Name of Organization: Minnesota Pollution Control Agency

Type of Organization: State

Contact Information: Dr. Judy Crane

Environmental Outcomes Division

520 Lafayette Road North

St. Paul MN 55155

Phone: (651) 297 - 4068 **Extension:**

Fax: (651) 297 - 7709

E-Mail: judy.crane@pca.state.mn.us

Project Title: Contaminated Sediment Database for the St. Louis River AOC

Project Category: Contaminated Sediments

Rank by Organization (if applicable): 2

Total Funding Requested ($): 184,725 **Project Duration:** 2 Years

Abstract:

The Minnesota Pollution Control Agency (MPCA), and it collaborators, propose to develop a novel, contaminated sediment database for the St. Louis River Area of Concern (AOC). This GIS-based database will allow users to access data on sediment chemistry, physical parameters, and biological endpoints, as well as quickly view maps identifying the locations of historical businesses along the Duluth waterfront. This easy access to historical information will assist the City of Duluth with waterfront development projects and the MPCA with carrying out the three-phase sediment strategy of the St. Louis River Remedial Action Plan (i.e., assessment, development of hot spot management plans, and remediation). This database will also further the goals of the Lake Superior Lakewide Management Plan (LaMP) by tracking the occurrence of critical pollutants. Other applications of the database include: determining status and trends of sediment indicators, comparing sediment chemistry data to sediment quality objective values, analyzing environmental data as part of the MPCA's Environmental Performance Partnership Agreement (EnPPA) requirements, evaluating the economic and ecological benefits of sediment remediation, developing risk assessments at contaminated sediment sites, mapping contaminated sediment sites (pre- and post-remediation), highlighting data gaps and possible new areas of contamination (based on historical locations of businesses), assisting with the development of a total maximum daily load (TMDL) for mercury in the St. Louis River, and assisting with the development of a multimedia approach for managing contamination along the Duluth waterfront. The framework of this database will also serve as a model that can be used at other Great Lakes AOCs for the incorporation of bioeffects data into GLNPO's sediment database format and for the inclusion of historical data into assessment, management, and remediation decisions.

Geographic Areas Affected by the Project

States:

- [x] Illinois
- [x] Indiana
- [x] Michigan
- [x] Minnesota
- [x] New York
- [x] Pennsylvania
- [x] Wisconsin
- [x] Ohio

Lakes:

- [x] Superior
- [x] Huron
- [x] Michigan
- [x] Erie
- [x] Ontario
- [x] All Lakes

Geographic Initiatives:

- [ ] Greater Chicago
- [ ] NE Ohio
- [ ] NW Indiana
- [ ] SE Michigan
- [ ] Lake St. Clair

Primary Affected Area of Concern: All AOCs

Other Affected Areas of Concern:

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area:

Other Affected Biodiversity Investment Areas:

Problem Statement:

Contaminated sediments contribute to many use impairments in the St. Louis River AOC, including fish advisories, habitat impairments, and restrictions on dredging. Since 1992, the U.S. Environmental Protection Agency (EPA) and EPA's Great Lakes National Program Office (GLNPO) have funded a number of sediment investigations by the MPCA, Fond du Lac Band, and Wisconsin Department of Natural Resources (DNR) to assess and manage contaminated sediments in the St. Louis River AOC. However, these data are not available in a central database format that is easily accessible to stakeholders and regulators.

The MPCA has previously provided feedback to GLNPO on the development of field sampling, sediment chemistry, and quality assurance/quality control (QA/QC) fields for its contaminated sediment database. However, GLNPO has not had an opportunity to develop the sediment database fields for biological effects, including sediment toxicity test endpoints (acute and chronic), bioaccumulation studies, and benthological community surveys. The MPCA has a large amount of bioeffects data, some of which has already been included in a matching sediment chemistry and toxicity database for GL985604-01 (Development of Sediment Quality Objectives for the St. Louis River AOC). Our consultant for GL985604-01, Mr. Donald MacDonald, has extensive experience with the development and use of bioeffects databases. Through the nonprofit Sustainable Fisheries Foundation, Mr. MacDonald can assist the MPCA and GLNPO with developing the bioeffects and associated QA/QC fields for the GLNPO sediment database. In turn, this effort will give other GLNPO grantees the template by which they can put their data into a standard GLNPO database format.

Successful cleanup of the St. Louis River AOC requires an understanding of the region's human use. Historic research can help to identify potential problem areas and the parties that may have contributed to environmental contamination. The St. Louis River Citizen's Action Committee (CAC) recently completed an EPA grant to develop an historical land use database for the St. Louis River AOC. A small portion of the project was dedicated to georeferencing historical (1884) Sanborn fire insurance maps of the Duluth waterfront. This encompassed an area from the Western Lake Superior Sanitary District (WLSSD) to Canal Park. This area has an active history of industrial and commercial development. The CAC's consultant, Mr. Tony Kroska, can assist us through the nonprofit group, Community GIS, Inc.

The creation of a central database for the St. Louis River AOC will allow the tracking of critical pollutants included in the Lake Superior LaMP and facilitate efforts to reduce use impairments listed in the St. Louis River Remedial Action Plan. In addition, data management has been elevated as a high priority issue at the MPCA. A GIS-based contaminated sediment database will allow MPCA staff to quantify the actual environmental results of their work. Finally, this database

will serve as a model for other Great Lakes AOCs to utilize for managing contaminated sediment data and incorporating important historical information.

Proposed Work Outcome:

The MPCA, and its collaborators, propose to develop a user-friendly contaminated sediment database. The database will be assembled with Microsoft Access and ArcView software, and it will include the following components:

* Contaminated Sediment Database Component--will be composed of contaminated sediment data from recent GLNPO/EPA grants, including:
  * sediment chemistry data [e.g., mercury, PAHs, PCBs, dioxins/furans, pesticides (e.g., DDT metabolites, toxaphene), metals, total organic carbon],
  * physical parameter data (e.g., particle size)
  * sediment toxicity test results for acute and chronic toxicity tests,
  * bioaccumulation data,
  * benthological community data (i.e., for bottom feeding organisms),
  * sediment quality objective values for threshold effect concentrations and probable effect concentrations,
  * GIS locational data for each sampling site, and
  * QA/QC data for each chemical, physical, and biological parameter.

* Historical Mapping Component of Industries and Businesses along the Duluth Waterfront. This component will include the following tasks:
  * develop base maps that contain key components (e.g., landmarks),
  * obtain SURE topographic maps for the St. Louis River AOC,
  * georeference all of the available Sanborn fire insurance maps for the Duluth waterfront (1880s through the 1960s). Ms. Karen Plass, Executive Director of the CAC, will provide Mr. Kroska with complete access to the Sanborn maps purchased by the CAC,
  * digitize the buildings, structures, and lots where industrial land uses occurred using the georeferenced Sanborn maps, and
  * link each digitized building, structure, and lot with the historical land use database developed for the CAC.
  * All of the digitized Sanborn maps will be overlain on an aerial orthoquad for the St. Louis River AOC. This will allow for some exciting visual applications. For example, a user will be able to click on an area of the Duluth waterfront and discover what businesses have occupied that site over different time periods. This historical information is critical for identifying potentially responsible parties. In addition, this information will assist MPCA staff in planning sediment assessment projects (e.g., target areas near historical polluters). City of Duluth planners will also utilize the database when planning future waterfront developments. This may reduce some of the delays they have encountered when contaminated material has been dug up at new building sites.

* Additional database "overlays" will include information on: habitat classifications and location of dredged areas, disposal sites, historical outfalls (from EPA database), and federally designated contaminated sites (i.e., CERLCA, RCRA, Superfund sites--from EPA database).

* As another component of the project, a user's manual and documentation of the database will be prepared. The manual will discuss how users can access ArcView Spatial Analyst to do more sophisticated plotting of the sediment contamination data.

* Training on how to use and query the database will be provided to interested stakeholders in the Duluth area and at the MPCA office in St. Paul, MN.

* CD-based ArcView projects of the database will be developed. These projects will utilize the Sanborn historical data, contaminated sediment data, digital topographic maps, and digital ortho imagery along the St. Louis River. This will include the development of database user interfaces (for "canned queries") and geographical user interfaces (for greater search flexibility).

This database will provide GLNPO with expanded database fields so that a comprehensive regional database of grantees' contaminated sediment data can be assembled. The database will be designed so that elements can be downloaded into the EPA's National Sediment Inventory. This will allow for the broad dissemination of results. This database will also provide a novel way of displaying historical information; we are not aware of any other databases that do this. We expect

this database to generate high interest not only in the Great Lakes region, but also nationally.

As mentioned in the abstract, this GIS-based contaminated sediment database will have many useful applications. Once the database is completed, it will be announced on the forthcoming contaminated sediment web page of the MPCA's web site. A CD version of the database will be available to stakeholders and regulators. The MPCA will take over the management and updating of the database upon completion of this proposed project. The MPCA does not currently have the kind of staff or resources available to initialize a large database such as this one, especially with the backlog of existing contaminated sediment data. Therefore, outside funding and collaborative assistance is essential for the initial phase of this project.

The MPCA, and it collaborators, are very interested in having a web-based application of the database developed as part of a future project. This would allow for additional links to:
1) the MPCA's Site Response database for the location of Voluntary Investigation and Cleanup Sites (VICS) and Leaking Underground Storage Tank sites (LUST); 2) the MPCA's air quality database; 3) the STORET database for water quality data; and 4) the Minnesota Department of Health's fish tissue database.

We would be interested in partnering with GLNPO or EPA Region 5 to develop a web site application. The database would need to be converted from Access to either PowerBuilder or Oracle so that it would be compatible with the MPCA's Unix web site. This would also allow greater security against computer hackers. Some interesting programming options could be developed to make the web site database very user friendly.

Project Milestones:	Dates:
Project Start	10/2000
Develop Database Format for Bioeffects	04/2001
Complete Map Georeferencing/Digitizing	06/2001
Complete GIS part--Historical Inventory	08/2001
Complete Contaminated Sediment Database	04/2002
Create CD-based ArcView Projects	06/2002
Create User's Manual/Documentation	08/2002
Database Training and Project End	09/2002

☐ Project Addresses Environmental Justice

If So, Description of How:

☒ Project Addresses Education/Outreach

If So, Description of How:

The results of this project will be used to educate the St. Louis River CAC and its Sediment Contamination Work Group, as well as the Harbor Technical Advisory Committee of the Metropolitan Interstate Committee. In addition, training workshops will be offered to stakeholders and MPCA staff to teach them how to use the database. CD-based ArcView projects of the database will be developed. This will include the development of database user interfaces of commonly asked questions (e.g., print out a map of all the surficial sediment sites that have mercury data exceeding the sediment quality objective values). This ease of use will allow local high schools and universities to incorporate the database into their environmental science and history courses. In addition, outreach will be done to let Minnesota's citizens know how environmental results are being achieved in the St. Louis River AOC. Conference presentations and peer-reviewed publications will also be used to disseminate the results of this project.

Project Budget:

	Federal Share Requested ($)	Applicant's Share ($)
Personnel:	20,000	6,289
Fringe:	4,200	1,320
Travel:	2,500	0
Equipment:	0	0
Supplies:	800	0
Contracts:	147,000	0
Construction:	0	0
Other:	3,500	0
Total Direct Costs:	178,000	7,609
Indirect Costs:	6,725	2,114
Total:	184,725	9,723
Projected Income:	0	0

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

Five percent of the entire project costs will be provided in cash, or by in-kind contributions and other non-cash support, from the MPCA.

In the above budget, approximately $45,000 of contractual work will be performed by Community GIS, Inc. for the historical mapping component of the project. Additional funds will be sought from other sources (e.g., EPA Coastal Environmental Management funds) to expand the historical mapping component to Superior, WI and upstream to Cloquet, MN (this would cost an additional $35,000), to create a CD-based extension for ArcView GIS software (approximately $36,000), and to create an internet-based application for the MPCA's web site (approximately $36,000). Alternatively, the MPCA is also interested in obtaining programming technical assistance from either GLNPO or EPA Region 5 to convert the database from Access to either PowerBuilder or Oracle; this will allow for the creation of an internet version of the database

Description of Collaboration/Community Based Support:

The main collaborators of this project will be Mr. Donald MacDonald of the Sustainable Fisheries Foundation (Nanaimo, British Columbia), Mr. Tony Kroska of Community GIS, Inc. (Duluth, MN), and Ms. Karen Plass of the St. Louis River CAC (Duluth, MN). The Wisconsin DNR (Kim Walz) and Fond du Lac Band support the idea of the database, but they do not have any resources that can be used to help develop the database.

Community-based support will be obtained from the City of Duluth, the Harbor Technical Advisory Committee, and grass-roots community groups dealing with contaminated sediment issues such as the CAC Sediment Contamination Work Group, Interlake/Duluth Tar Superfund site community work group, and USX Superfund site community work group. Community-based support may also be obtained through the technical transfer of information about the database at local environmental fairs. Great Lakes-wide support will be developed at meetings of RAP managers and at GLNPO's Great Lakes Planning meeting.