# PHASE IV GIS-BASED SEDIMENT QUALITY DATABASE FOR THE

## ST. LOUIS RIVER AREA OF CONCERN—WISCONSIN FOCUS

#### Quick Guide to the Phase IV ArcMap 9.1 Map Documents

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# FORWARD

The Phase IV geographic information system (GIS)-based sediment quality database for the St. Louis River Area of Concern (AOC)—Wisconsin focus represents a collaborative project between the St. Louis River Citizens Action Committee (CAC), Wisconsin Department of Natural Resources (WDNR), Minnesota Pollution Control Agency (MPCA), and Exa Data & Mapping Services, Inc. in conjunction with their subconsultants from Premier Environmental Services, Inc. and Searay Environmental. This project was funded by the Wisconsin Coastal Management Program (WCMP) and the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act, Grant # NA05NOS4191067, through a grant agreement with the St. Louis River CAC. In addition, the MPCA contributed 60% of state matching funds to this project. This project will be completed by June 30, 2006.

This report was prepared by Dr. Judy Crane (MPCA) as part of the state match to the St. Louis River CAC's grant under award number WCMP 86003-006.07 from NOAA, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author and do not necessarily reflect the views of NOAA, the Department of Commerce, or the MPCA.





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The Phase IV ArcMap 9.1 map documents include new GIS watershed data, as well as updated and original data that were assembled from two earlier phases of the GIS-based sediment quality database project conducted by Dr. Crane (MPCA) and her consultants. These earlier projects were funded as follows:

• Phase I (completed September 30, 2003): Grant number GL97536301-1 (\$81,000) from the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office (GLNPO) plus a 5% state match from the MPCA. MacDonald Environmental Sciences Ltd. (MESL) provided contractual assistance on this project. These GIS projects were produced in ArcView 3.2 by MESL staff.

• Phase II (completed December 22, 2004, as one component of a MPCA-Duluth grant to develop a comprehensive sediment management plan for the lower St. Louis River AOC): Grant number GL97540401-2 (\$40,000 of funds for the Phase II project) from GLNPO plus a 5% state match from the MPCA. MESL provided contractual assistance on this project. The GIS products were produced in ArcView 3.2 and ArcMap 8.3 by MESL staff. The GIS products were not updated during the Phase III database project.

Work products from Phases I through IV are either available on the MPCA's Contaminated Sediment Web page at: http://www.pca.state.mn.us/water/sediments/studies-stlouis.html#assessment or by contacting Dr. Crane at:

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# LIST OF ABBREVIATIONS AND ACRONYMS

AOC	Area of Concern
BC	British Columbia
CAC	Citizens Action Committee
C-CAP	Coastal Change Analysis Program
CD	Compact Disk
DNR	Department of Natural Resources
DSN	Data Source Name
DVD	Digital Versatile Disc
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FTP	File Transfer Protocol
GIS	Geographic Information System
GLNPO	Great Lakes National Program Office
MESL	MacDonald Environmental Sciences Ltd.
MN	Minnesota
MPCA	Minnesota Pollution Control Agency
MS <sup>TM</sup>	Microsoft <sup>TM</sup>
NAD	North American Datum
NOAA	National Oceanic and Atmospheric Administration
ODBC	Open Database Connectivity
OLE DB	Objecting Linking and Embedding for Databases
P.O.	Post Office
SEH	Short Elliott Hendrickson
SLRIDT	St. Louis River Interlake/Duluth Tar
U.S.	United States
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WA	Washington
WCMP	Wisconsin Coastal Management Program
WDNR	Wisconsin Department of Natural Resources
WI	Wisconsin

# ACKNOWLEDGMENTS

A number of individuals assisted with the preparation of the Phase I and Phase II GIS products that accompanied the analogous phases of the GIS-based sediment quality database for the St. Louis River AOC. These individuals were previously acknowledged in the Phase II Help Section for ArcView Users (Smorong *et al.* 2004).

The following people provided assistance with providing GIS watershed data for the Phase IV project: Andy McDonald (Arrowhead Regional Development Commission), Tony Kroska (Community GIS Services, Inc.), Rich Hager and Mark Broses (SEH Inc.), Sarah Hoffmann and Hal Watson (Minnesota Department of Natural Resources), and Brian Fredrickson (MPCA). George Host (Natural Resources Research Institute) provided helpful information about the CoastalGIS Web site.

Lynda Nelson (MPCA) provided exceptional assistance with adding most of the new shapefiles to the ArcMap 9.1 map documents. Judy Crane (MPCA) adapted the visual presentation of the shapefiles in a consistent format and performed checks of the map documents. Beth Brown (MPCA) provided technical assistance on a few GIS issues. Other MPCA staff provided information for the updates including Mike Bares, Brian Fredrickson, Tad Schindler, Andrew Streitz, and Chun Yi Wu. Todd Biewen (MPCA) provided useful supervisory assistance and was instrumental in securing state match funding for Dr. Crane's position.

The draft ArcMap 9.1 map documents were reviewed by the Wisconsin Coastal Management Program (WCMP). Kate Angel was the WCMP Program Liaison to the St. Louis River CAC for this grant. Lynelle Hanson (St. Louis River CAC) managed this grant. Jim Killian and Nancy Larson were the WDNR project collaborators.

Jennifer Holstad (MPCA) provided word processing and report production support.

## **CHAPTER 1**

## **INTRODUCTION**

Contaminated sediment issues in the St. Louis River Area of Concern (AOC) involve a complex interplay between watershed sources of contaminants, fate and transport mechanisms that affect the distribution, degradation, and enrichment of contaminants in the water column, sediments, and biota, and potential impacts to ecological and human health. Phase IV of a geographic information system (GIS)-based sediment quality database for the St. Louis River AOC has been developed to further expand the compilation of sediment quality data into Microsoft<sup>TM</sup> (MS<sup>TM</sup>) Access '97/2000 databases, as well as in Query Manager-compatible database files (Crane and Myre 2006). The following sediment quality parameters were included in the databases: sediment chemistry, sediment toxicity, benthic invertebrate community structure, tissue residue chemistry data from fish tissues, invertebrates, and plants, and physical data (e.g., particle size). This phase of the database focused on entering sediment quality data from the Wisconsin side of the AOC into the database. Since most of the sediment quality data have geopositional coordinates (i.e., latitude and longitude) for where the sediment samples were collected, the data can be displayed on maps along with GIS watershed data. This mapping process allows users to visualize the data results and to view watershed data that may help users interpret the results (e.g., location of current and historical industries, wastewater treatment plants, landfills, marinas, and navigational channels, as well as information on watershed soils, aquatic and nearshore habitats, and hydrological features).

A series of ArcView 3.2 projects were developed as part of the Phase I sediment quality database, which were subsequently updated with additional GIS data as part of the Phase II sediment quality database project. In addition, the Phase II ArcView 3.2 projects were also prepared as ArcMap 8.3 map documents. This GIS work was not updated during the Phase III database project. As part of the scope of work for the Phase IV database project, the Minnesota Pollution Control Agency (MPCA) completed an internal update of the Phase II ArcMap 8.3 map documents to ArcMap 9.1 map documents. All of the data sources represented in these map documents are in the Universal Transverse Mercator (UTM) Zone 15 North American Datum (NAD) 83 map projection.

Since a non-state funded MPCA staff person (Lynda Nelson) was involved in part of the updates, the GIS work was not restricted to the Wisconsin side of the St. Louis River AOC. Thus, both new and updated GIS data from the Minnesota and Wisconsin sides of the AOC were included in the Phase IV map documents. Subsequent sections of this Quick Guide describe how the map documents may be used. The associated technical documentation to be prepared for this project will contain tables of GIS data included in the Phase IV map documents. Users should also refer to the Phase II Help Section for ArcView Users (Smorong *et al.* 2004) for instructions on how to display GIS data and for information on known errors in GIS data sources for GIS data carried over from the Phase II project. Pertinent sections of this document (Smorong *et al.* 2004) have been included in the Appendices of this report

# **CHAPTER 2**

## PHASE IV ARCMAP 9.1 MAP DOCUMENTS

#### 2.1 BACKGROUND

The MPCA has assembled a variety of GIS watershed data into several themes of interest to state agency staff, the St. Louis River Citizens Action Committee (CAC), and stakeholders. *Users that have just a basic knowledge about ArcMap 8/9 will be able to obtain useful information from these map documents.* In addition, users will be able to link the results of sediment quality queries from the Phase IV sediment quality databases with these map documents (e.g., plot the distribution of mercury in surficial sediments on GIS maps containing locations of historical businesses along the Duluth and/or Superior waterfronts). The Phase IV ArcMap 9.1 map documents include the following themes:

- Contaminated Areas,
- Ecological Information,
- Geographical Areas,
- Hydrology Information,
- Land Use,
- Recreation,
- Historical Sanborn Insurance Maps for Duluth,
- Historical Sanborn Insurance Maps for Superior,
- U.S. EPA Inland Sensitivity Atlas,
- Water Quality,
- Water Use, and
- Black and White Basemap.

Users that would like training in ArcGIS 9 (including ArcMap 9.1) should consider taking either an instructor-led or web-based training class from ESRI (http://campus.esri.com/). The web-based training is helpful for users that like to learn at their own pace. The web-based training for paid courses also enables users to go back to the course after they have completed it to refresh their memory about certain training topics. Listed below are some relevant training courses and free seminars that were available from ESRI as of March 2006.

• *Learning ArcGIS 9*: first module is free, entire course is \$175. For more information, see:

http://campus.esri.com/acb2000/showdetl.cfm?&DID=6&Product\_ID=801&CATID=84 &CFID=1879245&CFTOKEN=60763180. Dr. Crane took this course and found it to be exceptionally well done and useful. The entire course takes between 16 to 40 hours, depending on the users expertise (i.e., complete beginner to some experience) and if the user does all of the exercises and exams. This course emphasizes practical GIS skills that will allow users to be able to:

- o Understand basic GIS concepts,
- o Describe the range of ArcGIS Desktop software capabilities and tools,
- Symbolize data for different types of maps,
- Add labels to a map,
- Create and edit geographic data,
- o Perform analyses using queries, geoprocessing tools, and models,
- o Create reports, and
- Design presentation quality graphics.
- What's New in ArcGIS 9: free 1 hour seminar offered at: http://campus.esri.com/acb2000/showdetl.cfm?&DID=6&Product\_ID=795&CATID=84 &CFID=1672845&CFTOKEN=77336145
- What's New in ArcGIS 9 Labeling and Annotation: free 1 hour seminar offered at: http://campus.esri.com/acb2000/showdetl.cfm?&DID=6&Product\_ID=805&CATID=84 &CFID=1672845&CFTOKEN=77336145
- Working with Map Projections and Coordinate Systems in ArcGIS: free 1 hour seminar offered at: http://campus.esri.com/acb2000/showdetl.cfm?&DID=6&Product\_ID=826&CATID=84 &CFID=1672845&CFTOKEN=77336145
- Understanding Spatial Statistics in ArcGIS 9: free 1 hr seminar: http://campus.esri.com/acb2000/showdetl.cfm?&DID=6&Product\_ID=852&CATID=84 &CFID=1672845&CFTOKEN=77336145

#### 2.2 GETTING STARTED

#### 2.2.1 Location of GIS Data

#### 2.2.1.1 For MPCA Staff

MPCA staff can obtain the Phase IV GIS files by accessing the X:drive network at: X:\Agency\_Files\EAO\Ph\_IV\_DB\_GIS\Final Phase IV GIS Files\. Copy the folder called "STLR\_GIS Project" to the C:drive of your computer. Otherwise, the map features will not display properly if they are copied to another drive.

#### 2.2.1.2 For Other Users

Other users can obtain the Phase IV GIS files from the project DVD. DVDs will be mailed to those users who had previously received the project CDs for the Phase II GIS-based sediment quality database project (including GIS files). Other users can request a copy of the DVD from Dr. Crane at the contact information given in Chapter 4. Copy the folder called "STLR\_GIS Project" to the C:drive of your computer. Otherwise, the map features will not display properly if they are copied to another drive.

### 2.2.2 Description of GIS Files

The "STLR\_GIS Project" folder contains the following Word file and subfolders:

- GIS\_Read\_Me.doc
- ArcMap9.1\_MapDocuments
- Shapefiles
- Extensions
- 3-2-06\_Revised\_River\_Polygon\_SLRIDT\_Boundary

The "GIS\_Read\_me.doc" contains funding information about this project, as well as instructions to download the files to the C:drive of the user's computer. It also indicates when and where guidance documentation will be available for these GIS products.

The "ArcMap 9.1\_MapDocuments" folder includes the 12 map documents listed in Section 2.1. The Shapefiles folder contains all of the shapefiles, image files, and metadata (when available) that are linked to the map documents.

The "Extensions" folder includes an ArcView 3.2 extension that allows for the interpretation of land cover and change analysis data contained in the Land Use map document (i.e., the C-CAP Legend Handler). Unfortunately, the National Oceanic and Atmospheric Administration (NOAA) has not designed this extension to be compatible with ArcMap 8/9. The extension is only included for those users who may want to work with the ArcView 3.2 projects that were distributed for the Phase II database project. Additional information about this extension is included in Sections 2.2 and 4.1 of the Phase II Help Section for ArcView Users (Smorong *et al.* 2004) that is reproduced in Appendix A.

The "3-2-06\_Revised\_River\_Polygon\_SLRIDT\_Boundary" folder is included for those users who would like to use a different line and polygon basemap for the St. Louis River Interlake/Duluth Tar Superfund (SLRIDT) site. The line and polygon basemap included in each map document is not a perfect representation of geographic features in the St. Louis River AOC. For example, some sediment quality samples appeared to plot on land at the SLRIDT site since the water boundary of this site is off a bit. The water boundary was edited to match the boundary of the color orthophoto for this site. However, this change resulted in some other unanticipated changes to the outer harbor area. Thus, this shapefile should only be used when plotting sediment quality data in a zoomed in area of the SLRIDT Superfund site.

Users should maintain a master copy of these files in case they accidentally make changes to their working files that they did not intend to make.

#### 2.2.3 Opening a Map Document

Open ArcMap 9.1 by double clicking on the desktop icon. In the ArcMap window, select "An existing map" as shown in the following figure.



Double-click on "Browse for maps..." and navigate to "C:\STLR\_GIS Project\ArcMap9.1\_MapDocuments." Next, select a map document file (e.g., Water\_Quality.mxd) to open by double-clicking on it.

Open					? ×
Look jn:	C ArcMap9.1_	MapDocuments	•	+ 🗈 💣 🎟	
My Recent Documents Desktop My Documents My Computer	BlackWhite.m Contaminated Ecological.mx Geographical/ Hydrology.mx Land_Use.mx Recreation.m Sanborn_Dulu Sanborn_Dulu Sanborn_Dulu USEPA_Inland Water_Qualit Water_Use.m	xd dAreas.mxd d Areas.mxd kd kd xd uth.mxd erior.mxd d_Sens_Atlas.mxd y.mxd y.mxd			
My Network	File <u>n</u> ame:	Water_Quality.mxd		•	<u>O</u> pen
Places	Files of <u>type</u> :	ArcMap Document (*.mxd)		•	Cancel

The map document opens to the Water Quality data frame listed in the Table of Contents to the left of the map. Users can scroll down the Table of Contents using the scroll bar on the right-hand side of it. In addition, users can widen or narrow the viewing screen by positioning their cursor to the right of the scroll bar until the double-arrow appears (click and drag the vertical line in the direction desired).



Next, scroll down to the bottom of the Table of Contents and notice the three other main subheadings (i.e., Quad Maps, Orthophotos – black and white, and Orthophotos – color). Each map document has four main subheadings that are referred to as data frames. To activate a different data frame, right click on the data frame and select "Activate." For example, select "Orthophotos – color," which is a digital orthographic aerial photograph (image data) in color. The color orthophotos were added as an additional basemap for the Phase IV project. Refer to Section 3.1.4 of the Phase II Help Section for ArcView Users (Smorong *et al.* 2004) that is reproduced in Appendix B for additional information about the orthophoto and quad maps, as well as for instructions on how to incorporate them into the main data frame of the ArcMap 9.1 map document (using the same instructions as for the ArcMap 8.3 map documents).



Now, the color orthophoto basemap will be displayed as follows.



## 2.3 DISPLAYING GIS DATA

Appendix C provides instructions for displaying GIS data as obtained from Sections 4.3 - 4.11 of the Phase II Help Section for ArcView Users (Smorong *et al.* 2004). Some examples of how to view GIS watershed data from the ArcMap 9.1 map documents are given in this section. As an example, suppose you want to know where all the known contaminated sediment areas (e.g., hot spot sites) are located in the St. Louis River AOC, including designated Superfund sites. You also want to know where contaminated sediment sites have been remediated (currently, Hog Island Inlet/Newton Creek is the only site that has been cleaned-up). In addition, you want to know where industrial facilities, toxic release inventory sites, oil storage facilities, and pipelines are located in the vicinity of these hot spot sites. Finally, you want to see where the main roads (including road labels) are located in relation to the other GIS watershed data. This information is located in the ContaminatedAreas.mxd map document, and these data can be viewed by clicking on each box by the pertinent description in the Table of Contents as shown below.



The above view shows the lower St. Louis River estuary, including the Duluth-Superior Harbor. To view the rest of the AOC boundaries, use the 'pan' tool ( $(\)$ ) to drag the screen to the right so that the town of Cloquet, MN can be viewed. Note that the middle section of the river in this view is lacking industrial development.



Next, go back to the previous extent (i.e., click on the toolbar arrow pointing left, () to return to the view of the lower estuary and harbor. ArcMap allows users to change the scale (1:218,690) on maps to see more or less detail as desired. In order to view a smaller area in more detail, the scale of the map needs to be increased (i.e., a large-scale map). To view a larger area in less detail, the scale of the map needs to be decreased (i.e., a small-scale map). Instead of manually changing the number in the scale ratio, users can select toolbar icons to achieve this change. To view more detail on the map, users can either select the 'zoom in' icon () or the 'fixed zoom in' icon (). To view less detail on the map, users can either select the 'zoom out' icon () or the 'fixed zoom out' icon ().

Hint: if the screen freezes up while zooming in or zooming out of a view, try clicking on the 'go back to previous extent' icon () or the 'full extent' icon () to unfreeze the screen. If either one of these methods does not work, exit the ArcMap 9.1 map document, and start it up again. Click on the 'zoom in' icon (2). The mouse pointer now appears as 2, and it can be moved to whatever area the user wants to zoom into. Move it to the outer harbor, and click twice to zoom to the below area. Note that labels appear for several contaminated sediment areas and water features. However, some labels will not appear until the user pans to the right to allow sufficient room for the labels to be viewed. Note that these labels were not designed to be used in final figure layouts that may be used in reports; users should re-do the labels for formalized figures. In addition, some labels (like Dakota Pier and Duluth Harbor Basin) are located off-center from the sites they are labeling due to the busyness of fitting the labels on the map.



From the above map, it is not apparent that the slip by Dakota Pier, Minnesota Slip, and Slip C are all contaminated sediment sites. In addition, most users would probably miss the remediated area for Hog Island Inlet and Newton Creek. Zoom in three more times over the Slip C label. The maps on the following page provide sufficient detail to clearly show these contaminated sediment areas, as well as Hog Island Inlet and Newton Creek (after panning down to it). Note that another set of labels appears on the map as the user zooms in further.





Users can use the 'identify' tool (1) to identify GIS features on their maps. As an example from the previous page, click on the 1 icon, move the icon over Dakota Pier (i.e., 4 slips below Slip C), and click the icon. The following information box will be superimposed on the map.

Identify F	esults			×
Layers:	<top-most layer=""></top-most>		V	
🖃 - Upd	lated Contaminated Se	Location: (56846	2.632799 5179289.547655)	
÷	Dakota Pier	Field	Value	
		FID Shape NAME COUNT SUM_AREA SUM_PERIME	3 Polygon Dakota Pier 4 28583.778 1730.2607	
•	<u> </u>			

To view the attribute table for all of the updated contaminated sediment sites, right click on "Updated Contaminated Sediment Hotspots" in the Table of Contents and select "Open Attribute Table."



The Attribute Table appears below. Additional column headings of "Count," "Sum\_Area," and "Sum\_Perime" (i.e., perimeter) appear in the right-hand side of the table.

<b>=</b>	Attributes of Updated Contaminated Sediment Hotspots				
Г	FID	Shape*	NAME		
┍	0	Polygon	Bay South of DM&IR Taconite Storage Facility		
	1	Polygon	Bays around the M.L. Hibbard/DSD No. 2 Plant		
	2	Polygon	City of Superior Wastewater Treatment Plant		
	3	Polygon	Dakota Pier		
	4	Polygon	Howard's Bay		
	5	Polygon	Minnesota Slip		
	6	Polygon	Slip C		
	7	Polygon	WLSSD and the outflow from Miller Creek and Coffee Creek		
	8	Polygon	Interlake/Duluth Tar Superfund		
	9	Polygon	USS Superfund		
h					
		4 1 1			
L H	Hecord: I Selected Hecords (Jout of TU Selected.) Options V				

As another example, click the identify tool on top of the Toxic Release Inventory site (i.e., green dot) below the label for Slip C. This site is correctly classified as the Georgia Pacific Corporation. The information included in the below table pertains to all of the categories of data included in the Attribute Table for Toxic Release Inventory sites.

Identify Results				
Layers: <top-most layer=""></top-most>	•			
Layers: <top-most layer=""> ⊡ • Toxic Release Inventory Sites </top-most>	Location: (56787 Field FID Shape PGM_ACRNM LDIP_CODE ID FAC_NAME FAC_UIN LOC_REF_ID LATITUDE LONGITUDE SRC_ACRNM SRC_ID SYM_CODE STCOEIPS	2.205966 5180401.747038) Value 1915 Point TRIS 17 55816SPRWD14THA GEORGIA PACIFIC CORPORATION 110000426405 2768061 46.773667 -92.110511		
	STCOFIPS CATUNIT ZIP_CODE MAD_ID BVFLAG REGISTRY_I	27137 04010201 55802 36958 Y 110000426405		
	PRIMARY_NA	GEORGIA PACIFIC CORPORATION		

For the aforementioned zoomed-in map of the slip by Dakota Pier, Minnesota Slip, and Slip C, note the Industrial Facilities symbol (red square) located in the water of Superior Bay. Click the identify tool on this symbol. Eight facilities come up for this site, which are all clearly located at the wrong site (e.g., Marine Iron and Shipbuilding).

Identify Results			×
Layers: <top-most layer=""></top-most>		•	
- Industrial Facilities	Location: (5699	986.757879 5177765.422575)	
MN0002950 MN0002950 MN0040444 MN0042234 MN0045373 MN0045934 MN0045942 MN0046086	Field FID Shape AREA PERIMETER TMP_B_ TMP_B_ID IFD_ID IFD_ID NPD NAM ADR CTY STA	Value 91 Point 0 0 6987 6987 6987 25576 MN0002950 MARINE IRON AND SHIPBUILDING 325 LAKE AVE SOUTH DULUTH MN	
	ZIP LAT LONG STCOFIPS NDC FRW FCU FSG	55801 464500 0920500 27137 1 SUPERIOR BAY VIA MINN SLIP 4010102 1	T

Users should note that it was beyond the scope of this project to correct errors in the GIS attribute data that were obtained from a number of different sources. Refer to Appendix D for a description of known errors in GIS data sources. Please contact Dr. Crane with any other errors found in the GIS data.

The geographic data layers are arranged in the Table of Contents so that the layer at the top of the Table of Contents will plot on top of the layers below it. Users can move layers in the Table of Contents by clicking on them with the mouse cursor, moving the cursor to the new location, and releasing the cursor to drop the layer into its new location. Users can edit the layer legends as described in Appendix C. Users can also query the data layers to display data of interest; refer to guidance documentation from ArcMap regarding how to query GIS data.

Some of the data layers of polygon data have been made semi-transparent so that other GIS data can be viewed below them. An example is shown below for the Geographical Areas map document, where the polygons for landforms are set at 30% transparency. Note you can still view the placement of roads and the boundaries of the lower St. Louis River underneath the landform data.



To change the transparency setting, right-click on the data layer (Landforms in the above example), and select 'Properties.' Nine tabs of information are given at the top of the 'Layer Properties' box as shown on the following page. Select 'Display' and change the transparency to 60%. Click ok and view the new map layout as shown on the following page. Note that the roads and water boundaries of the St. Louis River are more visible when the transparency is set to 60%. If you do not save your edits, then the display transparency will revert back to 30%. If you like the more transparent landforms, then save the file.

Layer Properties	? ×
General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates	
Show MapTips (uses primary display field)	
☑ Scale symbols when a reference scale is set	
Iransparent: 60 %	
Hyperlinks	
Support <u>Hyperlinks</u> using field:	
<none></none>	
Document O URL O Macro: Create	
Feature Exclusion	
The following <u>f</u> eatures are excluded from drawing:	
Feature ID GEOMORPH Eestore Drawing	
Restore All	
OK Cancel Apply	

Upon changing the transparency to 60%, the landform polygons are more transparent (as shown below).



As mentioned in Section 2.2.2, the line and polygon basemap is a bit off in accuracy compared to the color orthophoto basemap. Since a large number of samples have been collected at the SLRIDT Superfund site, a revised GIS file was created for use in close-up views of this site. In order to use this revised GIS file, perform the following steps:

1. Press the 'Source' button to reveal the pathways that GIS data in the shapefiles folder are connected to the map document (in this case, Ecological.mxd). Cursor down to the pathway for the St. Louis River, and make a note of it (i.e., C:\stlr\_gis project\shapefiles\hydrology\st.\_louis\_river\_boundaries\river\_polygon).



2. Next, press the ArcCatalog icon () to open up ArcCatalog. ArcCatalog is the application you work with to manage data. On the left hand side of the window, navigate to C:\stlr\_gis project\shapefiles\hydrology\st.\_louis\_river\_boundaries\river\_polygon\ and click on "shp\_pol\_utm\_update.shp." Press 'Preview' to view the river polygon. Make sure that you have a master copy of the shapefiles in a safe place, because you will be deleting this shapefile by pressing the delete button () in ArcCatalog. Respond 'Yes' when the Confirm Delete box appears.

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3. On the left-hand side of ArcCatalog, move up to the file called "3-2-06\_Revised\_River\_Polygon\_SLRIDT\_Boundary" and preview the shapefile called "shp\_pol\_utm\_update.shp" as shown below. Note that this shapefile is missing part of the water boundary for the outer harbor, so it could not be used in lieu of the original shapefile for the river polygon.



4. Highlight "shp\_pol\_utm\_update.shp" and right-click it to copy and paste it into C:\stlr\_gis project\shapefiles\hydrology\st.\_louis\_river\_boundaries\river\_polygon\. Close ArcCatalog and display the GIS map as shown below. Note that the river polygon for Stryker Bay, Slip 6, and Slip 7 of the SLRIDT Superfund site now more closely matches the aquatic habitat types polygons from the lower St. Louis River habitat plan (St. Louis River CAC 2002).



5. In order to view the outer harbor area of the St. Louis River AOC, the original river polygon shapefile will need to be added back to this map document using an analogous series of steps as given above.

Users can edit the line and polygon basemap for other sections of the St. Louis River to more closely match the color orthophoto basemap by using the edit feature of ArcMap 9.1. Refer to ArcGIS guidance for more information on how to edit features (such as the Creating and Editing Data module of ESRI's Learning ArcGIS 9 web-based training course).

# CHAPTER 3

# LINKING DATABASE QUERY RESULTS TO ARCMAP 9.1

## 3.1 AVAILABILITY OF PHASE IV SEDIMENT QUALITY DATABASES

The Phase IV MS<sup>TM</sup> Access '97/2000 and Query Manager-compatible sediment quality databases are available on the MPCA's ftp site at: ftp://files.pca.state.mn.us/pub/sedimentDB/. Each format is available as a zipped file, and users will need to unzip the file(s) before using them. The file options are as follows:

- **MS<sup>™</sup> Access '97 sediment quality database file name:** STLR\_SED\_DB\_PH4\_97.zip. Only a few stakeholders lacking MS<sup>™</sup> Access 2000 software will need to use this version of the database.
- **MS<sup>TM</sup> Access 2000 sediment quality database file name:** STLR\_SED\_DB\_PH4\_Finalb.zip.
- Query Manager-compatible database files: PhIV\_STLR\_SEDB\_QM\_Final.zip. See the instructions in Chapter 4 of the Phase III Addendum to the Phase II Help Section for Database Users (Crane and Myre 2005) for how to use these files with NOAA's free Query Manager 2.56 software.

Refer to the Phase IV Supplement to the Phase II/III Help Sections for Database Users (Crane and Myre 2006) for additional information regarding these database products, particularly for the availability of a user-friendly Query Interface in the MS<sup>TM</sup> Access 2000 sediment quality database. This Query Interface greatly facilitates the retrieval of benthic invertebrate community, sediment toxicity, and sediment chemistry data from the database.

## 3.2 LINKING THE PHASE IV SEDIMENT QUALITY DATABASE WITH ARCMAP 9.1

The following directions provide step-by-step instructions for linking the Phase IV MS<sup>™</sup> Access 2000 sediment quality database with the ArcMap 9.1 map documents. Similar procedures can be used for linking query output from the Phase IV Query Manager-compatible database files to the map documents.

## **3.2.1 Step 1: Create an ODBC Connection to the Database**

This section will enable the database to be connected to other programs, via a communication protocol called **ODBC** (Open Database Connectivity). The actual steps will vary somewhat depending on the Operating System in use. Instructions have been provided for users who use either Windows 2000 or Windows XP (very similar).

1. From the START menu, go to Settings/Control Panel.

- 2. From Control Panel, select "Switch to Classic View" (for MPCA staff) and doubleclick on the Administrative Tools option.
- 3. From Administrative Tools, double-click on the Data Sources (ODBC) tool. This step will open the <u>ODBC Data Source Administrator</u> dialogue box.
- 4. The user will now need to set up a new User Data Source Name (DSN). From the User DSN tab (should be first tab), highlight MS Access Database and then click on the Add... button.
- 5. Next, open a dialogue box called <u>Create New Data Source</u> and "Select a driver for which you want to set up a data source." Highlight Microsoft Access Driver (\*.mdb) and then click on the button **Finish**.
- 6. A dialogue box called <u>ODBC Microsoft Access Setup</u> should now appear.
- 7. Next, enter a Data Source Name. This can be any name the user recognizes, like "St Louis River Database." The user can also add a Description, but this is optional.
- 8. After entering a Data Source Name, go to the center of the dialogue box where it says 'Database.' Click on the button labeled **Select...**
- 9. This opens a dialogue box called <u>Select Database</u> and allows the user to browse to the location of the St Louis River database. Browse through the directories until the file is located; all \*.mdb files should show up on the left window of the dialogue box. When the correct file is located, highlight the name in the left window, and then click on the **OK** button.
- 10. The user should now be back to the <u>ODBC Microsoft Access Setup</u> dialogue box. The Data Source Name (top of the dialogue box) should be successfully related to the correct Database (middle of the dialogue box). If this is the case, click **OK**.
- 11. The user should now be back in <u>ODBC Data Source Administrator</u>, where the user's Data Source Name should appear in the list of User Data Sources. If this is correct, then click **OK**. Next, close the other Control Panel windows and continue to Step 2.

**NOTE**: Users only have to do this ONCE to connect their database. Thus, every time they open a ArcMap 9.1 map document, the database will already have an ODBC connection and be ready to connect to ArcMap 9.1.

#### 3.2.2 Step 2: Make a Connection to a Phase IV ArcMap 9.1 Map Document

- 12. Open an ArcMap 9.1 map document of interest (e.g., ContaminatedAreas.mxd).
- 13. Open ArcCatalog by clicking on the ArcCatalog button on the standard toolbar. Select "Database Connections" in the left window table.
- 14. In ArcCatalog, in the right window under the 'Contents' tab, there should be an option called "Add OLE DB Connection." Double click on this option.
- 15. A dialogue box called <u>Data Link Properties</u> will open up (under the tab 'Provider'). Highlight <u>Microsoft OLE DB Provider for ODBC Drivers</u>, and then click on the button **Next>>**.
- 16. The 'Connection' tab will appear and the user will need to "Specify the source of the data." Click on the down arrow from the drop-down list at the top of the dialogue box to view the Data Source Name set-up in Step 1. Select the data source.

- 17. Here it is useful to click on the **Test Connection** button. This step will ensure that the ODBC connection is working properly. If the test connection succeeds, click on **OK**. If not, the database was probably not set-up properly in Step 1.
- 18. The user should now be back in ArcCatalog since a new "OLE DB Connection" has been created. This connection will be highlighted. The user will now be prompted for a new name (the user can edit the name OLE DB Connection). The Data Source Name the user selected before will not be automatically assigned to the OLE DB Connection name. Re-name "OLE DB Connection" to the same or similar name as was used for the Data Source Name. The user is now ready to import data into ArcMap 9.1.

**NOTE**: Once the user has set-up a database connection in ArcCatalog, he/she does not have to repeat this step; ArcCatalog will recognize the connections made previously and will re-connect each time it is opened. IF, however, the user makes new queries or tables, he/she will have to Refresh the connection by right-clicking on the connection in ArcCatalog and selecting 'Refresh.'

19. While still in ArcCatalog, double-click on the new database connection. The contents of the database will open up, and the user will see all of the tables (with a preface of "lkp" or "ptbl") and all of the queries (with the preface of "Qry"). The user can import either tables or queries into ArcMap.

**NOTE**: The 'Type' will all be 'ACCESS Table' regardless of whether it is a table or query object in the database. ArcCatalog treats these similarly.

- 20. In order to import tables into ArcMap 9.1, geopositional coordinates must be present. Therefore, only the Station table, and any queries with station locations, can be brought into the users ArcMap 9.1 map document.
- 21. First, start with the Station table by dragging the ptbl Station table and dropping it into the ArcMap Layers window (left window). As a result of this action, the tab will change from "Display" to "Source."
- 22. Right-click on the 'ptbl STATION' table icon, and then select **Display XY Data** (this can also be done through the Tools menu).
- 23. Next, specify the fields for the X and Y coordinates. Under the headings for <u>X Field</u> and <u>Y Field</u>, enter "X-coord" and "Y-coord," respectively. Click **OK**. Note: if this step does not work, try specifying "Longitude" for the <u>X Field</u> and "Latitude" for the <u>Y Field</u>.
- 24. The station locations should now appear as points on the top layer of the ArcMap 9.1 map document. Since missing coordinates are coded as –9, points that appear to be located far away from the area of interest denote stations with missing geopositional coordinates. In case this step does not work, and the user is using a version of MS<sup>TM</sup> Access newer than the 2000 version, the user will need to truncate the Field Name column in the Access table to 8 characters or less. ArcMap 9.1 may also encounter problems with spaces and unique characters in Access Field Names. All spaces were removed from the Field Names in the Phase IV MS<sup>TM</sup> Access 2000 database.

25. The user can also drag and drop a query from ArcCatalog to ArcMap, and add them following the same **Display XY Data** step as above.

**NOTE**: If the user brings a query into his/her ArcMap 9.1 map document and tries to view the data, this might be a slow process considering that the queries have to be run each time they are viewed in ArcMap. There is another option to save the query data out as a separate table, so that the data can be worked with more quickly. These optional steps are provided below.

- 26. After importing the table or query into ArcMap 9.1, right-click on the table and select **Data/Export**. This will export the connected query into a \*.dbf file, which will be directly imported (rather than linked to) to the users ArcMap 9.1 map document.
- 27. Choose 'All records' and then either type in, or browse, to determine the location of where to store the new file. The user can either re-name the file, or retain the name of the query. Note that the file is automatically given the extension \*.dbf. Click **OK**.
- 28. The user will then be prompted if he/she wants to add the new \*.dbf file to his/her ArcMap map document. Click on **Yes**.
- 29. To add the stations to the users view, follow the same steps given above to **Display XY Data**. The points and underlying data will appear to be exactly the same as the layer linked from MS<sup>TM</sup> Access, but the data will refresh more quickly as the queries do not have to be run in the database each time the view is refreshed in ArcMap 9.1.

# **CHAPTER 4**

# **PROJECT CONTACT**

For further information about the Phase IV ArcMap 9.1 map documents, contact Dr. Judy Crane at:

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Documents from the Phase IV project will be linked to the MPCA's Contaminated Sediments Web page at: http://www.pca.state.mn.us/water/sediments/studies-stlouis.html#assessment.

## REFERENCES

- Crane, J.L. and P.L. Myre. 2005. Phase III GIS-based sediment quality database for the St. Louis River Area of Concern—Minnesota focus. Addendum to the Phase II help section for database users. Minnesota Pollution Control Agency, Environmental Analysis and Outcomes Division, St. Paul, MN and Exa Data & Mapping Services, Inc., Port Townsend, WA. MPCA Document Number tdr-fg05-01. (http://www.pca.state.mn.us/publications/tdr-fg05-01.pdf)
- Crane, J.L. and P.L. Myre. 2006. Phase IV GIS-based sediment quality database for the St. Louis River Area of Concern—Wisconsin focus. Supplement to the Phase II/III help sections for database users. Minnesota Pollution Control Agency, Environmental Analysis and Outcomes Division, St. Paul, MN and Exa Data & Mapping Services, Inc., Port Townsend, WA. MPCA Document Number tdr-fg06-02. (to be posted at: http://www.pca.state.mn.us/publications/tdr-fg06-02.pdf)
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- St. Louis River CAC (Citizens Action Committee). 2002. Lower St. Louis River habitat plan. St. Louis River Citizens Action Committee, Duluth, MN. (http://www.stlouisriver.org/IAhabitatplan/habitatplan.html)

# **APPENDIX** A

## INFORMATION ON THE C-CAP LEGEND HANDLER EXTENSION

The below information was taken directly from Sections 2.2 (paragraph 3) and 4.1 of the Phase II Help Section for ArcView Users (Smorong et al. 2004). Note that the C-CAP Legend Handler will only work in ArcView 3.2 (i.e., the Phase II ArcView 3.2 projects could be obtained from Dr. Crane and used to view this extension).

#### 2.2 Conversion of ArcView 3.2 Projects to ArcMap 8.3 Map Documents

#### From paragraph 3 of this section....

One difference between the two versions of the GIS applications is the interpretation of the National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center Coastal Change Analysis Program (C-CAP) data that are presented in the Land Use project (the organization of the GIS data into different projects will be described in more detail in Chapter 3 of this report). The Coastal Services Center developed an ArcView extension that allows for the interpretation of land cover and change analysis data (i.e., the C-CAP Legend Handler). Unfortunately, ArcView 8/9 does not support extensions that were developed for ArcView 3.x. So although the C-CAP data are included in the ArcMap 8.3 version, the C-CAP legend handler is not available to assist the user in interpreting the data. For ArcView 8/9 users that have access to the Spatial Analyst extension, the Coastal Services Center is in the process of developing a Data Handler extension that will enhance the users ability to access and manipulate the C-CAP land cover and change analysis data. This tool can be accessed from the following Web site: www.csc.noaa.gov/crs. Users who do not have Spatial Analyst may want to check the Coastal Services Center web site periodically to check for updates to the Legend Handler extension.

#### 4.1 Setting up the GIS Application to Run on a Personal Computer

#### **4.1.1 Set-up Instructions**

In order for the data to display correctly in ArcView 3.x, the files saved on the project CDs must be copied to specific sub-directories. The following set-up instructions are relevant to personal computers that have ArcView 3.x locally installed (i.e., these instructions will need to be modified for personal computers that have ArcView 3.x installed on a network).

- 1. Copy the contents of project CD #1 directly onto the hard drive. The resulting pathway must be "C:\STLR\_GIS Project\..."
- 2. Copy the two folders ("ccap\_nad83" and "Quads\_Orthophotos") on project CD #2 into the "C:\STLR\_GIS Projects\Shapefiles\Land\_Use\_Information" subdirectory.

Note that some ArcView installations may create a problem with viewing the NOAA C-CAP land use and change analysis data. In the main view (i.e., Land Use) of the Land Use project (ArcView 3.2), there should be three themes that appear near the bottom of the Table of

Contents: CCAP Land Cover 1995; CCAP Land Cover Change 1995-2000; and CCAP Land Cover 2000. If these themes are not included in this view, they can be added by clicking the "Add Theme" button, selecting "Image Data Source" in the "Data Source Types:" drop-down list, navigating to the following sub-directory "C:\STLR\_GIS

Project\Shapefiles\Land\_Use\_Information\ccap\_nad83", and adding the following files: ccaplu95.img, ccaplu00.img, and ccaplu95-00.img.

For ArcMap 8.3 users, it is not necessary to save the GIS data to a specific subdirectory on the hard drive.

### 4.1.2 Installing the Extension

The Land Use project has several shapefiles that need an extension in order to be viewed. The C-CAP Legend Handler extension is a tool that provides options for displaying and viewing NOAA's C-CAP land cover and change analysis data. The extension (ccaplegendhandler.avx) is saved in the following subdirectory on project CD #1: "C:\STLR\_GIS Project\Extensions". Information about the C-CAP land cover data set and instructions for using the C-CAP Legend Handler are saved in the following sub-directory and file: "C:\STLR\_GIS Project\Shapefiles\Land\_Use\Information\ccap\_nad83\ccaplegendhandler\_about.pdf".

Copy and past the "ccaplegendhandler.avx" file into the following subdirectory: "C:\ESRI\AV\_GIS30\ARCVIEW\EXT32\". In the main View of the Land Use project, enable the extension by clicking on "Extensions" under the "File" menu, and clicking the check box next to the "C-CAP Legend Handler" item. When the extension is enabled, there will be a menu item called "C-CAP Legend Handler" in the View window. Options for using this tool can be viewed by selecting "Menu definitions".

For ArcMap 8.3 users, it is not necessary to follow these instructions, since ArcMap 8.3 does not support this extension (see Section 2.2 for more details).

## **APPENDIX B**

## **INFORMATION ABOUT BASEMAPS**

The below information was taken directly from Section 3.1.4 of the Phase II Help Section for ArcView Users (Smorong et al. 2004). Text pertaining to incorporating orthophotos or quad maps in the main view of the ArcView 3.2 projects was excluded from the below section. Please note that as part of the Phase IV GIS work, a fourth basemap (color orthophotos) has been added as an additional option.

#### 3.1.4 Basemap of the St. Louis River Area of Concern

Three different basemaps (i.e., a planning level set of data) were compiled in each of the ten GIS maps. Each GIS map includes three views of different basemaps. The view named "Orthophotos" includes digital orthographic aerial photographs (image data); the view named "Quad maps" includes U.S. Geological Survey (USGS) digital orthographic topographic maps (image data); and the remaining view (the main view) includes a basemap comprised of several basic line and polygon shapefiles. Note that the image files are large and slow down ArcView's refresh rate substantially. As such, users are afforded quick access to each of the three basemaps, as any or all of the orthophotos or quad maps can be incorporated into the main view (i.e., the view that contains the feature geographic data).

To incorporate the orthophotos or quad maps in the main data frame of the ArcMap 8.3 map documents:

- 1. Use the "Quad map index" theme to determine the relevant images to include;
- 2. Activate the "Orthophotos" or "Quad Maps" data frame (right click on the data frame in the Table of Contents and select 'activate');
- 3. In the Table of Contents, select the desired image in the "Orthophotos" or "Quad Maps" data frame;
- 4. Right click and select "Copy";
- 5. Click on the main data frame, right click, and select "Paste layer"; and,
- 6. The image will be added to the top of the Table of Contents for the main data frame. Move the image to the bottom of the Table of Contents (click on it and drag it down).

# **APPENDIX C**

## **INSTRUCTIONS FOR DISPLAYING DATA**

The below information was taken directly from Sections 4.3 – 4.11 of the Phase II Help Section for ArcView Users (Smorong et al. 2004). Text pertaining to displaying data in the Phase II ArcView 3.2 projects was excluded from the below sections.

#### 4.3 Layers

#### 4.3.2 ArcMap 8/9

Geographic information on a map is displayed as layers, with each layer representing a particular type of feature, such as a stream, lake, highway, political boundary, or wildlife habitat. Layers are listed in the Table of Contents.

#### 4.4 Layer Table of Contents

#### 4.4.2 ArcMap 8/9

Each map has a Table of Contents. The Table of Contents shows you what layers the map contains and also how the map symbolizes the geographic features in those layers. Some maps display all the layers in one data frame. Others, such as those with insets and overviews, will have more than one data frame. The Table of Contents shows how the layers are organized into data frames. A data frame simply groups, in a separate frame, the layers that are displayed together. The Table of Contents shows the name of each layer in the data frame, how the layer is represented on the map (e.g., symbols, colors, fills), whether a layer is turned on or off, and the order the layers are drawn in.

A layer's legend can be hidden in the Table of Contents (hiding a layer's legend enables you to save space in the Table of Contents, especially when the layer's legend has a large number of classes). When a legend is hidden, the name of the layer and its check box remain visible so you can still turn the layer on and off, double-click it to edit its legend, drag and drop it to change drawing order, etc. To hide or show a layer's legend, click the plus or minus sign to the left of the layer name in the Table of Contents.

#### 4.5 Turning Themes On and Off

#### 4.5.2 ArcMap 8/9

To turn a layer on or off, check or uncheck the check box next to the layer. When the layer is on, it draws on the map.

#### 4.6 Making a Theme Active

#### 4.6.2 ArcMap 8/9

In ArcMap 8/9, there is no active theme concept incorporated into the functioning of the software. Therefore, actions that are performed relative to a specific layer are selected by right clicking on the layer of interest and choosing from the menu items available.

#### 4.7 Order Themes are Drawn

#### 4.7.2 ArcMap 8/9

The theme at the top of the Table of Contents is drawn on top of those below it. Themes that form the background of a view are therefore at the bottom of the list. Simply drag themes up and down in the Table of Contents to change the order they are drawn in.

#### 4.8 Viewing a Theme's Attribute Table

#### 4.8.2 ArcMap 8/9

Some spatial data sources, such as shapefiles and ARC/INFO coverages, have their own attribute tables containing descriptive information about the geographic features they contain. To view a layer's attribute table, right click on the layer in the Table of Contents and then select "Open Attribute Table" on the drop-down menu.

#### 4.9 Adding Themes and Image Data from the Project CDs

#### 4.9.2 ArcMap 8/9

It is possible to add feature and image data that have been included on the project CDs to any of the ten ArcMap 8.3 map documents. To determine where a certain shapefile or image file has been saved on the project CDs, refer to the *Location of GIS Data* column in Tables 2-11. To add an existing ArcView shapefile or image to a view:

- 1. Click the Add Data button on the Standard toolbar;
- 2. Click the Look in drop down arrow and navigate to the folder that contains the layer;
- 3. Click the layer; and,
- 4. Click Add. The new layer appears on your map.

#### 4.10 Editing a Theme Legend

ArcMap 8/9 allow users to modify layer legends to make visually appealing maps that assist with communicating data to target audiences. There are several different Legend Types to choose from, including:

- Single value legends will only show the extent and location of the data (e.g., all sediment sampling sites are shown as green dots);
- Graduated color legends will show the data according to specific numerical ranges (e.g., highly contaminated sediments are shown as red dots, moderately contaminated sediments are shown as yellow dots, and relatively clean sediments are shown as green dots);
- Graduated symbols are similar to graduated color legends but show the change in classification according to symbol size rather than color change; and,
- Unique value legends allow the users to chose the classification field from the theme's attribute table (e.g., clay-influenced bays are reddish-brown shading, sheltered bays are olive shading, and industrially-influenced bays are salmon shading).

## 4.10.2 ArcMap 8/9

In the Table of Contents, right-click the layer of interest and click Properties, then click the Symbology tab.

## 4.11 Moving Around in the Data Frame

# This section has been adapted to just include parts relevant to ArcMap 8.3 which will also be relevant to ArcMap 9.1.

ArcMap 8/9 has several different tools available to allow users to display and explore the geographic data included in the data frame.



Pointer tool; allows the user to select, move and resize graphics.



**Identify** tool; allows the user to retrieve the information in the attribute table that corresponds to a specific line, point, or polygon.



**Zoom in/Zoom out** tools; allows the user to zoom in or out of the position by clicking on the view (e.g., by drawing a box in a particular section of the view).



**Pan tool**; allows the user to move around the map. Pan the view by dragging in any direction with the Pan tool.



**Measuring** tool; allows the user to measure the distance between two specific points. Click at the start point and double-click the end point (length will be displayed in the bottom left corner of the screen). The line can have one or more line segments.



**Zoom to Previous Extent**; allows the user to zoom to the previous screen magnification. *In ArcMap 8/9, there is also a button that allows the user to zoom to the next extent (represented by an arrow pointing in the opposite direction).* 



Add Shapefile; allows the user to access file folders and navigate to a specific shapefile. This shapefile is then added to the view window.

**Select Feature Tool**; allows the user to select features with the mouse by pointing at them or by dragging a selection box over them. Features that fall partly or wholly inside the box will be selected. Features will be selected from all of the currently active themes. The selected features will also be highlighted in the theme's attribute table. To view the attribute data for these points, open the attribute table and use the Promote button (the selected records will appear at the top of the table). *This tool is available in ArcMap 8/9, but the button has a slightly different appearance. ArcMap 8/9 users should note that the tools and methods for selecting features in ArcMap 8/9 are considerably different than ArcView 3.x. It is recommended that users read the 'Selecting Features' topic in the ArcGIS Desktop Help tool.* 

# **APPENDIX D**

## KNOWN ERRORS IN GIS DATA SOURCES (PHASE II GIS WORK)

# The below section is from Chapter 6 of the Phase II Help Section for ArcView Users (Smorong et al. 2004).

In the process of compiling the GIS maps, a number of errors in the source data were identified. Users should be aware that identifying and correcting errors in the GIS data were not identified as a work plan task for this phase of the project. As such, even though GIS data from reliable data sources were preferentially included (e.g., USGS, USEPA, state agencies), there are some known inaccuracies in the GIS data. Users should also be aware that the metadata were current as to the time period the GIS information was assembled by the source agencies. The notable inaccuracies in the GIS data are listed below:

- Contaminated Areas project; Contaminated Sediment Hot Spots theme: the boundaries indicated are estimates and should not be construed as an estimation of the area requiring sediment remediation;
- Contaminated Areas project; Superfund Sites theme: the boundaries indicated are estimates and should not be construed as an estimation of the area requiring sediment remediation;
- Contaminated Areas project; Air Emissions (MN) theme: the Potlatch facility was bought out several years ago by Sappi;
- Ecological Areas project; MN DNR Important Habitat Sites theme: the location of some of the sites are inaccurate (e.g., Interstate Island is shown at the end of Rices Point instead of on Interstate Island; the Bong Bridge site is shown at Erie Pier; Hog Island is shown in Allouez Bay);
- Hydrology Project; Land Areas of the St. Louis River theme: some land areas such as Rices Point, Clough Island, Interstate Island, and Hearding Island are not included in this theme;
- Hydrology Project; Water Bodies of the St. Louis River theme: this theme does not include the reservoirs, Superior Bay is shown to extend too far over to Duluth, and Allouez Bay is cut off;
- Hydrology Project; MN Watersheds theme: the watershed designated as Keene Creek in the attribute table is not located near Keene Creek, which drains into the Interlake/Duluth Tar Superfund site; and,

• USEPA Inland Sensitivity Atlas Project: this project is a stand alone product available from the USEPA. It has been included on the project CD as it was available from the source agency, with the exception of some data layers originating from the WDNR that were deemed to be proprietary. The Inland Sensitivity Atlas used a different basemap than was used for the other projects included on the project CDs, which excludes many boat slips in the outer harbor. In addition, fewer marinas are identified in this project, as compared to the Recreation project (marinas theme). Also, part of the Minnesota state boundary is erroneously shown in Wisconsin.