>5(5)</td>
<td>19(19)</td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- Total PAHs (ug/kg)
- Mercury (mg/kg)
- Other parameters

**Notes:**
- No samples analyzed for PCDD/F TEQ.
- Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Mean PEC-Q**

Insufficient results available for PEC-Q calculation.

**Studies with Samples in Sediment Assessment Area:**

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (7 stations); Hotspot Study, 1994 (5); R-EMAP Study, 1996 (3); Duluth-Superior Harbor Study, 1993 (1).

Other chemical studies:

Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

Insufficient results available for PEC-Q calculation.

**Mercure (mg/kg)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>% &gt;TEC</th>
<th>% &gt;MEC</th>
<th>% &gt;PEC</th>
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<tr>
<td>0-15</td>
<td>4</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>15-50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Metals (without Hg)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>15(15)</td>
<td>15(15)</td>
<td>75(75)</td>
</tr>
<tr>
<td>Mercury</td>
<td>16(16)</td>
<td>19(19)</td>
<td>19(19)</td>
</tr>
<tr>
<td>PAHs</td>
<td>12(12)</td>
<td>12(12)</td>
<td>205(205)</td>
</tr>
<tr>
<td>PCBs</td>
<td>5(5)</td>
<td>5(5)</td>
<td>361(361)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>5(5)</td>
<td>5(5)</td>
<td>10(10)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>TOC</td>
<td>16(16)</td>
<td>19(19)</td>
<td>151(151)</td>
</tr>
<tr>
<td>Grain size</td>
<td>15(15)</td>
<td>15(15)</td>
<td>115(115)</td>
</tr>
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</table>

**Depth (cm)**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>No samples analyzed for PCDD/F TEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>(15)</td>
</tr>
<tr>
<td>15-50</td>
<td>(1)</td>
</tr>
<tr>
<td>&gt;150</td>
<td>(2)</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- IT Interlake Toxicity study, 1996 (1 station); IT Interlake, 1996 (1); IT Interlake, 1999 (14); Service Intlk WPIIa, 2001 (4); SLRIDT Stryker Bay-Slip 7 SEG 2003-04 (5).

Other chemical studies:
- Macro-invertebrate studies: IT Interlake Toxicity study, 1996; IT Interlake, 1999; Service Intlk WPIIa, 2001; SLRIDT Stryker Bay-Slip 7 SEG 2003-04.
- Fish tissue studies: No PCBs detected in analyzed samples.
- No samples analyzed for mercury.
- No samples analyzed for PCDD/F TEQ.

Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6(6)</td>
<td>13(13)</td>
<td>102(102)</td>
</tr>
<tr>
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<td>PCDD/Fs</td>
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Results Exceeding Thresholds (0-15 cm samples)

- No surface samples available.

Core Profiles

No data available for core profile.

Map of Assessment Area Cores

Labeled Stations Used in Characterization

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
- IT Interlake Toxicity study, 1996 (1 station); IT Interlake, 1996 (1); IT Interlake, 1999 (14); Service Intlk WPIIa, 2001 (4); SLRIDT Stryker Bay-Slip 7 SEG 2003-04 (5).

Other chemical studies:
- Macro-invertebrate studies: IT Interlake Toxicity study, 1996; IT Interlake, 1999; Service Intlk WPIIa, 2001; SLRIDT Stryker Bay-Slip 7 SEG 2003-04.
- Fish tissue studies: No PCBs detected in analyzed samples.
- No samples analyzed for mercury.
- No samples analyzed for PCDD/F TEQ.

Insufficient results available for PEC-Q calculation.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tr>
<td>Metals (without Hg)</td>
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<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
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<td>0(0)</td>
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<tr>
<td>PCDD/Fs</td>
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<td>Pesticides</td>
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<td>Other parameters</td>
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<tr>
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<td>0(0)</td>
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<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

Results Exceeding Thresholds (0-15 cm samples)

- No surface samples available
- No samples analyzed for mercury
- No samples analyzed for PAHs
- No samples analyzed for PCDD/F TEQ

Distributions of Constituent Concentrations

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
St. Louis Bay 40th Ave., 2010 (3 stations).

Other chemical studies:

- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization:
St. Louis Bay 40th Ave., 2010 (3 stations).
Other chemical studies:

- Macro-invertebrate studies: St. Louis Bay 40th Ave., 2010.
- Fish tissue studies:

### Data Summary
Available data in studies used for characterization
(All available data)

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tbody>
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<td>Metals (without Hg)</td>
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<td>Mercury</td>
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<td>PAHs</td>
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<td>PCBs</td>
<td>3(3)</td>
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<td>PCDD/Fs</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)

- Metals
- PAHs, PCBs, & PCDD/Fs

### Distributions of Constituent Concentrations

- Total PAHs (μg/kg)
- Total PCBs (μg/kg)
- PCDD/F TEQ (pg/g)

- Mercury (mg/kg)

### Potential Impairment

- Low: 0-15 cm (3)
- High: >15 cm (2)

- % Level I SQT: 0 %
- % Level II SQT: 100 %

- Mean PEC-Q

- Core Profiles

- Map of Assessment Area Cores
- Labeled Stations Used in Characterization
- Chemical studies used in the characterization:
St. Louis Bay 40th Ave., 2010 (3 stations).

- Other chemical studies:

- Macro-invertebrate studies:
St. Louis Bay 40th Ave., 2010.

- Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- St. Louis Bay 40th Ave., 2010 (6 stations).
- Duluth-Superior Harbor Study, 1993 (1 stations).

Macro-invertebrate studies:
- Duluth-Superior Harbor Study, 1993; St. Louis Bay 40th Ave., 2010.

Fish tissue studies:

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<th>Number of Results</th>
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<tbody>
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<td>Metals (without Hg)</td>
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<td>Mercury</td>
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<td>22(26)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>6(6)</td>
<td>22(22)</td>
<td>616(616)</td>
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<tr>
<td>PCDD/Fs</td>
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<tr>
<td>Pesticides</td>
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<tr>
<td>Other parameters</td>
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Data Summary
Available data in studies used for characterization (All available data)

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<tbody>
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<td>Metals (without Hg)</td>
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<tr>
<td>Mercury</td>
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<td>22(26)</td>
<td>22(26)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6(6)</td>
<td>22(22)</td>
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<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>22(22)</td>
<td>616(616)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td></td>
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<tr>
<td>Pesticides</td>
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<td>Other parameters</td>
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</tr>
<tr>
<td>TOC</td>
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<td>22(26)</td>
<td>22(26)</td>
</tr>
<tr>
<td>Grain size</td>
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<td>22(22)</td>
<td>154(154)</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**

**Macro-invertebrate studies:**

**Fish tissue studies:**

**Results Exceeding Thresholds (0-15 cm samples)**
- No surface samples available
- No PCRPs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ
- No samples analyzed for PAHs

---

**Data Summary**

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<thead>
<tr>
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<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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</thead>
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**Distributions of Constituent Concentrations**

- Mean PEC-Q
- Insufficient results available for PEC-Q calculation

---

**Map of Assessment Area Cores**

- Labeled Stations Used in Characterization
- Studies with Samples in Sediment Assessment Area
- Chemical studies used in the characterization:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

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<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
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<td>PCBs</td>
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</table>

### Distributions of Constituent Concentrations

- Level I SOT
- Level II SOT

- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ

No surface samples available
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- Service Intlk WPIIIA, 2001 (1 stations)
- Bay West Intlk Supplemental 2001 (5)
- Bay West Intlk Reconnaissance 2001 (1)
- Reference sites, 2001 (4)
- SLRIDT Reference Sites SEG 2004 (7)
- Lower St. Louis River, 2011 (5)

### Other chemical studies:
- Macro-invertebrate studies:
  - Service Intlk WPIIIA, 2001
  - Bay West Intlk Supplemental 2001
  - Bay West Intlk Reconnaissance 2001
  - Reference sites, 2001
  - SLRIDT Reference Sites SEG 2004
  - Lower St. Louis River, 2011
  - US Steel Macroinvertebrate Survey

### Fish tissue studies:
- Fond du Lac Fish Tissue Study 2000

---

**Data Summary**

Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>17(17)</td>
<td>28(28)</td>
<td>266(266)</td>
</tr>
<tr>
<td>Mercury</td>
<td>17(17)</td>
<td>28(28)</td>
<td>28(28)</td>
</tr>
<tr>
<td>PAHs</td>
<td>18(18)</td>
<td>29(29)</td>
<td>835(835)</td>
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<tr>
<td>PCBs</td>
<td>12(12)</td>
<td>18(18)</td>
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<td>PCDD/Fs</td>
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**Results Exceeding Thresholds (0-15 cm samples)**

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</tr>
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</tr>
<tr>
<td>Zn</td>
<td></td>
<td></td>
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**Total PAHs (µg/kg)**

Depth (cm) | 15-50 | 50-100 | 100-1000 |
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<thead>
<tr>
<th></th>
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</tr>
<tr>
<td>PCDD/F TEQ</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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**Mercury (mg/kg)**

Depth (cm) | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 |
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**PCDD/F TEQ (pg/g)**

Depth (cm) | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 |
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</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- **Lower St. Louis River, 2011 (9 stations).**
- **Other chemical studies:**
  - Bay West Int'l Supplemental 2001 (2 stations)
  - Bay West Int'l Reconnaissance 2001 (1); Reference sites, 2001 (3); SLRIDT Stryker Bay-Slip 7 SEG 2003-04 (3); SLRIDT Reference Site SEG 2004 (8).

### Macro-invertebrate studies:
- Duluth-Superior Harbor Study, 1993;
- Bay West Int'l Supplemental 2001;
- Bay West Int'l Reconnaissance 2001;
- Reference sites, 2001;
- SLRIDT Stryker Bay-Slip 7 SEG 2003-04;
- SLRIDT Reference Sites SEG 2004;
- Lower St. Louis River, 2011.

### Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

---

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Studies with Samples in Sediment Assessment Area:**

**Chemical studies used in the characterization:**
- Lower St. Louis River, 2011 (9 stations).

### Potential Impairment

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>PAHs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>PCBs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>TOC</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
<tr>
<td>Grain size</td>
<td>0-15 cm</td>
<td>&gt;15 cm</td>
</tr>
</tbody>
</table>

---

### Data Summary

**Available data in studies used for characterization**

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>9(20)</td>
<td>18(35)</td>
<td>180(354)</td>
</tr>
<tr>
<td>Mercury</td>
<td>9(20)</td>
<td>18(35)</td>
<td>18(35)</td>
</tr>
<tr>
<td>PAHs</td>
<td>9(21)</td>
<td>18(36)</td>
<td>692(1088)</td>
</tr>
<tr>
<td>PCBs</td>
<td>9(17)</td>
<td>18(29)</td>
<td>126(214)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(7)</td>
<td>4(9)</td>
<td>112(157)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>9(21)</td>
<td>18(36)</td>
<td>498(1088)</td>
</tr>
<tr>
<td>TOC</td>
<td>9(17)</td>
<td>18(29)</td>
<td>18(29)</td>
</tr>
<tr>
<td>Grain size</td>
<td>9(14)</td>
<td>18(26)</td>
<td>56(44)</td>
</tr>
</tbody>
</table>

---

**Results Exceeding Thresholds (0-15 cm samples)**

#### Metals

- Ag: 9(99)
- Cd: 9(99)
- Cr: 2(2)
- Cu: 9(99)
- Pb: 9(99)
- Hg: 9(99)
- Ni: 9(99)
- Zn: 9(99)

#### PAHs, PCBs, & PCDD/Fs

- Total PAHs: 9(99)
- Total PCBs: 9(99)
- PCDD/F TEQ: 9(99)

---

**Maps showing distribution of constituent concentrations**

- Mean PEC-Q(PQ): 9(99)
- Mercury (mg/kg): 9(99)
- TOC: 9(99)
- Grain size: 9(99)

---

**Core Profiles**

- TIF-4
- TIF-5
- TIF-2
- TIF-1
- MC-3
- IPW-1
- IPW-2
- IPW-4

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 71.1 (Tallas Island)**

Geographic zone: Lower St. Louis River

Date Generated: 6/28/2013
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

**Available data in studies used for characterization**

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(5)</td>
<td>6(10)</td>
<td>60(88)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(5)</td>
<td>6(10)</td>
<td>6(10)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(5)</td>
<td>6(10)</td>
<td>240(368)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>42(42)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>150(150)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>6(6)</td>
<td>168(168)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>3(5)</td>
<td>6(10)</td>
<td>390(694)</td>
</tr>
<tr>
<td>TOC</td>
<td>3(5)</td>
<td>6(10)</td>
<td>6(10)</td>
</tr>
<tr>
<td>Grain size</td>
<td>3(12)</td>
<td>6(17)</td>
<td>12(23)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- **Metals**
  - % > Level I SQT: 3
  - % > Level II SQT: 3

- **PAHs, PCBs, & PCDD/Fs**
  - % > Level I SQT: 3
  - % > Level II SQT: 3

### Sediment Assessment Area Chemistry Characterization

**Assessment Area # 71.2 (Kingsbury Bay Complex)**

Geographic zone: Lower St. Louis River

Date Generated: 6/28/2013

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(5)</td>
<td>6(10)</td>
<td>60(88)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(5)</td>
<td>6(10)</td>
<td>6(10)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(5)</td>
<td>6(10)</td>
<td>240(368)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>42(42)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>150(150)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>6(6)</td>
<td>168(168)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>3(5)</td>
<td>6(10)</td>
<td>390(694)</td>
</tr>
<tr>
<td>TOC</td>
<td>3(5)</td>
<td>6(10)</td>
<td>6(10)</td>
</tr>
<tr>
<td>Grain size</td>
<td>3(12)</td>
<td>6(17)</td>
<td>12(23)</td>
</tr>
</tbody>
</table>

No PCBs detected in 8 analyzed samples
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

#### Available data in studies used for characterization

(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>TOC</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

#### No data available for core profile

#### No samples analyzed for PAHs

#### No PCBs detected in 0 analyzed samples

#### No surface samples available

### Distributions of Constituent Concentrations

- TEC
- MEC
- PEC

Box plots show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (2 stations)
- R-EMAP Study, 1996 (1)
- Duluth-Superior Harbor Study, 1993 (1)

Other chemical studies:
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - R-EMAP Study, 1996
  - Duluth-Superior Harbor Study, 1993
  - 40th Ave Macroinvertebrate Survey, 2010
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)
  - Insufficient results available for PEC-Q calculation
- Other parameters
  - 3(3)
  - 3(3)
  - 38(38)
  - 21(21)

Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (1 stations)
- Bay West Intlk Supplemental 2001 (3)
- Bay West Intlk Reconnaissance 2001 (1)
- Reference sites, 2001

**Other chemical studies:**
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - Bay West Intlk Supplemental 2001
  - Bay West Intlk Reconnaissance 2001
  - Reference sites, 2001

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)

**Data Summary**
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>2 (2)</td>
<td>3 (3)</td>
<td>19 (19)</td>
</tr>
<tr>
<td>Mercury</td>
<td>2 (2)</td>
<td>3 (3)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>PAHs</td>
<td>2 (2)</td>
<td>3 (3)</td>
<td>81 (81)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>3 (3)</td>
<td>4 (4)</td>
<td>162 (162)</td>
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<tr>
<td>TOC</td>
<td>2 (2)</td>
<td>3 (3)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Grain size</td>
<td>5 (5)</td>
<td>6 (6)</td>
<td>12 (12)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

**Distributions of Constituent Concentrations**

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Core Profiles**

**Studies with Samples in Sediment Assessment Area:**
Chemical studies used in the characterization:
- R-EMAP Study, 1995 (1 stations)
- Bay West Intlk Supplemental 2001 (3)
- Bay West Intlk Reconnaissance 2001 (1)
- Reference sites, 2001

**Other chemical studies:**
- Macro-invertebrate studies:
  - R-EMAP Study, 1995
  - Bay West Intlk Supplemental 2001
  - Bay West Intlk Reconnaissance 2001
  - Reference sites, 2001

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Map of Assessment Area Cores

**Labeled Stations Used in Characterization**

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (1 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:

### Mean PEC-Q

<table>
<thead>
<tr>
<th>Level</th>
<th>Potential Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
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</tbody>
</table>

### Core Profiles

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>20(20)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>76(76)</td>
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<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>14(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>2(2)</td>
<td>34(34)</td>
</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
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</tr>
<tr>
<td>Grain size</td>
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<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

### Data Summary

**Available data in studies used for characterization**

(All available data)

### Distributions of Constituent Concentrations

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Available data in studies used for characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>1(1)</td>
</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
</tr>
<tr>
<td>Grain size</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Depth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

### Sediment Assessment Area Chemistry Characterization

**Assessment Area # 72.4 (Alder Island)**

**Geographic zone:** Lower St. Louis River

**Date Generated:** 6/28/2013

Potential Impairment

<table>
<thead>
<tr>
<th>Level</th>
<th>Potential Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Depth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PAHs</td>
<td>1(1)</td>
</tr>
<tr>
<td>Total PCBs</td>
<td>1(1)</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (1 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:

### Other parameters

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (4 stations)
- R-EMAP Study, 1996 (1)

**Other chemical studies:**
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

### Metals (without Hg)
- Number of Stations: 5
- Number of Samples: 5
- Number of Results: 25
- Mercury (mg/kg)
  - Number of Samples: 5
  - Number of Results: 5

### PAHs
- Number of Stations: 3
- Number of Samples: 3
- Number of Results: 53

### Other parameters
- TOC
  - Number of Stations: 5
  - Number of Samples: 5
  - Number of Results: 32

### Grain size
- Number of Stations: 5
- Number of Samples: 5
- Number of Results: 35

The maps show distributions of constituent concentrations, core profiles, and results exceeding thresholds. There are no PCBs detected in analyzed samples. No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Mean PEC-Q

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>20(20)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>76(76)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>14(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>1(1)</td>
<td>2(2)</td>
<td>34(34)</td>
</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

Core Profiles

Mean PEC-Q (PQ)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>20(20)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>76(76)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>14(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>2(2)</td>
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</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>%&lt;Level I SQT</th>
<th>%&lt;Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
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<td>100%</td>
</tr>
<tr>
<td>PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Total PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Data Summary
Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>2(2)</td>
<td>20(20)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>2(2)</td>
<td>2(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>76(76)</td>
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<tr>
<td>PCBs</td>
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<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>1(1)</td>
<td>2(2)</td>
<td>34(34)</td>
</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
<td>2(2)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

Total PAHs (ug/kg)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>%&lt;Level I SQT</th>
<th>%&lt;Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Total PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Mercury (mg/kg)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>%&lt;Level I SQT</th>
<th>%&lt;Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total PAHs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Total PCBs</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Lower St. Louis River, 2011 (5 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:
- Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>5(5)</td>
<td>10(10)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Mercury</td>
<td>5(5)</td>
<td>10(10)</td>
<td>10(10)</td>
</tr>
<tr>
<td>PAHs</td>
<td>5(5)</td>
<td>10(10)</td>
<td>392(392)</td>
</tr>
<tr>
<td>PCBs</td>
<td>5(5)</td>
<td>10(10)</td>
<td>70(70)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>150(150)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3(3)</td>
<td>6(6)</td>
<td>168(168)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>5(5)</td>
<td>10(10)</td>
<td>454(454)</td>
</tr>
<tr>
<td>TOC</td>
<td>5(5)</td>
<td>10(10)</td>
<td>10(10)</td>
</tr>
<tr>
<td>Grain size</td>
<td>5(5)</td>
<td>10(10)</td>
<td>20(20)</td>
</tr>
</tbody>
</table>

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization: Lower St. Louis River, 2011 (5 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
<thead>
<tr>
<th>Metals</th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
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</thead>
<tbody>
<tr>
<td>As</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cd</td>
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<td>Cr</td>
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<td>Cu</td>
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<td>Zn</td>
<td>5</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAHs, PCBs, &amp; PCDD/Fs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PAHs</td>
</tr>
<tr>
<td>Total PCBs</td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mercury (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>%≤Level I SQT</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

No PCDD/Fs detected in 10 analyzed samples.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Assessment Area # 75.2 (Munger Landing)
Geographic zone: Lower St. Louis River
Date Generated : 6/28/2013

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization:
Lower St. Louis River, 2011 (6 stations).
Other chemical studies:
Spirit Lake, 2011 (1 stations).
Macro-invertebrate studies:
Lower St. Louis River, 2011; Spirit Lake, 2011; US Steel Macroinvertebrate Survey.
Fish tissue studies:

Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>6(6)</td>
<td>12(12)</td>
<td>120(120)</td>
</tr>
<tr>
<td>Mercury</td>
<td>6(6)</td>
<td>12(12)</td>
<td>12(12)</td>
</tr>
<tr>
<td>PAHs</td>
<td>6(6)</td>
<td>12(12)</td>
<td>472(472)</td>
</tr>
<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>12(12)</td>
<td>84(84)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>200(200)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>8(8)</td>
<td>224(224)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>12(12)</td>
<td>588(588)</td>
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<tr>
<td>TOC</td>
<td>6(7)</td>
<td>12(16)</td>
<td>12(16)</td>
</tr>
<tr>
<td>Grain size</td>
<td>6(6)</td>
<td>12(12)</td>
<td>24(24)</td>
</tr>
<tr>
<td>TOC</td>
<td>6(7)</td>
<td>12(16)</td>
<td>12(16)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies

#### Chemical Studies Used in the Characterization:
- **Spirit Lake, 2011 (89 stations).**
- **Other chemical studies:**
  - Duluth Superfund Sites, 1993 (8 stations);
  - R-EMAP Study, 1995 (3);
  - R-EMAP Study, 1996 (2);
  - R-EMAP Study, 1997 (1);
  - LIF Study at USS Duluth Works, 2002 (13);
  - Duluth-Superior Harbor Study, 1993 (2);
  - USS Superfund Site URS 2003 (23);
  - USS Superfund Site MPCA 2003 (6);
  - Lower St. Louis River, 2011 (4).

### Biological Studies

#### Biological Studies Used in the Characterization:
- **Duluth Superfund Sites, 1993; R-EMAP Study, 1995; R-EMAP Study, 1996; LIF Study at USS Duluth Works, 2002; Duluth-Superior Harbor Study, 1993 (2); USS Superfund Site URS 2003 (23); USS Superfund Site MPCA 2003 (6); Lower St. Louis River, 2011 (4).**

### Fish Tissue Studies

#### Fish Tissue Studies:
- Fond du Lac Fish Tissue Study 2000.

---

### Data Summary

**Available data in studies used for characterization**: All available data

### Constituent Distribution

#### Metals (without Hg)
- Number of Stations: 16
- Number of Samples: 61
- Number of Results: 398

#### Mercury
- Number of Stations: 16
- Number of Samples: 61
- Number of Results: 61

#### PAHs
- Number of Stations: 8
- Number of Samples: 32
- Number of Results: 964

#### PCBs
- Number of Stations: 0
- Number of Samples: 0
- Number of Results: 0

#### PCDD/Fs
- Number of Stations: 2
- Number of Samples: 2
- Number of Results: 50

#### Pesticides
- Number of Stations: 0
- Number of Samples: 0
- Number of Results: 0

#### Other parameters
- Number of Stations: 16
- Number of Samples: 63
- Number of Results: 589

### TOC
- Number of Stations: 89
- Number of Samples: 329
- Number of Results: 329

### Grain size
- Number of Stations: 12
- Number of Samples: 38
- Number of Results: 38

---

### Sediment Assessment Area Chemistry Characterization

**Assessment Area # 76 (U.S. Steel Superfund Site)**

**Geographic zone:** Lower St. Louis River

**Date Generated:** 6/28/2013

### Sediment Assesment Area Core Profiles

<table>
<thead>
<tr>
<th>Core</th>
<th>Mean PEC-Q(PQ)</th>
<th>Mercury/(mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM-8</td>
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</tr>
<tr>
<td>UC-96</td>
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<td>UC-29</td>
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<td>UC-23</td>
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<td>UC-87</td>
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</tr>
<tr>
<td>WM-18</td>
<td>0.1-0.5</td>
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</tr>
<tr>
<td>WM-10</td>
<td>0.1-0.5</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

<table>
<thead>
<tr>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
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<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
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</tbody>
</table>

#### PAHs, PCBs, & PCDD/Fs

<table>
<thead>
<tr>
<th>Level I SQT</th>
<th>Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

---

### Distributions of Constituent Concentrations

- **Total PAHs (ug/kg):**
- **PCDD/F TEQ (pg/g):**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies Used in the Characterization:

- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters

### Other Chemical Studies:

- TOC
- Grain size

### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Metals (without Hg)
  - Mercury
- Other chemical studies:
  - Macro-invertebrate studies
- Fish tissue studies

### Results Exceeding Thresholds (0-15 cm samples)

- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ

### Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Mercury</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other parameters</td>
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</tr>
<tr>
<td>Grain size</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

### Distributions of Constituent Concentrations

- **Level I QT**
- **Level II QT**

Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 77 (Spirit Lake / Devils Elbow NC)**

**Geographic zone:** Lower St. Louis River

**Date Generated:** 6/28/2013

No data available for core profile.
Sediment Assessment Area Chemistry Characterization

Assessment Area # 78 (Spirit Lake / Devils Elbow)

Geographic zone: Lower St. Louis River
Date Generated: 6/28/2013

The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Map of Assessment Area Cores Labeled Stations Used in Characterization

Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization: USS Superfund Site URS 2003 (1 station); Lower St. Louis River, 2011 (51).
- Other chemical studies:
  - R-EMAP Study, 1995 (7 stations); Spirit Lake, 2011 (5).
  - Micro-invertebrate studies:
- Fish tissue studies:

Data Summary

Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>52 (60)</td>
<td>98 (109)</td>
<td>982 (1041)</td>
</tr>
<tr>
<td>Mercury</td>
<td>52 (60)</td>
<td>98 (109)</td>
<td>98 (109)</td>
</tr>
<tr>
<td>PAHs</td>
<td>52 (54)</td>
<td>98 (100)</td>
<td>3813 (3847)</td>
</tr>
<tr>
<td>PCBs</td>
<td>52 (52)</td>
<td>98 (98)</td>
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<tr>
<td>PCDD/Fs</td>
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<td>52 (60)</td>
<td>98 (109)</td>
<td>202 (255)</td>
</tr>
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</table>

Results exceeding thresholds (0-15 cm samples):

- Mercury (mg/kg)
- PAHs, PCBs, & PCDD/Fs
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

Core Profiles Mean PEC-Q (PQ)

Graphs show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
Chemical studies used in the characterization:
R-EMAP Study, 1995 (2 stations).
Other chemical studies:
Macro-invertebrate studies:
R-EMAP Study, 1995; US Steel Macroinvertebrate Survey.
Fish tissue studies:
Fond du Lac Fish Tissue Study 2000.

### Available data in studies used for characterization

#### Data Summary

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
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<td>2(2)</td>
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</tr>
<tr>
<td>Mercury</td>
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<td>2(2)</td>
<td>2(2)</td>
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</tr>
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<td>PCDD/Fs</td>
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#### Insufficient results available for PEC-Q calculation

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

- % > TEC
- % > MEC
- % > PEC

#### PAHs, PCBs, & PCDD/Fs

- No samples analyzed for PCDD/F TEQ

---

**Mean PEC-Q**

- Insufficient results available for PEC-Q calculation

---

**Core Profiles**

<table>
<thead>
<tr>
<th>PO</th>
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<td>98</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>Hg</td>
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---

**Depth (cm)**

- 0
- 50
- 100
- 150
- 200
- 250

---

**Map of Assessment Area Cores**

Labeled Stations Used in Characterization

---

**Distributions of Constituent Concentrations**

- Total PAHs (µg/kg)
- Mercury (mg/kg)
- TOC
- Grain size

---

**Studies with Samples in Sediment Assessment Area:**

R-EMAP Study, 1995 (2 stations).

Macronutrients studies:
R-EMAP Study, 1995; US Steel Macronutrients Study.

Fish tissue studies:
Fond du Lac Fish Tissue Study 2000.

---

**Constituent**

- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters

---

**Number of Stations**

- 2(2)
- 2(2)
- 1(1)
- 0(0)
- 0(0)
- 2(2)
- 2(2)

---

**Number of Samples**

- 2(2)
- 2(2)
- 1(1)
- 0(0)
- 0(0)
- 2(2)
- 2(2)

---

**Number of Results**

- 10(10)
- 2(2)
- 17(17)
- 0(0)
- 0(0)
- 11(11)
- 2(2)

---

**Total PAHs (µg/kg)**

- No PCBs detected in 0 analyzed samples

---

**Mercury (mg/kg)**

- No samples analyzed for PCDD/F TEQ

---

**Mercury (mg/kg)**

- Total PAHs
- Total PCBs
- PCDD/Fs

---

**Boxes show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

- Chemical studies used in the characterization: Lower St. Louis River, 2011 (6 stations).
- Other chemical studies: R-EMAP Study, 1995 (1 station).
- Macro-invertebrate studies: R-EMAP Study, 1995; Lower St. Louis River, 2011.
- Fish tissue studies:

### Data Summary

Available data in studies used for characterization

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<tr>
<th>Constituent</th>
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<th>Number of Results</th>
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<td>Mercury</td>
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<td>Grain size</td>
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### Maps and Graphs

- **Mean PEC-Q**
- **Map of Assessment Area Cores**
- **Studies with Samples in Sediment Assessment Area:**
- **Core Profiles**
- **Results Exceeding Thresholds (0-15 cm samples)**
- **Distributions of Constituent Concentrations**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Lower St. Louis River, 2011 (2 stations).

**Other chemical studies:**
- Macro-invertebrate studies:
  - Lower St. Louis River, 2011.
- Fish tissue studies:
  - Available data in studies used for characterization

### Mean PEC-Q

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<th>Number of Results</th>
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<td>PCBs</td>
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<td>28(28)</td>
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### Results Exceeding Thresholds (0-15 cm samples)

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<td>Zn</td>
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### Data Summary

**Available data in studies used for characterization**
(All available data)

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<tr>
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<td>4(4)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
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<tr>
<td>Pesticides</td>
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### Depth (cm)

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<td>40%</td>
<td>60%</td>
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<tr>
<td>Total PCBs</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<td>PCDD/F TEQ</td>
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<td>0%</td>
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</table>

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Lower St. Louis River, 2011 (9 stations)
- SL Mud Lake/Radio Tower Bay MPCA 2008 Sed Chem (3)

**Other chemical studies:**
- Duluth-Superior Harbor Study, 1993 (1 station)
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
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<th>Number of Results</th>
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<td>25 (27)</td>
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<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>11 (11)</td>
<td>20 (20)</td>
<td>144 (144)</td>
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<td>PCDD/Fs</td>
<td>4 (4)</td>
<td>8 (8)</td>
<td>200 (200)</td>
</tr>
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<td>Pesticides</td>
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<td>871 (875)</td>
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<tr>
<td>TOC</td>
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<td>25 (25)</td>
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**Data Summary**

**Available data in studies used for characterization**

- All available data

**Distributions of Constituent Concentrations**

- Level I SQT
- Level II SOT

<table>
<thead>
<tr>
<th>Metals</th>
<th>Total PAHs (ug/kg)</th>
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<tr>
<td>As</td>
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<td>Cr</td>
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<td>Cu</td>
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<td>10</td>
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<tr>
<td>Pb</td>
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<td>Hg</td>
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<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Zn</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**PAHs, PCBs, & PCDD/Fs**

- No PCBs detected in 19 analyzed samples

**Grain size**

| Assessment Area # 82 (Mud Lake East) | Geographic zone: Lower St. Louis River | Date Generated: 6/28/2013 |

**Core Profiles**

- Mean PEC-Q (PQ)
- Mercury (mg/kg)
- Depth (cm)
- Total PAHs (ug/kg)
- Total PCBs
- PCDD/F TEQ (pg/g)

**Map of Assessment Area Cores**

- Labeled Stations Used in Characterization
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (9 stations)
  - SL Mud Lake/Radio Tower Bay MPCA 2008 Sed Chem (3)

**Studies with Samples in**

- Sediment Assessment Area: Lower St. Louis River, 2011; SL Mud Lake/Radio Tower Bay MPCA 2008 Sed Chem

**Fish tissue studies:**
- Fond du Lac Fish Tissue Study 2000

**Quality Assurance/Quality Control (QA/QC)**

- Mean PEC-Q
- Mercury (mg/kg)
- Depth (cm)
- Total PAHs (ug/kg)
- Total PCBs
- PCDD/F TEQ (pg/g)

<table>
<thead>
<tr>
<th>Depth (cm)</th>
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<th>Level II SOT</th>
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<td>0-15 cm</td>
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<td>&gt;50 cm</td>
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<td>10</td>
<td>9</td>
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<tr>
<td>&gt;1000 cm</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

**No PCBs detected in 19 analyzed samples**

**Results Exceeding Thresholds (0-15 cm samples)**

- % Level I SQT
- % Level II SOT

- As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
- Total PAHs
- Total PCBs
- PCDD/F TEQ

**Sediment Assessment Area Chemistry Characterization**

- Data Summary
- Available data in studies used for characterization
- (All available data)

<table>
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<th>Number of Samples</th>
<th>Number of Results</th>
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<td>PCBs</td>
<td>11 (11)</td>
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<td>PCDD/Fs</td>
<td>4 (4)</td>
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<tr>
<td>Other parameters</td>
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<td>871 (875)</td>
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</tr>
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</table>

**Assessment Area # 82 (Mud Lake East)**

- Geographic zone: Lower St. Louis River
- Date Generated: 6/28/2013
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Lower St. Louis River, 2011 (7 stations).
- Other chemical studies:
  - Mercury: 7(7) 10(10) 10(10)
  - PAHs: 7(7) 10(10) 394(394)
  - PCBs: 7(7) 10(10) 70(70)
  - PCDD/Fs: 4(4) 7(7) 175(175)
  - Pesticides: 4(4) 7(7) 190(196)
  - Other parameters: 7(7) 10(10) 506(506)
  - TOC: 7(7) 10(10) 10(10)
  - Grain size: 7(7) 10(10) 20(20)

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (7 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:

Data Summary
Available data in studies used for characterization
(All available data)

Constituent | Number of Stations | Number of Samples | Number of Results |
--- | --- | --- | --- |
Metals (without Hg) | 7(7) | 10(10) | 100(100) |
Mercury | 7(7) | 10(10) | 10(10) |
PAHs | 7(7) | 10(10) | 394(394) |
PCBs | 7(7) | 10(10) | 70(70) |
PCDD/Fs | 4(4) | 7(7) | 175(175) |
Pesticides | 4(4) | 7(7) | 190(196) |
Other parameters | 7(7) | 10(10) | 506(506) |
TOC | 7(7) | 10(10) | 10(10) |
Grain size | 7(7) | 10(10) | 20(20) |

Results Exceeding Thresholds (0-15 cm samples)

- Mercury (mg/kg): 50-100, 15-50, 0-15
- Total PAHs (ug/kg): 50-100, 15-50, 0-15
- Total PCBs
- PCDD/F TEQ (pg/g)

Potential Impairment
- Low: 0-0.1
- High: >0.1

PAHs, PCBs, & PCDD/Fs

Core Profiles

Map of Assessment Area Cores
Labeled Stations Used in Characterization

Distributions of Constituent Concentrations

No PCBs detected in 10 analyzed samples

Stress shows 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization: Lower St. Louis River, 2011 (9 stations).
- Other chemical studies: R-EMAP Study, 1995; Bioaccumulation Study, 1999 (1).
- Fish tissue studies: Bioaccumulation Study, 1999.

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>9(11)</td>
<td>18(20)</td>
<td>180(190)</td>
</tr>
<tr>
<td>Mercury</td>
<td>9(12)</td>
<td>18(21)</td>
<td>18(21)</td>
</tr>
<tr>
<td>PAHs</td>
<td>9(11)</td>
<td>18(20)</td>
<td>700(735)</td>
</tr>
<tr>
<td>PCBs</td>
<td>9(10)</td>
<td>18(19)</td>
<td>126(147)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>4(4)</td>
<td>8(8)</td>
<td>200(200)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>8(8)</td>
<td>224(224)</td>
</tr>
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<td>18(21)</td>
<td>688(709)</td>
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<tr>
<td>TOC</td>
<td>9(11)</td>
<td>18(20)</td>
<td>36(50)</td>
</tr>
</tbody>
</table>

Distributions of Constituent Concentrations

No PCBs detected in 18 analyzed samples
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- Lower St. Louis River, 2011 (2 stations)
- SL Mud Lake/Radio Tower Bay MPCA 2008 Sed Chem (16)

Other chemical studies:
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)

### Data Summary
Available data in studies used for characterization
(All available data)

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
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<td>Mercury</td>
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<td>24(24)</td>
<td>24(24)</td>
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<td>PAHs</td>
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<td>50(50)</td>
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<td>Pesticides</td>
<td>4(4)</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)
- %>Level I SQT
- %>Level II SQT

### Distributions of Constituent Concentrations
- Total PAHs (μg/kg)
- PCDD/F TEQ (pg/g)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Chemical studies used in the characterization:
- R-EMAP Study, 1995 (3 stations);
- Duluth-Superior Harbor Study, 1993 (1);
- Lower St. Louis River, 2011 (1).

Other chemical studies:
- Fish tissue studies: Fond du Lac Fish Tissue Study 2000.

### Results Exceeding Thresholds (0-15 cm samples)

#### Metals

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
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<td>5(5)</td>
<td>35(35)</td>
</tr>
<tr>
<td>Mercury</td>
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<td>9(9)</td>
<td>9(9)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
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<td>PCDD/Fs</td>
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<td>Pesticides</td>
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<td>5(5)</td>
<td>25(25)</td>
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### Data Summary

Available data in studies used for characterization

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<th>Number of Samples</th>
<th>Number of Results</th>
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<tr>
<td>Metals (without Hg)</td>
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<td>35(35)</td>
</tr>
<tr>
<td>Mercury</td>
<td>5(5)</td>
<td>9(9)</td>
<td>9(9)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>14(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>50(50)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1(1)</td>
<td>2(2)</td>
<td>56(56)</td>
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<tr>
<td>Other parameters</td>
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<td>141(141)</td>
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<td>TOC</td>
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<td>9(9)</td>
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<tr>
<td>Grain size</td>
<td>4(4)</td>
<td>5(5)</td>
<td>25(25)</td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(3)</td>
<td>3(3)</td>
<td>15(15)</td>
</tr>
<tr>
<td>Mercury</td>
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<td>3(3)</td>
<td>3(3)</td>
</tr>
<tr>
<td>PAHs</td>
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<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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<tr>
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<td>3(3)</td>
<td>12(12)</td>
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<td>TOC</td>
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<tr>
<td>Grain size</td>
<td>3(3)</td>
<td>3(3)</td>
<td>21(21)</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)

**Metals**

- **Mercury (mg/kg)**
  - <=0.18
  - 0.18-1.1
  - >1.1

**PAHs, PCBs, & PCDD/Fs**

- **Total PAHs (ug/kg)**
  - Depth (cm) 0-15
  - No samples analyzed

### Maps

- **Map of Assessment Area Cores**
- **Labelled Stations Used in Characterization**
- **Studies with Samples in Sediment Assessment Area**
  - Chemical studies used in the characterization:
    - R-EMAP Study, 1995 (2 stations); R-EMAP Study, 1996 (1).
  - Other chemical studies:
  - Fish tissue studies:
    - Results Exceeding Thresholds (0-15 cm samples)
      - Mercury (mg/kg)
        - Depth (cm) 0-15
        - No samples analyzed for PCDD/F TEQ

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 87 (Red River Bay)**

Geographic zone: Middle St. Louis River

Date Generated: 6/28/2013

**Core Profiles**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(3)</td>
<td>3(3)</td>
<td>15(15)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(3)</td>
<td>3(3)</td>
<td>3(3)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
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<td>19(19)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
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</tr>
<tr>
<td>TOC</td>
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<tr>
<td>Grain size</td>
<td>3(3)</td>
<td>3(3)</td>
<td>21(21)</td>
</tr>
</tbody>
</table>

---

**Graphs**

- **Mercury (mg/kg)**
  - Depth (cm) 0-15
  - No samples analyzed for PCDD/F TEQ

---

**Tables**

- **Mean PEC-Q**
  - Metals (without Hg)
  - Mercury
  - PAHs
  - PCBs
  - PCDD/Fs
  - Pesticides
  - Other parameters
  - TOC
  - Grain size

---

**Data Interpretation**

- Insufficient results available for PEC-Q calculation

---

**Report Summary**

- Total PAHs (ug/kg)
  - Depth (cm) 0-15
  - No samples analyzed

---

**Notes**

- No PCBs detected in 0 analyzed samples

---

**Conclusion**

- Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:** Lower St. Louis River, 2011 (2 stations).

**Other chemical studies:**
- Macro-invertebrate studies: Lower St. Louis River, 2011.
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>Metals (without Hg)</td>
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<td>Mercury</td>
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<td>4(4)</td>
<td>4(4)</td>
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<tr>
<td>PAHs</td>
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<tr>
<td>PCBs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>28(28)</td>
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<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>100(100)</td>
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<td>Pesticides</td>
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<td>Other parameters</td>
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<td>Grain size</td>
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<td>4(4)</td>
<td>8(8)</td>
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</table>

**Distributions of Constituent Concentrations**

- **Total PAHs (ug/kg)**
- **PAHs, PCBs, & PCDD/Fs**
- **PCDD/F TEQ (pg/g)**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies Used in the Characterization
- Bay West Intlk Supplemental 2001 (5 stations)
- Bay West Intlk Reconnaissance 2001 (4 stations)
- Lower St. Louis River, 2011 (6 stations)
- Chlorinated Bornane/Bornene Study, 1999 (2 stations)

### Other Chemical Studies
- Lower St. Louis River USFWS 2001-02

### Biological Studies
- Chlorinated Bornane/Bornene Study, 1999
- Bay West Intlk Supplemental 2001
- Bay West Intlk Reconnaissance 2001
- Lower St. Louis River, 2011
- Radio Tower Bay Macroinvertebrate Survey, 2011

### Fish Tissue Studies
- Bay West Intlk Supplemental 2001
- St. Louis River USFWS 2001-02

### Results Exceeding Thresholds (0-15 cm samples)
- No PCBs detected in 12 analyzed samples

### Data Summary
Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
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<td>Mercury</td>
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<td>29(29)</td>
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<td>PAHs</td>
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<td>PCDD/Fs</td>
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### Potential Impairment
- 0-15 cm (6 stations)

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<th>% Level II SQT</th>
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<td>0 %</td>
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</tr>
<tr>
<td>Medium</td>
<td>20 %</td>
<td>40 %</td>
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<tr>
<td>High</td>
<td>40 %</td>
<td>60 %</td>
</tr>
<tr>
<td>Very High</td>
<td>60 %</td>
<td>100 %</td>
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</tbody>
</table>

### Metals
- % Level I SQT: 0 %, 20 %, 40 %, 60 %, 100 %
- % Level II SQT: 0 %, 20 %, 40 %, 60 %, 100 %

### PAHs, PCBs, & PCDD/Fs
- % Level I SQT: 0 %, 20 %, 40 %, 60 %, 100 %
- % Level II SQT: 0 %, 20 %, 40 %, 60 %, 100 %

### Total PAHs (ug/kg)
- No data available

### PCDD/F TEQ (pg/g)
- No data available

### TOC
- No data available

### Grain Size
- No data available

### Other Parameters
- No data available
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies Used in the Characterization:
- Lower St. Louis River, 2011 (4 stations).
- R-EMAP Study, 1995 (1 station).
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)

### Data Summary
Available data in studies used for characterization (All available data)

<table>
<thead>
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<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>8(9)</td>
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<td>PCBs</td>
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<tr>
<td>Grain size</td>
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<td>16(23)</td>
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</table>

### Results Exceeding Thresholds (0-15 cm samples)
- % Level I SQT
- % Level II SQT

### Distributions of Constituent Concentrations
- Total PAHs (ug/kg)
- PCDD/F TEQ (pg/g)

### Studies with Samples in Sediment Assessment Area:
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (4 stations).
- Other chemical studies: R-EMAP Study, 1995 (1 station).

### Fish tissue studies:
- No PCBs detected in 8 analyzed samples

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 90 (Fond du Lac Stretch)**

**Geographic zone:** Middle St. Louis River

**Date Generated:** 6/28/2013

---

**Map of Assessment Area Cores Labeled Stations Used in Characterization**

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (4 stations).
- Other chemical studies:
  - R-EMAP Study, 1995 (1 station).
- Macro-invertebrate studies:
- Fish tissue studies:
  - No PCBs detected in 8 analyzed samples

---

**Core Profiles**

- Mean PEC-Q
- Mercury (Hg, mg/kg)

---

**Potential Impairment**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Low</th>
<th>Potential Impairment</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Results Exceeding Thresholds (0-15 cm samples)**

- % Level I SQT
- % Level II SQT

---

**Grain size**

- 4(5) 8(9) 16(23)

---

**Sediment Assessment Area Chemistry Characterization**

**Data Summary**

**Available data in studies used for characterization**

- **Constituent**
  - Number of Stations
  - Number of Samples
  - Number of Results

---

**Sediment Assessment Area Chemistry Characterization**

**Mean PEC-Q**

- Low
- Potential Impairment
- High

---

**Distributions of Constituent Concentrations**

- Level I SQT
- Level II SOT

---

**Results Exceeding Thresholds (0-15 cm samples)**

- Metals
  - Mercury (Hg, mg/kg)
- PAHs, PCBs, & PCDD/Fs

---

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- PCDD/F TEQ (pg/g)

---

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (4 stations).
- Other chemical studies:
  - R-EMAP Study, 1995 (1 station).
- Macro-invertebrate studies:
- Fish tissue studies:
  - No PCBs detected in 8 analyzed samples

---

**Sediment Assessment Area Chemistry Characterization**

**Map of Assessment Area Cores Labeled Stations Used in Characterization**

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (4 stations).
- Other chemical studies:
  - R-EMAP Study, 1995 (1 station).
- Macro-invertebrate studies:
- Fish tissue studies:
  - No PCBs detected in 8 analyzed samples

---

**Sediment Assessment Area Chemistry Characterization**

**Mean PEC-Q**

- Low
- Potential Impairment
- High

---

**Distributions of Constituent Concentrations**

- Level I SQT
- Level II SOT

---
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Map of Assessment Area Cores**
Labeled Stations Used in Characterization

**Studies with Samples in Sediment Assessment Area:**
Chemical studies used in the characterization:
Lower St. Louis River, 2011 (3 stations).

Other chemical studies:
Macro-invertebrate studies:
Lower St. Louis River, 2011.

Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

- **Metals:**
  - 0-15 cm: 3 samples exceed the threshold.
  - >15 cm: 3 samples exceed the threshold.

- **Total PAHs:**
  - 0-15 cm: 3 samples exceed the threshold.

- **PCDD/Fs:**
  - 0-15 cm: 3 samples exceed the threshold.

**Data Summary**
Available data in studies used for characterization
(All available data)

- **Constituent**
  - Number of Stations
  - Number of Samples
  - Number of Results

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>3(3)</td>
<td>6(6)</td>
<td>60(60)</td>
</tr>
<tr>
<td>Mercury</td>
<td>3(3)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>232(232)</td>
</tr>
<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>6(6)</td>
<td>42(42)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>2(2)</td>
<td>50(50)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1(1)</td>
<td>2(2)</td>
<td>56(56)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>3(3)</td>
<td>6(6)</td>
<td>198(198)</td>
</tr>
<tr>
<td>TOC</td>
<td>3(3)</td>
<td>6(6)</td>
<td>6(6)</td>
</tr>
<tr>
<td>Grain size</td>
<td>3(3)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
</tbody>
</table>

**Distributions of Constituent Concentrations**

- **Total PAHs (ug/kg)**
  - No PCBs detected in 8 analyzed samples

- **Mercury (mg/kg)**
  - No data exceeding threshold

- **PCDD/F TEQ (pg/g)**
  - No data exceeding threshold

**Core Profiles**

- **Mean PEC-Q**: Potential Impairment (Low, Potential, High)
  - 0-15 cm: 3 samples exceed the threshold.
  - >15 cm: 3 samples exceed the threshold.

- **Mercury (Hg, mg/kg)**
  - Levels: 0.01, 0.05, 0.50, 5.00
  - Samples: 3, 3, 3, 3

**Potential Impairment**

- **Low**: 0-15 cm, >15 cm
- **High**: 0-15 cm, >15 cm

**Depth (cm)**

- **Total PAHs**
  - Depth: 10, 15, 50, 100, 1000, 10000, 100000

- **PCDD/F TEQ**
  - Depth: 0.01, 0.05, 0.50, 5.00

**Samples**

- **Level I SQT**: Samples exceeding threshold
- **Level II SQT**: Samples exceeding Level I SQT

<table>
<thead>
<tr>
<th>Constituent</th>
<th>% &gt; Level I SQT</th>
<th>% &gt; Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Cd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hg</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Ni</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zn</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constituents</th>
<th>% &gt; Level I SQT</th>
<th>% &gt; Level II SQT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PAHs</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Total PCBs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCDD/F TEQ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization:
- Lower St. Louis River, 2011 (11 stations).
- Other chemical studies:
  - R-EMAP Study, 1995 (2 stations).
- Macro-invertebrate studies: R-EMAP Study, 1995; Lower St. Louis River, 2011.
- Fish tissue studies:
  - Results Exceeding Thresholds (0-15 cm samples)

Data Summary

Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>11(13)</td>
<td>22(24)</td>
<td>220(230)</td>
</tr>
<tr>
<td>Mercury</td>
<td>11(13)</td>
<td>22(24)</td>
<td>22(24)</td>
</tr>
<tr>
<td>PAHs</td>
<td>11(12)</td>
<td>22(23)</td>
<td>860(877)</td>
</tr>
<tr>
<td>PCBs</td>
<td>11(11)</td>
<td>22(22)</td>
<td>154(154)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>6(6)</td>
<td>12(12)</td>
<td>300(300)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6(6)</td>
<td>12(12)</td>
<td>336(336)</td>
</tr>
<tr>
<td>Other parameters</td>
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<td>22(24)</td>
<td>948(959)</td>
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<td>TOC</td>
<td>11(13)</td>
<td>22(24)</td>
<td>44(58)</td>
</tr>
<tr>
<td>Grain size</td>
<td>11(13)</td>
<td>22(24)</td>
<td></td>
</tr>
</tbody>
</table>

Results Exceeding Thresholds (0-15 cm samples)

- Metals
  - As
  - Cd
  - Cr
  - Cu
  - Pb
  - Hg
  - Ni
  - Zn
- PAHs, PCBs, & PCDD/Fs
- TOC
- Grain size

Mean PEC-Q

Distributions of Constituent Concentrations

- Level I SQT
- Level II SQT

- Mercury (mg/kg)
- Total PAHs (ug/kg)
- Total PCBs
- PCDD/F TEQ (pg/g)

Results show 25th percentile, median, and 75th percentile values. Whiskers extend to 1.5 times the inter-quartile range, and individual samples outside the whiskers are shown as open circles.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Lower St. Louis River, 2011 (1 stations).
- Other chemical studies:
  - Macro-invertebrate studies: Lower St. Louis River, 2011.
  - Fish tissue studies:

### Data Summary

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>(1)</td>
<td>(2)</td>
<td>(20)</td>
</tr>
<tr>
<td>Mercury</td>
<td>(1)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>PAHs</td>
<td>(1)</td>
<td>(2)</td>
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</tr>
<tr>
<td>PCBs</td>
<td>(1)</td>
<td>(2)</td>
<td>(14)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>(1)</td>
<td>(2)</td>
<td>(50)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>(1)</td>
<td>(2)</td>
<td>(56)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>(1)</td>
<td>(2)</td>
<td>(130)</td>
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<td>TOC</td>
<td>(1)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Grain size</td>
<td>(1)</td>
<td>(2)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (1 stations).

**Other chemical studies:**

- Macro-invertebrate studies: Lower St. Louis River, 2011.
- Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**

- **Metals**
  - Arsenic
  - Cadmium
  - Cr: Chromium
  - Copper
  - Lead
  - Mercury
  - Nickel
  - Zinc

- **PAHs, PCBs, & PCDD/Fs**

### Distributions of Constituent Concentrations

- **Total PAHs (µg/kg)**
- **PCDD/F TEQ (pg/g)**

**Results showing:**
- % > Level I SQT
- % > Level II SQT
- No PCBs detected in 2 analyzed samples.

---

**Assessment Area # 93 (Chambers Grove Reach)**

**Geographic zone:** Middle St. Louis River

**Date Generated:** 6/28/2013

---

**Map of Assessment Area Cores Labeled Stations Used in Characterization**

---

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
  - Lower St. Louis River, 2011 (1 stations).

**Other chemical studies:**

- Macro-invertebrate studies: Lower St. Louis River, 2011.
- Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (10 stations)
- R-EMAP Study, 1996 (1)
- Cloquet Reservoir Study, 1992-93 (1)
- Upper St. Louis River, 2011 (1)

**Other chemical studies:**
- Macro-invertebrate studies:
- Fish tissue studies:
  - Mercury (Hg), mg/kg

---

**Data Summary**

Available data in studies used for characterization (All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>12(12)</td>
<td>13(13)</td>
<td>99(99)</td>
</tr>
<tr>
<td>Mercury</td>
<td>13(13)</td>
<td>63(63)</td>
<td>63(63)</td>
</tr>
<tr>
<td>PAHs</td>
<td>7(7)</td>
<td>8(8)</td>
<td>144(144)</td>
</tr>
<tr>
<td>PCBs</td>
<td>2(2)</td>
<td>10(10)</td>
<td>688(688)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1(1)</td>
<td>6(6)</td>
<td>12(12)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>13(13)</td>
<td>21(21)</td>
<td>211(211)</td>
</tr>
<tr>
<td>TOC</td>
<td>11(1)</td>
<td>11(1)</td>
<td>77(77)</td>
</tr>
</tbody>
</table>

---

**Chemical studies used in the characterization:**
- R-EMAP Study, 1995 (10 stations)
- R-EMAP Study, 1996 (1)
- Cloquet Reservoir Study, 1992-93 (1)
- Upper St. Louis River, 2011 (1)

**Other chemical studies:**
- Macro-invertebrate studies:
- Fish tissue studies:
  - Mercury (Hg), mg/kg

---

**Results Exceeding Thresholds (0-15 cm samples)**

**Metals**

- As
- Cd
- Cr
- Cu
- Pb
- Hg
- Ni
- Zn

**PAHs, PCBs, & PCDD/Fs**

**Distributions of Constituent Concentrations**

**Mercury (mg/kg)**

**PCDD/F TEQ (pg/g)**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical studies used in the characterization:
- Upper St. Louis River, 2011 (2 stations).

### Other chemical studies:
- **Fish tissue studies:**
- **Macro-invertebrate studies:** Upper St. Louis River, 2011.

### Data Summary

#### Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>2(2)</td>
<td>4(4)</td>
<td>88(88)</td>
</tr>
<tr>
<td>Mercury</td>
<td>2(2)</td>
<td>4(4)</td>
<td>4(4)</td>
</tr>
<tr>
<td>PAHs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>80(80)</td>
</tr>
<tr>
<td>PCBs</td>
<td>2(2)</td>
<td>4(4)</td>
<td>40(40)</td>
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<td>PCDD/Fs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>30(30)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>2(2)</td>
<td>4(4)</td>
<td>37(37)</td>
</tr>
<tr>
<td>Other parameters</td>
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<tr>
<td>TOC</td>
<td>2(2)</td>
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<td>4(4)</td>
</tr>
<tr>
<td>Grain size</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- Metals
- PAHs, PCBs, & PCDD/Fs

---

**Map of Assessment Area Cores**

Labeled Stations Used in Characterization

Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Upper St. Louis River, 2011 (2 stations).

- Other chemical studies:
  - Macro-invertebrate studies:
    - Upper St. Louis River, 2011.
  - Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Assessment Area #96 (Middle Jay Cooke State Park Reach)**

**Geographic zone:** Upper St. Louis River  
**Date Generated:** 6/28/2013

Chemical studies used in the characterization:
- Upper St. Louis River, 2011 (1 stations).

Other chemical studies:
- Fish tissue studies:

**Data Summary**

**Available data in studies used for characterization**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>1(1)</td>
<td>1(1)</td>
<td>22(22)</td>
</tr>
<tr>
<td>Mercury</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>PAHs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>20(20)</td>
</tr>
<tr>
<td>PCBs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>10(10)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>30(30)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1(1)</td>
<td>1(1)</td>
<td>25(25)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>1(1)</td>
<td>1(1)</td>
<td>61(61)</td>
</tr>
<tr>
<td>TOC</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Grain size</td>
<td>1(1)</td>
<td>1(1)</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- Metals (> Level I SQT)
- PAHs, PCBs, & PCDD/Fs

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- PCDD/F TEQ (pg/g)
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Mean PEC-Q

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>0(0)</td>
<td>0(0)</td>
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<tr>
<td>Mercury</td>
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</tr>
<tr>
<td>PAHs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCBs</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
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</table>

### Data Summary

Available data in studies used for characterization
(All available data)

### Distributions of Constituent Concentrations

- Level I SOT
- Level II SOT

No samples analyzed for PAHs

No samples analyzed for mercury

No samples analyzed for PCDD/F TEQ

No data available for core profile.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical Studies used in the Characterization:**

- Metals (without Hg)
- Mercury
- PAHs
- PCBs
- PCDD/Fs
- Pesticides
- Other parameters
- TOC
- Grain size

**Results Exceeding Thresholds (0-15 cm samples):**

- No samples analyzed for PAHs
- No PCBs detected in 0 analyzed samples
- No surface samples available
- No samples analyzed for mercury
- No samples analyzed for PCDD/F TEQ

**Data Summary**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tbody>
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<td>PCBs</td>
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<td>0(0)</td>
<td>0(0)</td>
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<td>PCDD/Fs</td>
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</table>

**Insufficient results available for PEC-Q calculation**

**No data available for core profile**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Other chemical studies:
- Fish tissue studies:

Results Exceeding Thresholds (0-15 cm samples)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>Metals (without Hg)</td>
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<tr>
<td>PAHs</td>
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<td>PCBs</td>
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<td>PCDD/Fs</td>
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</table>

Assessment Area #99 (Thomson Reservoir)
Geographic zone: Upper St. Louis River
Date Generated: 6/28/2013

Insufficient results available for PEC-Q calculation.

No samples analyzed for PAHs

No samples analyzed for PCDD/F TEQ.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

Studies with Samples in Sediment Assessment Area:

Chemical studies used in the characterization: R-EMAP Study, 1995 (1 stations); R-EMAP Study, 1996 (1); ENSR Mercury Study, 1995 (5); Cloquet Reservoir Study, 1992-93 (1).

Other chemical studies:

Toxaphene Study, 1996 (1 stations).

Macro-invertebrate studies:


Fish tissue studies:

Results Exceeding Thresholds (0-15 cm samples)

Data Summary

Available data in studies used for characterization (All available data)

<table>
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<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
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<td>PAHs</td>
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<td>PCBs</td>
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<td>PCDD/Fs</td>
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<td>Pesticides</td>
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<td>Grain size</td>
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<td>14(14)</td>
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</tbody>
</table>

Insufficient results available for PEC-Q calculation

Distributions of Constituent Concentrations

- Mean PEC-Q
- Mercury (Hg, mg/kg)
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

Insufficient results available for PEC-Q calculation
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies

- **Upper St. Louis River, 2011 (5 stations):**
- **ENSR Mercury Study, 1995 (2 stations):**

### Biological Studies

- **Macro-invertebrate studies:**

### Fish Tissue Studies

- Results Exceeding Thresholds (0-15 cm samples):
  - Metals (without Hg): 308 samples
  - Mercury: 14 samples
  - PAHs: 280 samples
  - PCBs: 140 samples
  - PCDD/Fs: 436 samples
  - Pesticides: 854 samples
  - TOC: 14 samples
  - Grain size: 14 samples

### Sediment Assessment Area Chemistry Characterization

#### Data Summary

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<td>PCBs</td>
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<td>14(14)</td>
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</table>

### Mean PEC-Q

Mean PEC-Q ranges from 0 to 1, with lower values indicating lower potential for ecological risk.

### Map of Assessment Area Cores

Labeled Stations Used in Characterization

### Core Profiles

- **USR11-46**
- **USR11-44**
- **USR11-45**
- **USR11-42**
- **USR11-43**

### Distributions of Constituent Concentrations

- Total PAHs (µg/kg)
- Total PCBs (µg/kg)
- PCDD/F TEQ (pg/g)

### Results Exceeding Thresholds

- **Metals**
  - As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
- **Total PAHs**
- **Total PCBs**
- **PCDD/Fs**

### Biological Studies

- **Macro-invertebrate studies:**
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**

- Upper St. Louis River, 2011 (3 stations).
- Other chemical studies: ENSR Mercury Study, 1995; Upper St. Louis River, 2011.

**Macro-invertebrate studies:**


**Fish tissue studies:**

- Results Exceeding Thresholds (0-15 cm samples)

### Sediment Assessment Area Chemistry Characterization

**Assessment Area # 102 (Scanlon Reservoir)**

**Geographic zone:** Upper St. Louis River

**Date Generated:** 6/28/2013

Map of Assessment Area Cores Labeled Stations Used in Characterization

Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Upper St. Louis River, 2011 (3 stations).

- Other chemical studies: ENSR Mercury Study, 1995 (4 stations).

- Macro-invertebrate studies:

- Fish tissue studies:

### Data Summary

Available data in studies used for characterization

<table>
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<th>Number of Results</th>
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<td>5(13)</td>
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<td>Grain size</td>
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<td>5(5)</td>
<td>5(5)</td>
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### Distributions of Constituent Concentrations

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

**Results Exceeding Thresholds (0-15 cm samples)**

- Metals
- PAHs, PCBs, & PCDD/Fs

Mean PEC-Q

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
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<tr>
<td>Mercury</td>
<td>3(7)</td>
<td>5(13)</td>
<td>5(13)</td>
</tr>
<tr>
<td>PAHs</td>
<td>3(3)</td>
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<tr>
<td>PCBs</td>
<td>3(3)</td>
<td>5(5)</td>
<td>50(50)</td>
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<td>PCDD/Fs</td>
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<tr>
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<td>5(5)</td>
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</tbody>
</table>

Potential Impairment

- Low
- High

- 0-15 cm
- >15 cm

- Depth (cm)
- 0.01 0.10 1.00 10.00 100.00
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

### Core Profiles

- USR11-40
- USR11-39
- USR11-41

Mean PEC-Q(PQ)

- Mercury (Hg, mg/kg)
- PAHs, PCBs, & PCDD/Fs

- As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

- Samples
- 22222

- 15% > Level I SQT
- 2% > Level II SQT

- ToC
- 5(5)
- Grain size
- 5(5)

- Levels
- 0-15 cm
- >15 cm

- Distributions of Constituent Concentrations

- Level I SQT
- Level II SQT
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Upper St. Louis River, 2011 (6 stations).

**Other chemical studies:**
- Fish tissue studies:

**Potential Impairment**
- Low (0-15 cm: 5)
- High (>15 cm: 5)

**Data Summary**
Available data in studies used for characterization
(All available data)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>Mercury</td>
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<td>12(12)</td>
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<tr>
<td>PAHs</td>
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<tr>
<td>PCBs</td>
<td>6(6)</td>
<td>12(12)</td>
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<td>PCDD/Fs</td>
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<tr>
<td>Grain size</td>
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<td>12(12)</td>
<td>12(12)</td>
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</table>

**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization: Upper St. Louis River, 2011 (6 stations).
- Other chemical studies:
  - Fish tissue studies:

**Results Exceeding Thresholds (0-15 cm samples)**
- %>Level I SQT
- %>Level II SQT

**Distributions of Constituent Concentrations**
- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/F TEQ (pg/g)

---

**Potential Impairment**
- Low (0-15 cm: 5)
- High (>15 cm: 5)

**Data Summary**
Available data in studies used for characterization
(All available data)

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<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>Metals (without Hg)</td>
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<td>12(12)</td>
<td>264(264)</td>
</tr>
<tr>
<td>Mercury</td>
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<td>12(12)</td>
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<tr>
<td>PAHs</td>
<td>6(6)</td>
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<td>240(240)</td>
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<tr>
<td>PCBs</td>
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<td>12(12)</td>
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**Studies with Samples in Sediment Assessment Area:**
- Chemical studies used in the characterization: Upper St. Louis River, 2011 (6 stations).
- Other chemical studies:
  - Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

**Chemical studies used in the characterization:**
- Upper St. Louis River, 2011 (5 stations).
- ENSR Mercury Study, 1995 (3 stations).

**Macro-invertebrate studies:**

**Fish tissue studies:**
- Results Exceeding Thresholds (0-15 cm samples)

**Data Summary**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
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<td>9(14)</td>
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<tr>
<td>PAHs</td>
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<tr>
<td>PCBs</td>
<td>5(5)</td>
<td>9(9)</td>
<td>90(90)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
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<td>Pesticides</td>
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<td>Grain size</td>
<td>4(4)</td>
<td>8(8)</td>
<td>8(8)</td>
</tr>
</tbody>
</table>

**Results Exceeding Thresholds (0-15 cm samples)**

- %>Level I SQT
- %>Level II SQT

**Total PAHs (μg/kg)**

- No PCBs detected in 9 analyzed samples
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies Used in Characterization:
- Upper St. Louis River, 2011 (8 stations)
- ENSR Mercury Study, 1995 (6 stations)
- Other parameters
- TOC
- Grain size

### Biological Studies:
- ENSR Mercury Study, 1995
- Upper St. Louis River, 2011

### Results Exceeding Thresholds (0-15 cm samples)
- 

---

**Data Summary**

Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>8(8)</td>
<td>16(16)</td>
<td>352(352)</td>
</tr>
<tr>
<td>Mercury</td>
<td>8(14)</td>
<td>16(28)</td>
<td>16(28)</td>
</tr>
<tr>
<td>PAHs</td>
<td>8(8)</td>
<td>16(16)</td>
<td>320(320)</td>
</tr>
<tr>
<td>PCBs</td>
<td>8(8)</td>
<td>16(16)</td>
<td>160(160)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>2(2)</td>
<td>2(2)</td>
<td>60(60)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>8(8)</td>
<td>16(16)</td>
<td>100(100)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>8(14)</td>
<td>16(28)</td>
<td>948(960)</td>
</tr>
</tbody>
</table>

---

**Distributions of Constituent Concentrations**

- Total PAHs (ug/kg)
- Total PCBs (ug/kg)
- PCDD/Fs TEQ (pg/g)

---

**Sediment Assessment Area Chemistry Characterization**

**Assessment Area # 105 (Knife Falls Reservoir)**

Geographic zone: Upper St. Louis River

Date Generated: 6/28/2013

---

**Studies with Samples in Sediment Assessment Area:**

- Chemical studies used in the characterization:
  - Upper St. Louis River, 2011 (8 stations)
- Other chemical studies:
  - ENSR Mercury Study, 1995 (6 stations)
- Macro-invertebrate studies:
  - ENSR Mercury Study, 1995; Upper St. Louis River, 2011
- Fish tissue studies:
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies

- Metal (without Hg): Upper St. Louis River, 2011 (4 stations).
- PAHs: Upper St. Louis River, 2011.
- Pesticides: Fond du Lac Fish Tissue Study 2000.
- Other parameters: Upper St. Louis River, 2011.

### Data Summary

#### Available data in studies used for characterization

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Number of Stations</th>
<th>Number of Samples</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (without Hg)</td>
<td>4(4)</td>
<td>5(5)</td>
<td>110(110)</td>
</tr>
<tr>
<td>Mercury</td>
<td>4(6)</td>
<td>5(9)</td>
<td>5(9)</td>
</tr>
<tr>
<td>PAHs</td>
<td>4(4)</td>
<td>5(5)</td>
<td>100(100)</td>
</tr>
<tr>
<td>PCBs</td>
<td>4(4)</td>
<td>5(5)</td>
<td>50(50)</td>
</tr>
<tr>
<td>PCDD/Fs</td>
<td>1(1)</td>
<td>1(1)</td>
<td>38(38)</td>
</tr>
<tr>
<td>Pesticides</td>
<td>4(4)</td>
<td>5(5)</td>
<td>41(41)</td>
</tr>
<tr>
<td>Other parameters</td>
<td>4(6)</td>
<td>7(11)</td>
<td>305(309)</td>
</tr>
<tr>
<td>TOC</td>
<td>4(4)</td>
<td>5(5)</td>
<td>5(5)</td>
</tr>
</tbody>
</table>

### Results Exceeding Thresholds (0-15 cm samples)

- Metals
  - As: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Cd: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Cr: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Cu: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Pb: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Hg: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Ni: 2(2) 2(2) 2(2) 2(2) 2(2)
  - Zn: 2(2) 2(2) 2(2) 2(2) 2(2)

- PAHs, PCBs, & PCDD/Fs
  - Total PAHs: 100(100)
  - Total PCBs: 100(100)
  - PCDD/F TEQ: 10(10)

### Map of Assessment Area Cores

Labeled Stations Used in Characterization

#### Studies with Samples in Sediment Assessment Area:

- Chemical studies used in the characterization:
  - Upper St. Louis River, 2011 (4 stations).
- Other chemical studies:
- Macro-invertebrate studies:
- Fish tissue studies:
  - Fond du Lac Fish Tissue Study 2000.
The sediment assessment area chemistry characterizations provide screening-level displays of the sediment chemical data available for individual assessment areas within the St. Louis River Area of Concern and are based on benthic toxicity guidelines. They are intended to assist in decision-making related to remedial and restoration activities. However, they do not provide a final remedial category designation. This decision will be made by Minnesota and Wisconsin regulatory personnel following careful review of available site information. Sediment chemistry is not the only source of information by which remediation and restoration decisions are made. Biological studies are also available for some of the sediment assessment areas and qualitative considerations may also affect remediation and restoration decision-making.

### Chemical Studies

- **Upper St. Louis River, 2011 (15 stations).**
- **Fond du Lac Reservation Lakes Ph 2 2002 (7 stations).**

### Macro-invertebrate Studies

- **Fond du Lac Reservation Lakes Ph 2 2002**
- **Upper St. Louis River, 2011.**

### Fish Tissue Studies

- **Fond du Lac Fish Tissue Study 2000.**

### Results Exceeding Thresholds (0-15 cm samples)

- **Constituent**
  - **Metals (without Hg)**
  - **Mercury**
  - **PAHs**
  - **PCBs**
  - **PCDD/Fs**
  - **Pesticides**
  - **Other parameters**
  - **TOC**
  - **Grain size**

### Sediment Assessment Area Chemistry Characterization

- **Data Summary**
  - Available data in studies used for characterization
  - (All available data)

### Distributions of Constituent Concentrations

- **Total PAHs (µg/kg)**
  - Level I SQT: 0-15 µg/kg
  - Level II SQT: 15-50 µg/kg
  - Level III SQT: >50 µg/kg

- **Mercury (mg/kg)**
  - Level I SQT: 0-0.1 mg/kg
  - Level II SQT: 0.1-1.0 mg/kg
  - Level III SQT: >1.0 mg/kg

- **PCDD/Fs (pg/g)**
  - Level I SQT: 0-0.01 pg/g
  - Level II SQT: 0.01-0.1 pg/g
  - Level III SQT: >0.1 pg/g

### Maps

- **Map of Assessment Area Cores**
- **Labeled Stations Used in Characterization**
- **Chemical Studies Used in the Characterization**
  - Upper St. Louis River, 2011 (15 stations).
  - Fond du Lac Reservation Lakes Ph 2 2002 (7 stations).
  - Fish tissue studies: Fond du Lac Fish Tissue Study 2000.
Appendix B
Contaminant Concentration Maps
Mean PEC-Q in Surface Sediment: Geographic Zones

Mean PEC-Q in surface samples:
- 0.0 - 0.1 (x ≤ TEC)
- 0.1 - 0.6 (TEC < x ≤ PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Geographic Zones

- **Mean PEC-Q**
  - 0.0 - 0.1 (x <= TEC)
  - 0.1 - 0.6 (TEC < x <= PEC)
  - > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC

- Upper St. Louis River
- Middle St. Louis River
- Lower St. Louis River
- St. Louis Bay
- Superior Bay
- Lake Superior
- Allouez Bay
- Superior
- Koppers/Crawford Creek
ST. LOUIS RIVER AOC
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Geographic Zones

Mean PEC-Q
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Mean PEC-Q in the > 100 cm Sediment Layer: Geographic Zones

Mean PEC-Q
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

State Boundary

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Mean PEC-Q in Surface Sediment: Allouez Bay

Mean PEC-Q in surface samples
- 0.0 - 0.1 (k <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-q samples were found for this geographic zone.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Allouez Bay

**Mean PEC-Q**
- **0.0 - 0.1** ($x \leq TEC$)
- **0.1 - 0.6** ($TEC < x \leq PEC$)
- **$> 0.6$** ($PEC < x$)

*State Boundary*
*Allouez Bay*
*Federal Navigation Channel*

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-q samples were found for this geographic zone.
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Allouez Bay

Mean PEC-Q
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-Q samples were found for this geographic zone.
Mean PEC-Q in the > 100 cm Sediment Layer: Allouez Bay

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-q samples were found for this geographic zone.
Mean PEC-Q in surface samples

- > 0.6 (PEC < x)
- 0.1 - 0.6 (TEC < x <= PEC)
- 0.0 - 0.1 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by EPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Superior Bay

- **Mean PEC-Q**
  - 0.0 - 0.1 (x <= TEC)
  - 0.1 - 0.6 (TEC < x <= PEC)
  - > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Superior Bay

Mean PEC-Q
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the > 100 cm Sediment Layer: Superior Bay

- **State Boundary**
- **Superior Bay**
- **Federal Navigation Channel**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

- **0.0 - 0.1 (x <= TEC)**
- **0.1 - 0.6 (TEC < x <= PEC)**
- **> 0.6 (PEC < x)**

Mean PEC-Q
Mean PEC-Q in Surface Sediment: St. Louis Bay

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: St. Louis Bay

- **0.0 - 0.1 (PEC < TEC)**
- **0.1 - 0.6 (TEC < PEC < x)**
- **> 0.6 (PEC < x)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Data source: [Map with points indicating sediment concentrations in St. Louis Bay](#).
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer:
St. Louis Bay

Mean PEC-Q:
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the > 100 cm Sediment Layer: St. Louis Bay

- Mean PEC-Q

0.0 - 0.1 (x <= TEC)
0.1 - 0.6 (TEC < x <= PEC)
0.0 - 0.1 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in surface samples

- **Lower St. Louis River**

Mean PEC-Q in surface sediment:

- Greater than 0.6 (PEC < x)
- 0.1 - 0.6 (TEC < x <= PEC)
- 0.0 - 0.1 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Lower St. Louis River

- Mean PEC
  - 0.0 - 0.1 \((x \leq TEC)\)
  - 0.1 - 0.6 \((TEC < x \leq PEC)\)
  - > 0.6 \((PEC < x)\)

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
ST. LOUIS RIVER AOC
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Lower St. Louis River

Mean PEC-Q
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Mean PEC-Q in the
> 100 cm Sediment Layer: Lower St. Louis River

Mean PEC-Q

- **0.0 - 0.1 (x ≤ TEC)**
- **0.1 - 0.6 (TEC < x ≤ PEC)**
- **> 0.6 (PEC < x)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in Surface Sediment: Middle St. Louis River

Mean PEC-Q in surface samples

- < 0.1 (PEC < x)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Middle St. Louis River

Mean PEC-Q:
- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Middle St. Louis River

- Mean PEC-Q (0.0 - 0.1) (x <= TEC)
- Mean PEC-Q (0.1 - 0.6) (TEC < x <= PEC)
- Mean PEC-Q (> 0.6) (PEC < x)

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Mean PEC-Q in the > 100 cm Sediment Layer: Middle St. Louis River

<table>
<thead>
<tr>
<th>Concentration Interval</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 0.6 (PEC &lt; x)</td>
<td>Highest PEC-Q values</td>
</tr>
<tr>
<td>0.1 - 0.6 (TEC &lt; x &lt;= PEC)</td>
<td>Intermediate values</td>
</tr>
<tr>
<td>0.0 - 0.1 (x &lt;= TEC)</td>
<td>Lowest values</td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterization. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in surface samples:

- 0.0 - 0.1 (PEC < x)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Upper St. Louis River

<table>
<thead>
<tr>
<th>PEC-Q Interval</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.1 (x &lt;= TEC)</td>
<td></td>
</tr>
<tr>
<td>0.1 - 0.6 (TEC &lt; x &lt;= PEC)</td>
<td></td>
</tr>
<tr>
<td>&gt; 0.6 (PEC &lt; x)</td>
<td></td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST LOUIS RIVER AOC
Federal Navigation Channel

Upper St. Louis River

Middle St. Louis River
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Upper St. Louis River

Mean PEC-Q

- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mean PEC-Q in the > 100 cm Sediment Layer: Upper St. Louis River

Mean PEC-Q

- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. No Mean PEC-q samples were found for this geographic zone.
Mean PEC-Q in Surface Sediment: Koppers/Crawford Creek

Mean PEC-Q in surface samples:
- **0.0 - 0.1** (x <= TEC)
- **0.1 - 0.6** (TEC < x <= PEC)
- **> 0.6** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-Q samples were found for this geographic zone.
Mean PEC-Q in the 15 cm to 50 cm Sediment Layer: Koppers/Crawford Creek

Mean PEC-Q

- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

State Boundary

Koppers/Crawford Creek
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-Q samples were found for this geographic zone.
Mean PEC-Q in the 50 cm to 100 cm Sediment Layer: Koppers/Crawford Creek

Mean PEC-Q

- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-q samples were found for this geographic zone.
Mean PEC-Q in the > 100 cm Sediment Layer: Koppers/Crawford Creek

- 0.0 - 0.1 (x <= TEC)
- 0.1 - 0.6 (TEC < x <= PEC)
- > 0.6 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mean PEC-Q samples were found for this geographic zone.
Mercury in Surface Sediment: Geographic Zones

Mercury concentrations in surface samples (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Lake Superior
Superior Bay
St. Louis Bay
Superior
Upper St. Louis River
Middle St. Louis River
Lower St. Louis River
Allouez Bay
Koppers/Crawford Creek

Mercury in Surface Sediment:

ST. LOUIS RIVER AOC
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury in the 15 cm to 50 cm Sediment Layer: Geographic Zones

Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Lake Superior
Superior Bay
St. Louis Bay
Upper St. Louis River
Lower St. Louis River
Middle St. Louis River
Allouez Bay
Superior
Koppers/Crawford Creek

Copyright: ©2012 Esri, DeLorme, NAVTEQ
Mercury in the 50 cm to 100 cm Sediment Layer:
Geographic Zones

Mercury concentrations (mg/kg)
- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations in surface samples (mg/kg)

- > 1.1  (PEC < x)
- 0.64 - 1.1  (MEC < x <= PEC)
- 0.18 - 0.64  (TEC < x <= MEC)
- 0.0 - 0.18  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Mercury in Surface Sediment: Allouez Bay

Mercury concentrations in surface samples (mg/kg)

- > 1.1  (PEC < x)
- 0.64 - 1.1  (MEC < x <= PEC)
- 0.18 - 0.64  (TEC < x <= MEC)
- 0.0 - 0.18  (x <= TEC)
ST. LOUIS RIVER AOC
Mercury in the 15 cm to 50 cm Sediment Layer: Allouez Bay

Mercury concentrations (mg/kg)
- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase V St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

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Mercury in the 50 cm to 100 cm Sediment Layer: Allouez Bay

Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Superior Bay
Lake Superior
Allouez Bay
Bay Creek
State Boundary
Federal Navigation Channel
Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Mercury in the >100 cm Sediment Layer: Allouez Bay
Mercury concentrations in surface samples (mg/kg)

- **> 1.1 (PEC < x)**
- **0.64 - 1.1 (MEC < x <= PEC)**
- **0.18 - 0.64 (TEC < x <= MEC)**
- **0.0 - 0.18 (x <= TEC)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

- > 1.1  (PEC < x)
- 0.64 - 1.1  (MEC < x <= PEC)
- 0.18 - 0.64  (TEC < x <= MEC)
- 0.0 - 0.18  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Mercury in the >100 cm Sediment Layer:
Superior Bay

Mercury concentrations (mg/kg)
- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

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Mercury concentrations in surface samples (mg/kg)

- ST. LOUIS RIVER AOC
- St. Louis Bay

Mercury in Surface Sediment: St. Louis Bay

- > 1.1  (PEC < x)
- 0.64 - 1.1  (MEC < x <= PEC)
- 0.18 - 0.64  (TEC < x <= MEC)
- 0.0 - 0.18  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth intervals where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.1</td>
<td>(PEC &lt; x)</td>
</tr>
<tr>
<td>0.64 - 1.1</td>
<td>(MEC &lt; x &lt;= PEC)</td>
</tr>
<tr>
<td>0.18 - 0.64</td>
<td>(TEC &lt; x &lt;= MEC)</td>
</tr>
<tr>
<td>0.0 - 0.18</td>
<td>(x &lt;= TEC)</td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

ST. LOUIS RIVER AOC
Mercury in the 50 cm to 100 cm Sediment Layer: St. Louis Bay

- Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
- Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

State Boundary
St. Louis Bay
Federal Navigation Channel

Mercury concentrations (mg/kg):
- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)
Mercury concentrations (mg/kg)

ST. LOUIS RIVER AOC

Mercury in the >100 cm Sediment Layer:
St. Louis Bay

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury in Surface Sediment: Lower St. Louis River

Mercury concentrations in surface samples (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury in the 15 cm to 50 cm Sediment Layer: Lower St. Louis River

Mercury concentrations (mg/kg)

- > 1.1  (PEC < x)
- 0.64 - 1.1  (MEC < x <= PEC)
- 0.18 - 0.64  (TEC < x <= MEC)
- 0.0 - 0.18  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Lower St. Louis River

Federal Navigation Channel

State Boundary

Lower St. Louis River
Mercury concentrations (mg/kg) ST. LOUIS RIVER AOC

Mercury in the 50 cm to 100 cm Sediment Layer: Lower St. Louis River

- **> 1.1  (PEC < x)**
- **0.64 - 1.1  (MEC < x <= PEC)**
- **0.18 - 0.64  (TEC < x <= MEC)**
- **0.0 - 0.18  (x <= TEC)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

ST. LOUIS RIVER AOC
Sediment Layer:
Lower St. Louis River

Mercury in the >100 cm Sediment Layer:
Lower St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations in surface samples (mg/kg)

- Middle St. Louis River:
  - $> 1.1$ (PEC $< x$)
  - $0.64 - 1.1$ (MEC $< x <= PEC$)
  - $0.18 - 0.64$ (TEC $< x <= MEC$)
  - $0.0 - 0.18$ ($x <= TEC$)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Mercury in Surface Sediment: Middle St. Louis River

Mercury concentrations in surface samples (mg/kg)

- $0.0 - 0.18$ ($x <= TEC$)
- $0.18 - 0.64$ (TEC $< x <= MEC$)
- $0.64 - 1.1$ (MEC $< x <= PEC$)
- $> 1.1$ (PEC $< x$)
Mercury concentrations (mg/kg)

ST. LOUIS RIVER AOC
Mercury in the
15 cm to 50 cm
Sediment Layer:
Middle St. Louis River

Mercury concentrations (mg/kg):
- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MRPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg) in the 50 cm to 100 cm Sediment Layer: Middle St. Louis River

- > 1.1 (PEC < x)
- 0.64 - 1.1 (MEC < x <= PEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.0 - 0.18 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

ST. LOUIS RIVER AOC
Mercury in the >100 cm Sediment Layer:
Middle St. Louis River

<table>
<thead>
<tr>
<th>Mercury Concentration (mg/kg)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.1 (PEC &lt; x)</td>
<td></td>
</tr>
<tr>
<td>0.64 - 1.1 (MEC &lt; x &lt;= PEC)</td>
<td></td>
</tr>
<tr>
<td>0.18 - 0.64 (TEC &lt; x &lt;= MEC)</td>
<td></td>
</tr>
<tr>
<td>0.0 - 0.18 (x &lt;= TEC)</td>
<td></td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations in surface samples (mg/kg)

**Upper St. Louis River**

- > 1.1 (PEC < x)
- 0.64 - 1.1 (MEC < x <= PEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.0 - 0.18 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury concentrations (mg/kg)

- > 1.1 (PEC < x)
- 0.64 - 1.1 (MEC < x < PEC)
- 0.18 - 0.64 (TEC < x < MEC)
- 0.0 - 0.18 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury in the >100 cm Sediment Layer: Upper St. Louis River

Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

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Mercury concentrations in surface samples (mg/kg)

- **ST. LOUIS RIVER AOC**
  - **Mercury in Surface Sediment: Koppers/Crawford Creek**
  - **Mercury concentrations in surface samples (mg/kg):**
    - > 1.1 (PEC < x)
    - 0.64 - 1.1 (MEC < x <= PEC)
    - 0.18 - 0.64 (TEC < x <= MEC)
    - 0.0 - 0.18 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mercury samples were found for this geographic zone.
Mercury in the 15 cm to 50 cm Sediment Layer: Koppers/Crawford Creek

Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Mercury samples were found for this geographic zone.
Mercury concentrations (mg/kg)

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>&gt; 1.1</td>
<td>(PEC &lt; x)</td>
</tr>
<tr>
<td>0.64 - 1.1</td>
<td>(MEC &lt; x &lt;= PEC)</td>
</tr>
<tr>
<td>0.18 - 0.64</td>
<td>(TEC &lt; x &lt;= MEC)</td>
</tr>
<tr>
<td>0.0 - 0.18</td>
<td>(x &lt;= TEC)</td>
</tr>
<tr>
<td>0.0 - 0.01</td>
<td>(x &lt;= TEC)</td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Mercury in the >100 cm Sediment Layer: Koppers/Crawford Creek

Mercury concentrations (mg/kg)

- 0.0 - 0.18 (x <= TEC)
- 0.18 - 0.64 (TEC < x <= MEC)
- 0.64 - 1.1 (MEC < x <= PEC)
- > 1.1 (PEC < x)

ST. LOUIS RIVER AOC
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Total PAHs in Surface Sediment: Geographic Zones

Total PAH concentrations in surface samples (ug/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.

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ST. LOUIS RIVER AOC
Total PAHs in the 15 cm to 50 cm Sediment Layer:
Geographic Zones

Total PAH (µg/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= NEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
ST. LOUIS RIVER AOC
Total PAHs in the 50 cm to 100 cm Sediment Layer: Geographic Zones

Total PAH (µg/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the >100 cm Sediment Layer: Geographic Zones

<table>
<thead>
<tr>
<th>Total PAH (µg/kg)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 1,600</td>
<td>(x &lt;= TEC)</td>
</tr>
<tr>
<td>1,600 - 12,300</td>
<td>(TEC &lt; x &lt;= MEC)</td>
</tr>
<tr>
<td>12,300 - 23,000</td>
<td>(MEC &lt; x &lt;= PEC)</td>
</tr>
<tr>
<td>&gt; 23,000</td>
<td>(PEC &lt; x)</td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PAHs based on sum of 13 priority PAH compounds.
Total PAH concentrations in surface samples (ug/kg)

- **0.0 - 1,600** (x <= TEC)
- **1,600 - 12,300** (TEC < x <= MEC)
- **12,300 - 23,000** (MEC < x <= PEC)
- **> 23,000** (PEC < x)

**ST. LOUIS RIVER AOC**

**Total PAHs in Surface Sediment: Allouez Bay**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 15 cm to 50 cm Sediment Layer: Allouez Bay

Total PAH (ug/kg)

- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Total PAHs based on sum of 13 priority PAH compounds. No Total PAH samples were found for this geographic zone.
Total PAHs in the 50 cm to 100 cm Sediment Layer: Allouez Bay

Total PAH (μg/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PAHs based on sum of 13 priority PAH compounds. No Total PAH samples were found for this geographic zone.

ST. LOUIS RIVER AOC
Allouez Bay
Federal Navigation Channel
State Boundary

0 1
0 km
Total PAHs in the >100cm Sediment Layer: Allouez Bay

Total PAH (ug/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Total PAHs based on sum of 13 priority PAH compounds. No Total PAH samples were found for this geographic zone.
Total PAH concentrations in surface samples (ug/kg)

- **Superior Bay**:
  - > 23,000 (PEC < x)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 0.0 - 1,600 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 15 cm to 50 cm Sediment Layer: Superior Bay

- **Total PAH (ug/kg)**
  - 0.0 - 1,600 (x <= TEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - > 23,000 (PEC < x)

- Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
- Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
- Total PAHs based on sum of 13 priority PAH compounds.

**ST LOUIS RIVER AOC**

- Superior Bay
- Federal Navigation Channel

**Lake Superior**

- State Boundary
- Superior Bay
- Federal Navigation Channel
Total PAHs in the 50 cm to 100 cm Sediment Layer: Superior Bay

Total PAH (ug/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Total PAHs based on sum of 13 priority PAH compounds.
ST. LOUIS RIVER AOC
Total PAHs in the
>100 cm Sediment Layer:
Superior Bay

Total PAH (ug/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAH concentrations in surface samples (ug/kg)

- **0.0 - 1,600** (x <= TEC)
- **1,600 - 12,300** (TEC < x <= MEC)
- **12,300 - 23,000** (MEC < x <= PEC)
- **> 23,000** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Total PAHs based on sum of 13 priority PAH compounds.
ST. LOUIS RIVER AOC
Total PAHs in the
15 cm to 50 cm
Sediment Layer:
St. Louis Bay
Total PAH (μg/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 50 cm to 100 cm Sediment Layer: St. Louis Bay

**Total PAH (ug/kg)**

- **0.0 - 1,600** (x <= TEC)
- **1,600 - 12,300** (TEC < x <= MEC)
- **12,300 - 23,000** (MEC < x <= PEC)
- **> 23,000** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the >100 cm Sediment Layer: St. Louis Bay

- **Total PAH (µg/kg)**
  - 0.0 - 1,600 (x <= TEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - > 23,000 (PEC < x)

*Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.*

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAH concentrations in surface samples (ug/kg)

- **Lower St. Louis River**
  - > 23,000 (PEC < x)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 0.0 - 1,600 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 15 cm to 50 cm Sediment Layer:
Lower St. Louis River

- Lower St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 50 cm to 100 cm Sediment Layer: Lower St. Louis River

- **Total PAH (ug/kg):**
  - 0.0 - 1,600 \((x < \text{TEC})\)
  - 1,600 - 12,300 \((\text{TEC} < x \leq \text{MEC})\)
  - 12,300 - 23,000 \((\text{MEC} < x \leq \text{PEC})\)
  - > 23,000 \((\text{PEC} < x)\)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the >100 cm Sediment Layer: Lower St. Louis River

- **Lower St. Louis River**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAH concentrations in surface samples (µg/kg)

- **Middle St. Louis River**
  - > 23,000 (PEC < x)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 0.0 - 1,600  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 15 cm to 50 cm Sediment Layer:
Middle St. Louis River

- **Total PAH (ug/kg)**
  - **0.0 - 1,600** (x <= TEC)
  - **1,600 - 12,300** (TEC < x <= MEC)
  - **12,300 - 23,000** (MEC < x <= PEC)
  - **> 23,000** (PEC < x)

ST. LOUIS RIVER AOC
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 50 cm to 100 cm Sediment Layer:

Middle St. Louis River

Total PAH (μg/kg):
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

State Boundary
Middle St. Louis River
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the >100 cm Sediment Layer:

Middle St. Louis River

- Total PAH (ug/kg):
  - 0.0 - 1,600 (x <= TEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAH concentrations in surface samples (μg/kg)

- **Upper St. Louis River**
  - > 23,000 (PEC < x)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 0.0 - 1,600 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 15 cm to 50 cm Sediment Layer:
Upper St. Louis River

- **0.0 - 1,600 (x <= TEC)**
- **1,600 - 12,300 (TEC < x <= MEC)**
- **12,300 - 23,000 (MEC < x <= PEC)**
- **> 23,000 (PEC < x)**

ST. LOUIS RIVER AOC

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 50 cm to 100 cm Sediment Layer: Upper St. Louis River

- **Upper St. Louis River**

**Total PAH (ug/kg)**
- 0.0 - 1,600 \((x \leq TEC)\)
- 1,600 - 12,300 \((TEC < x \leq MEC)\)
- 12,300 - 23,000 \((MEC < x \leq PEC)\)
- > 23,000 \((PEC < x)\)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the >100 cm Sediment Layer: Upper St. Louis River

**Upper St. Louis River AOC**

**Total PAH (ug/kg)**
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.

No Total PAH samples were found for this geographic zone.

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Upper St. Louis River

Federal Navigation Channel
Total PAH concentrations in surface samples (ug/kg)

- Total PAHs in Surface Sediment: Koppers/Crawford Creek
  - $> 23,000$ (PEC < x)
  - $12,300 - 23,000$ (MEC < x <= PEC)
  - $1,600 - 12,300$ (TEC < x <= MEC)
  - $0.0 - 1,600$ (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Total PAHs based on sum of 13 priority PAH compounds.

State Boundary
Koppers/Crawford Creek
Federal Navigation Channel
Total PAHs in the 15 cm to 50 cm Sediment Layer:
Koppers/Crawford Creek

- **Total PAH (µg/kg)**
  - 0.0 - 1,600 (x <= TEC)
  - 1,600 - 12,300 (TEC < x <= MEC)
  - 12,300 - 23,000 (MEC < x <= PEC)
  - > 23,000 (PEC < x)

State Boundary

- Koppers/Crawford Creek
- Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the 50 cm to 100 cm Sediment Layer: Koppers/Crawford Creek

Total PAH (ug/kg)

- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PAHs in the
>100 cm Sediment Layer: Koppers/Crawford Creek

Total PAH (μg/kg)
- 0.0 - 1,600 (x <= TEC)
- 1,600 - 12,300 (TEC < x <= MEC)
- 12,300 - 23,000 (MEC < x <= PEC)
- > 23,000 (PEC < x)

State Boundary
Koppers/Crawford Creek
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterization.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Total PAHs based on sum of 13 priority PAH compounds.
Total PCB concentrations in surface samples (ug/kg)

ST. LOUIS RIVER AOC
Total PCBs in Surface Sediment: Geographic Zones

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

State Boundary

Koppers/Crawford Creek

Upper St. Louis River

Middle St. Louis River

Lower St. Louis River

St. Louis Bay

Superior Bay

Lake Superior

Superior

Allouez Bay
Total PCBs in the 15 cm to 50 cm Sediment Layer:
Geographic Zones

- **St. Louis Bay**
- **Superior Bay**
- **Superior**
- **Lake Superior**
- **Allouez Bay**
- **Koppers/Crawford Creek**

**ST. LOUIS RIVER AOC**

Total PCBs (ug/kg):
- **0 - 60** (x ≤ TEC)
- **60 - 370** (TEC < x ≤ MEC)
- **370 - 680** (MEC < x ≤ PEC)
- **60 - 370** (TEC < x ≤ MEC)
- **> 680** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 50 cm to 100 cm Sediment Layer: Geographic Zones

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the >100 cm Sediment Layer: Geographic Zones

St. Louis River AOC

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

0 - 60 (x <= TEC)
60 - 370 (TEC < x <= MEC)
370 - 680 (MEC < x <= PEC)
> 680 (PEC < x)

0 1 2 3 km

Upper St. Louis River
Middle St. Louis River
Lower St. Louis River
St. Louis Bay
Lake Superior
Superior Bay
Allouez Bay
Koppers/Crawford Creek
TOTAL PCB CONCENTRATIONS IN SURFACE SAMPLES (ug/kg)

**ST. LOUIS RIVER AOC**

Total PCB concentrations in surface samples (ug/kg)

- **0 - 60** (x <= TEC)
- **60 - 370** (TEC < x <= MEC)
- **370 - 680** (MEC < x <= PEC)
- **> 680** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
Total PCBs in the 15 cm to 50 cm Sediment Layer: Allouez Bay

- **Total PCB** (µg/kg)
  - > 680 (PEC < x)
  - 370 - 680 (MEC < x <= PEC)
  - 60 - 370 (TEC < x <= MEC)
  - 0 - 60 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
ST. LOUIS RIVER AOC
Total PCBs in the 50 cm to 100 cm Sediment Layer: Allouez Bay

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
Total PCBs in the >100 cm Sediment Layer: Allouez Bay

Total PCB (µg/kg)

- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

State Boundary
Allouez Bay
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
No Total PCB samples were found for this geographic zone.
Total PCB concentrations in surface samples (ug/kg)

- **0 - 60 (x <= TEC)**
- **60 - 370 (TEC < x <= MEC)**
- **370 - 680 (MEC < x <= PEC)**
- **> 680 (PEC < x)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 15 cm to 50 cm Sediment Layer: Superior Bay

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Total PCBs in the 50 cm to 100 cm Sediment Layer: Superior Bay

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

State Boundary
Superior Bay
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the >100 cm Sediment Layer: Superior Bay

- >680 (PEC < x)
- 370 - 680 (MEC < x <= PEC)
- 60 - 370 (TEC < x <= MEC)
- 0 - 60 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCB concentrations in surface samples (ug/kg)

- **ST. LOUIS RIVER AOC**
- **Total PCBs in Surface Sediment:**
  - **St. Louis Bay**
    - **> 680** (PEC < x)
    - **370 - 680** (MEC < x <= PEC)
    - **60 - 370** (TEC < x <= MEC)
    - **0 - 60** (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC

Total PCBs in the 15 cm to 50 cm Sediment Layer:
St. Louis Bay

Total PCB (μg/kg)

- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 50 cm to 100 cm Sediment Layer:
St. Louis Bay

Total PCB (µg/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCB (µg/kg)

ST. LOUIS RIVER AOC
Total PCBs in the >100 cm Sediment Layer:
St. Louis Bay

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 680</td>
<td>PEC &lt; x</td>
</tr>
<tr>
<td>370 - 680</td>
<td>MEC &lt; x &lt;= PEC</td>
</tr>
<tr>
<td>60 - 370</td>
<td>TEC &lt; x &lt;= MEC</td>
</tr>
<tr>
<td>0 - 60</td>
<td>x &lt;= TEC</td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by EPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCB concentrations in surface samples (ug/kg)

- St. Louis River AOC
- Surface Sediment:
  - Lower St. Louis River

- Total PCBs in Surface Sediment:
  - > 680 (PEC < x)
  - 370 - 680 (MEC < x <= PEC)
  - 60 - 370 (TEC < x <= MEC)
  - 0 - 60 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Total PCBs in Surface Sediment: Lower St. Louis River

Total PCB concentrations in surface samples (ug/kg)

- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

State Boundary
- Lower St. Louis River
- Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 15 cm to 50 cm Sediment Layer: Lower St. Louis River

Total PCB (μg/kg)

- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 50 cm to 100 cm Sediment Layer: Lower St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the >100 cm Sediment Layer: Lower St. Louis River

Total PCB (µg/kg)
- 0 - 60 (x ≤ TEC)
- 60 - 370 (TEC < x ≤ MEC)
- 370 - 680 (MEC < x ≤ PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MRCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCB concentrations in surface samples (ug/kg)

ST. LOUIS RIVER AOC

Total PCBs in Surface Sediment:
Middle St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 15 cm to 50 cm Sediment Layer: Middle St. Louis River

- **Total PCB (ug/kg)**
  - 0 - 60 (x <= TEC)
  - 60 - 370 (TEC < x <= MEC)
  - 370 - 680 (MEC < x <= PEC)
  - > 680 (PEC < x)

**Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.**

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 50 cm to 100 cm Sediment Layer: Middle St. Louis River

- **ST. LOUIS RIVER AOC**
- **Total PCB (ug/kg)**
  - **0 - 60** (x <= TEC)
  - **60 - 370** (TEC < x <= MEC)
  - **370 - 680** (MEC < x <= PEC)
  - **> 680** (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

State Boundary
Federal Navigation Channel

Middle St. Louis River
Upper St. Louis River
Lower St. Louis River

0 1 km

0 1 km
Total PCBs in the >100 cm Sediment Layer: Middle St. Louis River

- **Total PCB (ug/kg)**
  - 0 - 60 (x <= TEC)
  - 60 - 370 (TEC < x <= MEC)
  - 370 - 680 (MEC < x <= PEC)
  - > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST LOUIS RIVER AOC
Total PCBs in Surface Sediment: Upper St. Louis River
Total PCB (ug/kg)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)
- 0 - 60 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the 15 cm to 50 cm Sediment Layer: Upper St. Louis River

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

ST. LOUIS RIVER AOC

Total PCBs in the 15 cm to 50 cm Sediment Layer: Upper St. Louis River

0 - 60 (x <= TEC)
60 - 370 (TEC < x <= MEC)
370 - 680 (MEC < x <= PEC)
> 680 (PEC < x)

State Boundary
Upper St. Louis River
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

0 2 km

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Total PCBs in the 50 cm to 100 cm Sediment Layer: Upper St. Louis River

Total PCB (ug/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCBs in the >100 cm Sediment Layer:
Upper St. Louis River

Total PCB (ug/kg):
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Total PCB concentrations in surface samples (ug/kg)

- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
Total PCBs in the 15 cm to 50 cm Sediment Layer:
Koppers/Crawford Creek

Total PCB (μg/kg)
- 0 - 60 (x <= TEC)
- 60 - 370 (TEC < x <= MEC)
- 370 - 680 (MEC < x <= PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
ST. LOUIS RIVER AOC

Total PCBs in the 50 cm to 100 cm Sediment Layer:
Koppers/Crawford Creek

Total PCB (μg/kg)
- 0 - 60 (x ≤ TEC)
- 60 - 370 (TEC < x ≤ MEC)
- 370 - 680 (MEC < x ≤ PEC)
- > 680 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
Total PCBs in the >100 cm Sediment Layer: Koppers/Crawford Creek

- **Total PCB (ug/kg)**
  - 0 - 60 (x <= TEC)
  - 60 - 370 (TEC < x <= MEC)
  - 370 - 680 (MEC < x <= PEC)
  - > 680 (PEC < x)

**Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.**

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Total PCB samples were found for this geographic zone.
ST. LOUIS RIVER AOC
PCDD/F TEQWHO98-Fish
in Surface Sediment:
Geographic Zones

PCDD/F TEQWHO98-Fish
in surface samples (ng/kg):
0.0 - 0.85 (x <= TEC)
0.85 - 11.2 (TEC < x <= MEC)
11.2 - 21.5 (MEC < x <= PEC)
> 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database
using preferred datasets selected by MPCA and WDNR
personnel for sediment characterizations.
Sediment samples assigned to depth interval where the
highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health
Organization (WHO) ecological risk values for fish.
ST. LOUIS RIVER AOC
PCDD/F TEQ WHO98-Fish in the 15 cm to 50 cm Sediment Layer:
Geographic Zones

PCDD/F TEQ WHO98-Fish (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization (WHO) ecological risk values for fish.
PCDD/F TEQ WHO98-Fish in the 50 cm to 100 cm Sediment Layer: Geographic Zones

ST. LOUIS RIVER AOC

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization (WHO) ecological risk values for fish.

Upper St. Louis River
Middle St. Louis River
Lower St. Louis River
St. Louis Bay
Superior Bay
Lake Superior
Allouez Bay
Koppers/Crawford Creek

State Boundary
Superior
PCDD/F TEQ WHO98-Fish in the >100 cm Sediment Layer: Geographic Zones

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization (WHO) ecological risk values for fish.
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish. No PCDD/F TEQWHO98-Fish samples were found for this geographic zone.
ST. LOUIS RIVER AOC
PCDD/F TEQWHO98-Fish in the 15 cm to 50 cm Sediment Layer: Allouez Bay

PCDD/F TEQWHO98-Fish (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
No PCDD/F TEQWHO98-Fish samples were found for this geographic zone.
PCDD/F TEQ\textsubscript{WHO98-Fish} in the 50 cm to 100 cm Sediment Layer: Allouez Bay

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

No PCDD/F TEQ\textsubscript{WHO98-Fish} samples were found for this geographic zone.
PCDD/F TEQWHO98-Fish (ng/kg)

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

No PCDD/F TEQWHO98-Fish samples were found for this geographic zone.
PCDD/F TEQWHO98-Fish in Surface Sediment: Superior Bay

PCDD/F TEQWHO98-Fish in surface samples (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
ST. LOUIS RIVER AOC

PCDD/F TEQ\textsubscript{WHO98-Fish} in the 15 cm to 50 cm Sediment Layer: Superior Bay

<table>
<thead>
<tr>
<th>Concentration Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 21.5 (PEC &lt; x)</td>
<td></td>
</tr>
<tr>
<td>11.2 - 21.5 (MEC &lt; x &lt;= PEC)</td>
<td></td>
</tr>
<tr>
<td>0.85 - 11.2 (TEC &lt; x &lt;= MEC)</td>
<td></td>
</tr>
<tr>
<td>0.0 - 0.85 (x &lt;= TEC)</td>
<td></td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
ST LOUIS RIVER AOC
PCDD/F TEQ\WHO98-Fish
in the 50 cm to 100 cm
Sediment Layer:
Superior Bay

PCDD/F TEQ\WHO98-Fish (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database
using preferred datasets selected by MPCA and WDNR
personnel for sediment characterizations.
Sediment samples assigned to depth interval where the
highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health
Organization 1998 ecological risk values for fish.
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
ST. LOUIS RIVER AOC
PCDD/F TEQ$_{WHO98}$-Fish
in Surface Sediment:
St. Louis Bay

PCDD/F TEQ$_{WHO98}$-Fish
in Surface Sediment:
St. Louis Bay

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ WHO98-Fish (ng/kg)
in the 15 cm to 50 cm Sediment Layer:
St. Louis Bay

- > 21.5 (PEC < x)
- 11.2 - 21.5 (MEC < x <= PEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 0.0 - 0.85 (x <= TEC)
- 0 (x = 0)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ_{WHO98-Fish} in the 50 cm to 100 cm Sediment Layer: St. Louis Bay

ST LOUIS RIVER AOC

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ\textsubscript{WHO98-Fish} in the >100 cm Sediment Layer:

- St. Louis Bay

- Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

- Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

- Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

\begin{itemize}
  \item 0.0 - 0.85 (x <= TEC)
  \item 0.85 - 11.2 (TEC < x <= MEC)
  \item 11.2 - 21.5 (MEC < x <= PEC)
  \item > 21.5 (PEC < x)
\end{itemize}
ST. LOUIS RIVER AOC

PCDD/F TEQWHO98-Fish in Surface Sediment: Lower St. Louis River

PCDD/F TEQWHO98-Fish in surface samples (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

0 1 km

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

ST. LOUIS RIVER AOC

PCDD/F TEQWHO98-Fish in Surface Sediment: Lower St. Louis River

PCDD/F TEQWHO98-Fish in surface samples (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

0 1 km

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQWHO98-Fish (ng/kg)

- > 21.5 (PEC < x)
- 11.2 - 21.5 (MEC < x <= PEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 0.0 - 0.85 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
ST. LOUIS RIVER AOC

PCDD/F TEQ\WHO98-Fish (ng/kg)

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ WHO98-Fish in Surface Sediment:
Middle St. Louis River

- Toxic equivalent values calculated using World Health Organization (WHO) 1998 ecological risk values for fish.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Depth interval assignments for surface sediment samples:
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

State Boundary
Federal Navigation Channel

ST. LOUIS RIVER AOC
Upper St. Louis River
Lower St. Louis River
Middle St. Louis River
Upper St. Louis River
PCDD/F TEQ WHO98-Fish (ng/kg) in the 15 cm to 50 cm Sediment Layer: Middle St. Louis River

- > 21.5 (PEC < x)
- 11.2 - 21.5 (MEC < x <= PEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 0.0 - 0.85 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization (1988) ecological risk values for fish.

State Boundary
Middle St. Louis River
Federal Navigation Channel
PCDD/F TEQ\textsubscript{WHO98-Fish} (ng/kg) in the 50 cm to 100 cm Sediment Layer: Middle St. Louis River

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ WHO98-Fish (ng/kg)

ST. LOUIS RIVER AOC
PCDD/F TEQ WHO98-Fish in the >100 cm Sediment Layer:
Middle St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization (WHO) ecological risk values for fish.

0 1 km
PCDD/F TEQWHO98-Fish in Surface Sediment: Upper St. Louis River

PCDD/F TEQWHO98-Fish in surface samples (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish geographic zone.

0 2 km

State Boundary
Upper St. Louis River
Federal Navigation Channel

Upper St. Louis River
Middle St. Louis River
ST LOUIS RIVER AOC
PCDD/F TEQWHO98-Fish
in the 15 cm to 50 cm
Sediment Layer:
Upper St. Louis River
PCDD/F TEQWHO98-Fish (ng/kg)

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2
  (TEC < x <= MEC)
- 11.2 - 21.5
  (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database
using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

Upper St. Louis River
Federal Navigation Channel

Data from Phase VII St. Louis River AOC database
using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
geographic zone.
ST LOUIS RIVER AOC
PCDD/F TEQ WHO98-Fish
in the 50 cm to 100 cm
Sediment Layer:
Upper St. Louis River

PCDD/F TEQ WHO98-Fish (ng/kg)
- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish geographic zone.

0 2 km

ST LOUIS RIVER AOC
Upper St. Louis River
Federal Navigation Channel

0.0 - 0.85 (x <= TEC)
0.85 - 11.2 (TEC < x <= MEC)
11.2 - 21.5 (MEC < x <= PEC)
> 21.5 (PEC < x)
PCDD/F TEQ$_{WHO98}$-Fish in the >100 cm Sediment Layer: Upper St. Louis River

PCDD/F TEQ$_{WHO98}$-Fish (ng/kg)
- 0.0 - 0.85 ($x < TEC$)
- 0.85 - 11.2 ($TEC < x < MEC$)
- 11.2 - 21.5 ($MEC < x < PEC$)
- > 21.5 ($PEC < x$)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish geographic zone.
PCDD/F TEQ WHO98-Fish in surface samples (ng/kg)

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
ST. LOUIS RIVER AOC

PCDD/F TEQ\textsubscript{WHO98}-Fish in the 15 cm to 50 cm Sediment Layer: Koppers/Crawford Creek

PCDD/F TEQ\textsubscript{WHO98}-Fish (ng/kg)

- 0.0 - 0.85 (x \leq TEC)
- 0.85 - 11.2 (TEC < x \leq MEC)
- 11.2 - 21.5 (MEC < x \leq PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

 Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

Koppers/Crawford Creek
Federal Navigation Channel
PCDD/F TEQ$_{\text{WHO98}}$-Fish in the 50 cm to 100 cm Sediment Layer: Koppers/Crawford Creek

PCDD/F TEQ$_{\text{WHO98}}$-Fish (ng/kg)

- 0.0 - 0.85 (x <= TEC)
- 0.85 - 11.2 (TEC < x <= MEC)
- 11.2 - 21.5 (MEC < x <= PEC)
- > 21.5 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.
PCDD/F TEQ\textsubscript{WHO98-Fish} in the >100 cm Sediment Layer: Koppers/Crawford Creek

<table>
<thead>
<tr>
<th>Toxic Equivalent Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.85 (x &lt;= TEC)</td>
<td>(PEC &lt; x)</td>
</tr>
<tr>
<td>0.85 - 11.2 (TEC &lt; x &lt;= MEC)</td>
<td></td>
</tr>
<tr>
<td>11.2 - 21.5 (MEC &lt; x &lt;= PEC)</td>
<td></td>
</tr>
<tr>
<td>&gt; 21.5 (PEC &lt; x)</td>
<td></td>
</tr>
</tbody>
</table>

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs. Toxic equivalent values calculated using World Health Organization 1998 ecological risk values for fish.

No PCDD/F TEQ\textsubscript{WHO98-Fish} samples were found for this geographic zone.
Lead concentrations in surface samples (mg/kg)

- Greater than 130 (PEC < x)
- Between 83 and 130 (MEC < x <= PEC)
- Between 36 and 83 (TEC < x <= MEC)
- Between 0.0 and 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC

Lead in the
15 cm to 50 cm
Sediment Layer:
Geographic Zones

Lead concentrations (mg/kg)

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database
using preferred datasets selected by MPCA and WDNR
personnel for sediment characterizations.

Sediment samples assigned to depth interval where the
highest fraction of the sample occurs.

State Boundary

Koppers/Crawford Creek

Upper St. Louis River

Middle St. Louis River

Lower St. Louis River

St. Louis Bay

Superior Bay

Lake Superior

Allouez Bay
ST. LOUIS RIVER AOC
Lead in the 50 cm to 100 cm Sediment Layer: Geographic Zones

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Lead in the >100 cm Sediment Layer:
Geographic Zones

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations in surface samples (mg/kg)

- > 130  (PEC < x)
- 83 - 130  (MEC < x <= PEC)
- 36 - 83  (TEC < x <= MEC)
- 0.0 - 36  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
Lead concentrations (mg/kg)

- **0.0 - 36 (x <= TEC)**
- **36 - 83 (TEC < x <= MEC)**
- **83 - 130 (MEC < x <= PEC)**
- **> 130 (PEC < x)**

**ST. LOUIS RIVER AOC**

**Lead in the 15 cm to 50 cm Sediment Layer: Allouez Bay**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
ST. LOUIS RIVER AOC
Lead in the
50 cm to 100 cm
Sediment Layer:
Allouez Bay

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
No Lead samples were found for this geographic zone.
ST. LOUIS RIVER AOC
Lead in the >100 cm Sediment Layer: Allouez Bay

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
ST LOUIS RIVER AOC
Mercury in Surface Sediment: Superior Bay

Lead concentrations in surface samples (mg/kg)

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead in the 50 cm to 100 cm Sediment Layer: Superior Bay

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 120 (MEC < x <= PEC)
- > 120 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

ST. LOUIS RIVER AOC
Lead in the >100 cm Sediment Layer: Superior Bay

Lake Superior
St. Louis Bay
Superior Bay
Allouez Bay
Lead concentrations in surface samples (mg/kg)

- **ST. LOUIS RIVER AOC**

**Lead in Surface Sediment: St. Louis Bay**

- **0.0 - 36 (x <= TEC)**
- **36 - 83**
  - **(TEC < x <= MEC)**
- **83 - 130**
  - **(MEC < x <= PEC)**
- **> 130 (PEC < x)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead in the 15 cm to 50 cm Sediment Layer: St. Louis Bay

- **> 130 (PEC < x)**
- **83 - 130 (MEC < x <= PEC)**
- **36 - 83 (TEC < x <= MEC)**
- **0.0 - 36 (x <= TEC)**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the
50 cm to 100 cm 
Sediment Layer:
St. Louis Bay

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the >100 cm Sediment Layer: St. Louis Bay

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC

Lead in Surface Sediment: Lower St. Louis River

Lead concentrations in surface samples (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the 15 cm to 50 cm Sediment Layer: Lower St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg) in the 50 cm to 100 cm Sediment Layer: Lower St. Louis River

- > 130  (PEC < x)
- 83 - 130  (MEC < x <= PEC)
- 36 - 83  (TEC < x <= MEC)
- 0.0 - 36  (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
ST. LOUIS RIVER AOC
Lead in the >100 cm Sediment Layer: Lower St. Louis River

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations in surface samples (mg/kg)

ST. LOUIS RIVER AOC
Lead in Surface Sediment: Middle St. Louis River

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

0 1 km

ST. LOUIS RIVER AOC
Lead in Surface Sediment: Middle St. Louis River

Lead concentrations in surface samples (mg/kg)

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

0 1 km
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the 15 cm to 50 cm Sediment Layer: Middle St. Louis River

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by SPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the 50 cm to 100 cm Sediment Layer: Middle St. Louis River

Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC

Lead in the >100 cm Sediment Layer:
Middle St. Louis River

Data from Phase VII St. Louis River AOC database using preferred datasets selected by DRPCC and WIDE personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations in surface samples (mg/kg)

- **ST. LOUIS RIVER AOC**

**Lead in Surface Sediment: Upper St. Louis River**

- **Upper St. Louis River**

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

ST. LOUIS RIVER AOC
Lead in the
15 cm to 50 cm
Sediment Layer:
Upper St. Louis River

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

ST. LOUIS RIVER AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.
ST. LOUIS RIVER AOC
Lead in the
50 cm to 100 cm
Sediment Layer:
Upper St. Louis River
Lead concentrations (mg/kg)
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations. Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations (mg/kg)

Upper St. Louis River

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

No Lead samples were found for this geographic zone.

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.
Lead concentrations in surface samples (mg/kg)

ST. LOUIS RIVER AOC
Lead in Surface Sediment: Koppers/Crawford Creek

Lead concentrations in surface samples (mg/kg):
- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
Lead concentrations (mg/kg)

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
Lead concentrations (mg/kg)

- > 130 (PEC < x)
- 83 - 130 (MEC < x <= PEC)
- 36 - 83 (TEC < x <= MEC)
- 0.0 - 36 (x <= TEC)

ST. LOUIS RIVER AOC
Lead in the 50 cm to 100 cm Sediment Layer: Koppers/Crawford Creek

Data from Phase VII St. Louis River AOC database using preferred datasets selected by MPCA and WDNR personnel for sediment characterizations.

Sediment samples assigned to depth interval where the highest fraction of the sample occurs.

No Lead samples were found for this geographic zone.
Lead concentrations (mg/kg)

- 0.0 - 36 (x <= TEC)
- 36 - 83 (TEC < x <= MEC)
- 83 - 130 (MEC < x <= PEC)
- > 130 (PEC < x)

No Lead samples were found for this geographic zone.
Memorandum

From: Tim Towey, Virginia Breidenbach  
Date: June 28, 2013  
Project: St. Louis River Sediment Characterization

To: Dan Breneman, Suzanne Hanson, and Nelson French, MPCA  
CC: Tim Dekker, Scott Wade, LimnoTech

SUBJECT: Remedial Categorization of St. Louis River Area of Concern Sediment Assessment Areas

Introduction

As part of the Remedial Action Plan (RAP) process for the St. Louis River Area of Concern (AOC), LimnoTech was asked by the Minnesota Pollution Control Agency (MPCA) to categorize the identified sediment assessment areas (SAAs) to assist in prioritizing future remediation and restoration activities. This memorandum describes the approach for determining the remedial categories and provides the remedial categorization for each of the Minnesota SAAs based on a screening-level analysis.

The levels of legacy contaminants St. Louis River AOC sediments are well characterized due to extensive sample collection efforts in 2010 and 2011, as well as many years of previous data collection efforts. The data from the recent sampling efforts has recently been compiled and added to the St. Louis River AOC Phase VII database. The available data is sufficient to perform a screening-level analysis to prioritize assessment areas within the AOC for remediation efforts based on beneficial use impairments linked with sediment contamination. The modified version of the Red, Yellow, Green color scale developed by the Minnesota Remedial Assessment Team (MNRAT) was adopted for this evaluation:

- Purple - Remedial action complete, monitoring of effectiveness underway or complete.
- Red - Remedial action needed.
- Red-Gray - Additional characterization and assessment needed to determine if remedial action is necessary.
- Yellow - Remediation generally not warranted but management actions must consider the presence of contaminants, especially bioaccumulative contaminants.
- Green - No known contamination. No remedial actions planned.

Method

The following approach was used to designate remedial categories for each of the Minnesota SAAs:

- Designations from MNRAT based on site specific knowledge were used as a basis for Red and Red-Gray SAAs.
• SAAs were designated as gray if the sampling data was sparse.
• Benthic toxicity variables related to threshold ecological effects were used to identify potential additional Red SAAs and Green SAAs.
• All SAAs that were not designated as Red, Green, Red-gray, or Gray, were designated Yellow.

The remedial color designations, beyond those identified by the MNRAT, were informed both by established benthic toxicity thresholds and the identification of assessment areas that were at the high and low ends of the distribution for the screening parameters.

Additional analysis was performed to identify SAAs that contribute most significantly to fish exposure concerns, both for fish consumption and fish tumors. However, the results of that analysis indicate that a driving factor regarding fish exposure is the area of the SAA. The analysis was not used to inform remedial categorization.

**Minnesota Remedial Assessment Team Evaluation**

Members of the MNRAT have many years of first-hand experience working in the St. Louis River AOC. The team was involved in the design of the 2010 and 2011 AOC data collection efforts and have been evaluating the data since its compilation. Additionally, they are active in the management of Superfund Sites within the AOC. Based on their knowledge of the system, including some datasets not used in this evaluation, the MNRAT developed a list of assessment areas to be pre-designated as Red (requiring remediation) and Red-gray (limited information suggests the need for remediation or further investigation). The list of Red and Red-gray SAAs identified by the MNRAT is presented in Table 1 along with comments explaining the pre-designation.
### Table 1. MNRAT designation of Red and Red-gray Sediment Assessment Areas.

<table>
<thead>
<tr>
<th>Assessment Area ID</th>
<th>Assessment Area</th>
<th>Pre-Designation</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Minnesota Slip</td>
<td>Red</td>
<td>Remedial Investigation (RI) work complete; update Feasibility Study (FS)</td>
</tr>
<tr>
<td>21</td>
<td>Slip 2</td>
<td>Red</td>
<td>Polycyclic aromatic hydrocarbon (PAH) concerns</td>
</tr>
<tr>
<td>23</td>
<td>Slip C</td>
<td>Red</td>
<td>Lead (Pb) and PAH at surface are drivers. Back half of slip affected, front end much less risk</td>
</tr>
<tr>
<td>27</td>
<td>Northland Pier / AGP Slip</td>
<td>Red</td>
<td>PAH concerns. Historical data consistent.</td>
</tr>
<tr>
<td>28</td>
<td>Azcon Corp / Duluth Seaway Port Authority Garfield Slip C</td>
<td>Red</td>
<td>Lead and PAH concerns</td>
</tr>
<tr>
<td>75.1</td>
<td>Munger Landing</td>
<td>Red</td>
<td>High metals, PAHs and dioxin. Human health review needed.</td>
</tr>
<tr>
<td>76</td>
<td>U.S. Steel Superfund Site</td>
<td>Red</td>
<td>RI work complete; FS pending</td>
</tr>
<tr>
<td>83</td>
<td>Mud Lake West</td>
<td>Red</td>
<td>Additional data shows high metals near shore. Surface water impacted.</td>
</tr>
<tr>
<td>22</td>
<td>Slip 3</td>
<td>Red-gray</td>
<td>Occasional PAH hits; some Pb-more sampling</td>
</tr>
<tr>
<td>29</td>
<td>Duluth Seaway Port Authority Garfield Slip D / Clure Public Marine Terminal Berth 1</td>
<td>Red-gray</td>
<td>Highest PCB hit in AOC at surface, some PAH. More sampling needed.</td>
</tr>
<tr>
<td>37</td>
<td>Slip near 21st Ave W</td>
<td>Red-gray</td>
<td>One sample location had high hits of many metals at depth. More sampling.</td>
</tr>
<tr>
<td>59</td>
<td>Ponds behind Erie Pier</td>
<td>Red-gray</td>
<td>Only south pond sampled (2 ponds) North pond drainage from active RCRA site. More samples needed.</td>
</tr>
<tr>
<td>99</td>
<td>Thomson Reservoir</td>
<td>Red-gray</td>
<td>Data limited to mercury, some elevated. Flood influenced.</td>
</tr>
<tr>
<td>102</td>
<td>Scanlon Reservoir</td>
<td>Red-gray</td>
<td>High Hg and dioxin. Subject to flood scour.</td>
</tr>
</tbody>
</table>

Note: The MNRAT also designated Munger Landing as Red. For this evaluation Munger Landing was included as part of the Riverside Marina SAA.

### Degradation of Benthos

Degradation of Benthos is one of the beneficial use impairments identified in the St. Louis River AOC. Two metrics have been calculated as part of the sediment characterization project that serve
to integrate a range of contaminant measurements compared to their benthic toxicity thresholds and form the basis of the proposed ranking method:

**Mean Probable Effects Concentration Quotient (Mean PEC-Q; Crane and Hennes, 2007 and WDNR 2003)** - The Mean PEC-Q is an average of ratios of sediment contaminant levels to their Level II Sediment Quality Targets (SQTs).

**Sediment Quality Index (SeQI; CCME, 2007)** - The SeQI is a metric that incorporates both the frequency and magnitude of exceedances of the toxicity thresholds. A SeQI score was calculated for comparison to both the Level I SQTs and the Level II SQTs.

Sample depth is an important consideration when evaluating benthic toxicity. The MPCA has defined three relevant sample depth intervals: surface samples (highly bioactive), the bioactive zone (BAZ), and below the BAZ. The ranking method uses the same sample data sets selected for each SAA by the Minnesota and Wisconsin teams for display in the dashboards and AOC-wide point maps. Within these datasets, samples were assigned to the surface and BAZ as follows:

- Surface samples: 0-15 cm
- BAZ:
  - 15-100 cm for samples collected in areas with less than 8ft of water depth
  - 15-50 cm for samples collected in areas with greater than 8 ft of water depth

All remaining samples were categorized as below BAZ. The samples were categorized based on the interval where the highest fraction of the sample was found (e.g., a sample that extends from 0-20 cm was categorized as a surface sample).

For this evaluation, surface samples were assigned a weight of **four**, BAZ samples were assigned a weight of **two**, and below BAZ samples were assigned a weight of **one**. While these weights are necessarily somewhat arbitrary, the selected weights are intended to reflect the idea that highly bioactive surface samples are about twice as important as BAZ samples which are in turn about twice as important as below BAZ samples when considering benthic toxicity. The selected weights could be refined with site-specific knowledge of factors such as scour potential and bioturbation, but are appropriate for a screening level analysis such as this one.

The following method was used to create depth-weighted metrics to evaluate the assessment areas:

- Mean PEC-Q values were calculated for surface samples, samples in the BAZ, and samples below the BAZ for each assessment area
- The Level 1-SeQI, Level 2-SeQI, and average of the Level 1 and Level 2-SeQIs were calculated for the same depth intervals
- Depth-interval-weighted Mean PEC-Q, Level 1-SeQI, Level 2 SeQI, and average SeQI were calculated for each area

**Designation of Gray SAAs**

Some of the SAAs had very few samples. Generally these areas were not thought to be priorities during the planning of the sample collection efforts in 2010 and 2011. SAAs that had a low number of total samples and were very sparsely sampled were classified as Gray.
Based on a visual examination of the mercury and PAH contribution to SWAC, a search radius of approximately 200 meters was determined to adequately characterize a site. This radius corresponds with 1 sample per 30 acres. Twelve assessment areas with fewer than 1 sample per 30 acres were identified. Eleven of the Gray SAAs had zero, one, or two samples, so the gray assignment was undoubtedly appropriate. However, Superior Bay had 16 station locations sampled at multiple depth intervals, which is not consistent with the intended meaning of the Gray categorization. It was not included in the Gray category.

**Fish Consumption and Fish Tumors**

Both Minnesota and Wisconsin have issued fish consumption advisories for the St. Louis River based on PCBs and mercury. Fish tumors have also been identified as a beneficial use impairment in the St. Louis River AOC. Although no definitive cause of fish tumors in the AOC has been identified, several studies have linked polycyclic aromatic hydrocarbons (PAHs) to tumor formation in fish and wildlife (Eisler, 1987). Total PAHs (based on the 13 priority PAHs) were used as an indicator for addressing fish tumors.

For both fish consumption and fish tumor formation, the average surface sediment contaminant concentration is an important factor for evaluating fish exposure levels. To assess which SAAs contribute the most to surface-weighted average concentrations (SWACs), LimnoTech generated a series of interpolations using inverse distance weighting and then calculated the incremental contribution to mercury and PAH SWAC for each assessment area. (The sediment PCB data contained too many values below the detection limit to create reasonable interpolations.)

The inverse distance weighting (IDW) tool from ArcGIS was used to interpolate cell values with a linearly weighted combination of a set of sample points. The IDW interpolation was performed using mercury and PAH concentrations in surface samples (0-15 cm). Input parameters used for the IDW interpolation in ArcGIS include:

- Cell size - the cell size at which the output raster will be created
- Power – controls the significance of surrounding points in the interpolated value
- Search Radius - distance within which all sample points will be used for the interpolation
- Number of Points – the number of nearest input samples points to be used in the interpolation
- Barrier Line – the assessment area boundary used to break or limit the interpolation

An IDW routine with variable search radii, power functions, and search neighborhoods was developed. The IDW interpolation was run 60 times for a series of different input parameters. The ranges of input parameters are defined in the Table 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Size</td>
<td>25 meters (constant)</td>
</tr>
<tr>
<td>Power (exponent)</td>
<td>0.5-2.5</td>
</tr>
<tr>
<td>Search Radius</td>
<td>100-1,000 meters</td>
</tr>
<tr>
<td>Number of Points</td>
<td>6-24</td>
</tr>
</tbody>
</table>
The surface-area weighted average concentrations (SWACs) for each assessment area were calculated for each of the 60 iterations of the interpolation. The incremental contribution to the Minnesota AOC-wide SWAC was calculated as follows:

$$\text{Contribution to SWAC of } AA_i = \frac{SWAC_{AA_i} \times \text{Area}_{AA_i}}{\sum_{n=1}^{10^7} SWAC_{AA_n} \times \text{Area}_{AA_n}}$$

The contributions to SWAC were compared across iterations. With the exception of a few sites with relatively few samples, the contributions to SWAC were stable across iterations. The median contribution to SWAC from the 60 iterations was used in further evaluations.

### Data Evaluation and Results

Scatterplots were used to determine whether there were strong relationships between the various screening parameters and to identify whether there were clear breaks in the data that could be used to categorize the assessment areas. Figure 1 shows a series of scatterplots comparing the Mean PEC-Q, Average SeQI, contribution to Hg SWAC, and contribution to PAH SWAC for each of the SAAs. The plots show that the two benthic toxicity parameters (top left plot) and the two exposure parameters (bottom right plot) are correlated. However, the benthic toxicity parameters are not well-correlated with the fish exposure parameters. Also, the scatterplots do not show clear breaks in the data at either the high end or the low end that would be useful for assigning remedial categories.

To better identify logical break points for remedial categories, the distributions of individual benthic toxicity parameters for each assessment area were plotted in rank order of increasing impairment. Figure 2 shows the distribution of each of the benthic toxicity parameters. Clear inflection points are present at the upper end of the distribution for each of the parameters. The Mean PEC-Q has an established Level 2 SQT of 0.6. Assessment areas with a depth-weighted Mean PEC-Q greater than 0.6 were designated as Red; only the Minnesota Slip had a depth weighted Mean PEC-Q greater than 0.6. The SeQI values do not have established SQTs, so the assessment areas with values above the inflection points were given Red designations. The sites requiring remediation based on the evaluation of benthic toxicity were all previously identified as Red or Red-gray by the MNRAT.

A similar approach was used to evaluate the fish exposure parameters. The distributions of SAAs were plotted in rank order of increasing incremental contribution to SWAC of PAHs and mercury. For both PAHs and mercury, an inflection point is present at around 5% contribution. Only the U.S. Steel Superfund Site and Superior Bay are above the 5% threshold for PAHs. However, the U.S. Steel site alone accounts for 60% of the Total PAH SWAC among the Minnesota SAAs. For mercury, several SAAs exceed the 5% threshold including three that were not identified as Red sites through the MNRAT or benthic toxicity evaluations: Superior Bay, 21st Avenue, and Spirit Lake/Devil’s Elbow.

A related approach to setting thresholds for contributions to SWAC is presented in Figure 4. These plots show the cumulative contribution to PAH and mercury SWAC, with the SAAs ranked from highest contribution to lowest. Using an approach that designates all SAAs up to the knee-of-the-curve as red, would result in a Red designation for most of the largest sites in the AOC.

The contribution to the mercury and PAH SWAC for many sites is driven, at least in part, by their large areas. Because surface mercury is relatively even throughout the AOC (with a few higher
concentrations on the Wisconsin side), it may not be appropriate to use SAA boundaries for addressing this impairment. Bioaccumulation potential and prevalence of fish habitat would also be considered before making a remedy plan to address mercury and PAH in fish. For this reason, the evaluation of fish exposure variables was not used to generate remedial categories at this time.

Only select parameters were used to designate Green SAAs. Green sites are intended to represent those that are ready for restoration with no further remedial consideration necessary. The benthic toxicity parameters integrate a number of chemical constituents. The SAAs with the lowest benthic toxicity scores are unlikely to have legacy sediment contamination issues that would require remediation prior to restoration activities. A relatively conservative threshold was established for the designation of Green SAAs: the SAA must have a depth-weighted Mean PEC-Q value below the established Level 1 SQT of 0.1 and the Level 1 SeQI score must be below the inflection point at the lower end of the distribution. The Level 1 SQTs were used because they represent threshold effects, which are appropriate for designating the cleanest of the SAAs. Figure 5 shows the distribution plots for delineating Green areas.

Sediment Assessment Areas that were neither categorized as Gray, Red, or Green were designated as Yellow. Available data for yellow sites must be evaluated prior to initiating restoration activities. Strategic remediation of legacy contaminant issues may be needed. However, many of these SAAs have levels of sediment contamination consistent with levels in other urban rivers.

Table 3 shows the color designation for each of the Minnesota Sediment Assessment Areas in the AOC, along with the rationale for the designation of Red sites. Maps of the color coded SAAs are shown as Figures 6-10.

**Table 3. Color designation for each of the Minnesota Sediment Assessment Areas in the St. Louis River AOC.**

<table>
<thead>
<tr>
<th>Assessment Area ID</th>
<th>Assessment Area</th>
<th>Color Designation</th>
<th>Red Site Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lake Superior - Minnesota</td>
<td>GRAY</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Minnesota Pocket</td>
<td>GRAY</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Superior Bay - Minnesota</td>
<td>YELLOW</td>
<td>Contribution to mercury SWAC</td>
</tr>
<tr>
<td>18</td>
<td>Hearing Island</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>North Park Point Bayside</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Minnesota Slip</td>
<td>RED</td>
<td>MNRAT designation, benthic toxicity</td>
</tr>
<tr>
<td>21</td>
<td>Slip 2</td>
<td>RED</td>
<td>MNRAT designation, benthic toxicity</td>
</tr>
<tr>
<td>22</td>
<td>Slip 3</td>
<td>RED-GRAY</td>
<td>MNRAT designation</td>
</tr>
<tr>
<td>23</td>
<td>Slip C</td>
<td>RED</td>
<td>MNRAT designation, benthic toxicity</td>
</tr>
<tr>
<td>24</td>
<td>General Mills Elevator A Slip</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Cargill Elevator B1 Slip</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Cargill Elevator B2 / Northland Pier Slip</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Northland Pier / AGP Slip</td>
<td>RED</td>
<td>MNRAT designation,</td>
</tr>
<tr>
<td>Assessment Area ID</td>
<td>Assessment Area</td>
<td>Color Designation</td>
<td>Red Site Rationale</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------</td>
<td>-------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>28</td>
<td>Azcon Corp / Duluth Seaway Port Authority Garfield Slip C</td>
<td>RED</td>
<td>MNRAT designation, benthic toxicity</td>
</tr>
<tr>
<td>29</td>
<td>Duluth Seaway Port Authority Garfield Slip D / Clure Public Marine Terminal Berth 1</td>
<td>RED-GRAY</td>
<td>MNRAT designation, benthic toxicity, elevated PCB surface sample</td>
</tr>
<tr>
<td>30</td>
<td>Rices Point Off-Channel East</td>
<td>RED-GRAY</td>
<td>MNRAT designation</td>
</tr>
<tr>
<td>31</td>
<td>Duluth Harbor Basin Off-Channel</td>
<td>GRAY</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Rices Point Off-Channel West</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Slip near 21st Ave W</td>
<td>RED-GRAY</td>
<td>MNRAT designation</td>
</tr>
<tr>
<td>38</td>
<td>21st Avenue</td>
<td>YELLOW</td>
<td>Contribution to mercury SWAC</td>
</tr>
<tr>
<td>39</td>
<td>Interstate Island Off-Channel</td>
<td>GRAY</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Bay NE of Canadian National / DM&amp;IR</td>
<td>GREEN</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Interstate Island Flats</td>
<td>GREEN</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>DM&amp;IR</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Hibbard</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Bay NE Side of Erie Pier</td>
<td>GREEN</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Erie Pier Slip</td>
<td>GREEN</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Ponds behind Erie Pier</td>
<td>RED-GRAY</td>
<td>MNRAT designation, elevated PCB surface sample</td>
</tr>
<tr>
<td>60</td>
<td>Coffee Ground</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Grassy Point</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Belknap Flats</td>
<td>GRAY</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>C. Reiss Coal Dock Slip</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Bay between C. Reiss and SLRIDT 7 / W. Grassy Point Estuary Flats</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>SLRIDT Superfund Site</td>
<td>PURPLE</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Kingsbury Bay</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>71.1</td>
<td>Tallas Island</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>71.2</td>
<td>Kingsbury Bay</td>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>75.1</td>
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Figure 1. Scatterplots to evaluate relationships of benthic toxicity and fish exposure parameters.
Figure 2. Rank order of Mean PEC-Q, Average SeQI, Level 1 SeQI, and Level 2 SeQI scores used to designate additional Red assessment areas. The dashed red line indicates the Mean PEC-Q Level 2 Sediment Quality Target. The red rectangles indicate scores above inflection points for each of the SeQI variables.
Figure 3. Rank order of contribution to PAH and mercury. The red rectangles indicate assessment areas above the 5% inflection point.

Figure 4. Cumulative contribution to PAH and mercury SWAC. Assessment areas labeled as examples only. No thresholds were set based on this method.
Figure 5. Mean PEC-Q and Level 1 SeQI scores used to designate green assessment areas. The dashed green line indicates the Level 1 SQT for Mean PEC-Q. The green rectangle indicates the Level 1 SeQI scores that are below the inflection point at the low end of the distribution. Note: the Mean PEC-Q values are shown on a log scale to more clearly represent the SAAs below 0.1.
Figure 6. Remedial categories in Superior Bay.
Figure 7. Remedial categories in St. Louis Bay.
Figure 8. Remedial categories in the Lower St. Louis River.
Figure 9. Remedial categories in the Middle St. Louis River.
Figure 10. Remedial categories in the Upper St. Louis River.
References


