



Project Status Report

Upper Mississippi River
Long Term Resource Monitoring Program
U.S. Geological Survey

Watershed Data for the Upper Mississippi River System

by
Henry C. DeHaan and Dr. Kenneth S. Lubinski

The Upper Mississippi River System (UMRS) has been dramatically altered by changing land use and management practices within its basins. One consequence of these changes is the environmental problem of increased sediment loading to its major rivers. The Long Term Resource Monitoring Program (LTRMP) is addressing this problem by quantifying sediment movement within the UMRS. As part of this research, watershed boundary information was generated and stored as a Geographic Information System (GIS) data layer (Figure). The watershed data, in conjunction with other subbasin information, will be used to document sediment loading from Upper Mississippi River tributaries, analyze relationships between basin characteristics and their sediment loads, and produce maps that compare discharge and sediment loading potential among tributaries. Results of this research will provide information needed to target subbasins for soil erosion management.

Description of Watershed Data

The UMRS watershed (excluding the Missouri basin) encompasses an area of about 50 million hectares (121 million acres). It extends north from Cairo, Illinois, primarily through the states of Missouri, Illinois, Iowa, Wisconsin, and Minnesota. The 1:250,000-scale data layer for the basin contains watershed boundaries for basins larger than 150 acres that empty directly into the main stem floodplain of the UMRS. Watershed size, perimeter length, stream order, stream name (for basins larger than second order), and outlet location by navigation pool are included. U.S. Geological Survey 1:250,000-scale Digital Elevation Models (DEMs) were the primary sources used in developing the watershed data.

Data Development Procedure

The watershed data layer was developed through a procedure that utilized Arc/Info GIS hydrologic modeling tools. Arc/Info lattice files were generated from DEMs and converted to flow grid coverages. These were combined with basin outlet data to create a watershed grid. This grid was then converted to an Arc/Info polygon coverage and basin attribute information was added.

(continued)

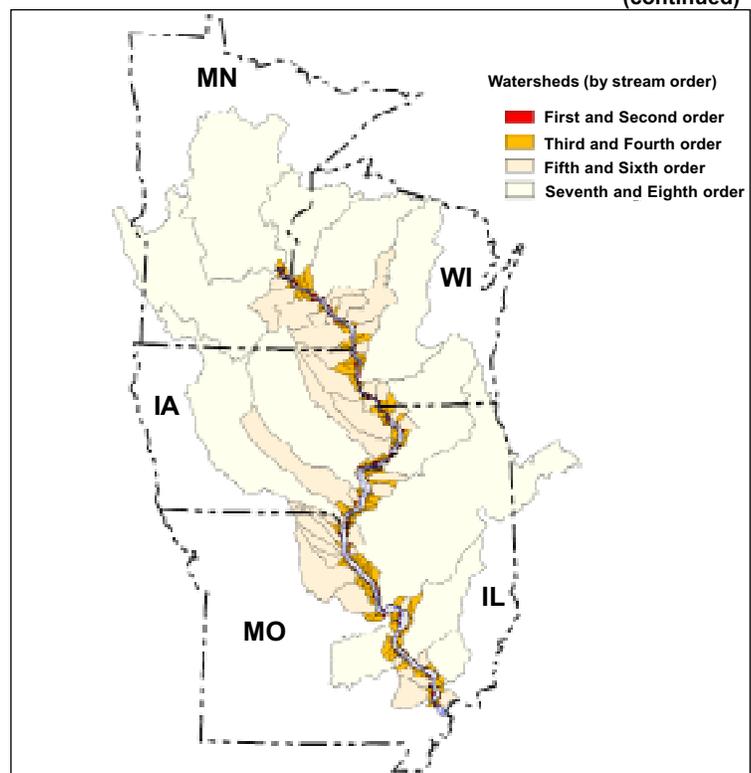


Figure. Upper Mississippi River System watershed data layer.*

(over)

Available Products

Upper Mississippi River System watershed products are now available through the Environmental Management Technical Center in Onalaska, Wisconsin. These include a variety of digital, map, and analysis products. The GIS watershed data layer is available in an Arc/Info polygon coverage format. Several maps have been produced displaying basins for the entire UMRS, watersheds by pool, and basins overlaid on Digital Raster Graphics. Analysis products have also been generated that provide information on watershed characteristics for the UMRS basin (Table 1) and for the LTRMP trend analysis study areas (Table 2).

Table 1. Upper Mississippi River System basin characteristics.

Stream order	Frequency	Acres (1000's)		Percent Area
		Mean	Total	
1	745	0.5	345.5	0.3%
2	286	2.2	622.0	0.5%
3	156	10.6	1,646.7	1.4%
4	60	50.3	3,016.3	2.5%
5	28	195.5	5,475.3	4.5%
6	13	1,197.4	15,565.8	12.8%
7	7	5,030.6	35,214.3	29.0%
8	5	11,440.3	57,201.7	47.1%
0 ^a	1	2,289.2	2,289.2	1.9%
		Total	121,376.6	100.0%

^a floodplain and near floodplain area

The Future

Future enhancements to the watershed data layer are currently being explored. These include adding attribute information (e.g., nearest downstream river mile), improving spatial accuracy of selected subbasins (e.g., 1:100,000 or 1:24,000-scale), and developing GIS subbasin data layers for the larger tributaries (e.g., Illinois and Minnesota Rivers) of the UMRS. □

*The graphic is available in color through the Environmental Management Technical Center's Homepage at <http://www.emtc.nbs.gov/>

Table 2. Upper Mississippi River System basin characteristics for the Long Term Resource Monitoring Program trend analysis study areas.

Outlet Location	Stream order	Frequency	Acres (1000's)		Percent Area
			Mean	Total	
Pool 4	1	35	0.5	15.9	0.2%
	2	15	2.6	38.4	0.5%
	3	8	11.9	94.9	1.2%
	4	4	67.2	268.6	3.5%
	5	1	286.9	286.9	3.7%
	6	1	926.4	926.4	12.0%
	8	1	6,084.5	6,084.5	78.9%
			Total	7,715.6	100.0%
Pool 8	1	12	0.3	4.0	0.3%
	2	5	1.8	9.2	0.6%
	3	4	11.6	46.5	3.0%
	4	2	63.4	126.8	8.2%
	5	1	300.9	300.9	19.4%
	6	1	1,062.3	1,062.3	68.5%
		Total	1,549.7	100.0%	
Pool 13	1	26	0.5	12.8	0.7%
	2	9	2.5	22.7	1.3%
	3	5	12.1	60.3	3.5%
	4	3	36.8	110.4	6.4%
	5	2	167.7	335.3	19.4%
	6	1	1,187.8	1,187.8	68.7%
		Total	1,729.3	100.0%	
Pool 26	1	32	0.5	16.4	0.1%
	2	16	2.0	31.3	0.2%
	3	3	6.5	19.6	0.1%
	4	4	53.5	214.0	1.1%
	6	1	784.5	784.5	4.0%
	8	1	18,414.8	18,414.8	94.5%
			Total	19,480.6	100.0%
	Open River	1	33	0.5	16.1
2		18	2.4	43.8	3.4%
3		5	8.9	44.6	3.5%
4		4	26.2	104.9	8.1%
5		2	166.8	333.7	25.9%
6		1	747.1	747.1	57.9%
		Total	1,290.0	100.0%	

For further information, contact

Henry C. DeHaan
U.S. Geological Survey
Environmental Management Technical Center
575 Lester Avenue
Onalaska, Wisconsin 54650
Phone: 608/783-7550, ext. 710
e-mail: Hank_DeHaan@usgs.gov

Dr. Kenneth S. Lubinski
U.S. Geological Survey
Environmental Management Technical Center
575 Lester Avenue
Onalaska, Wisconsin 54650
Phone: 608/783-7550, ext. 61
e-mail: Ken_Lubinski@usgs.gov

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United States Department of the Interior
U.S. Geological Survey
Environmental Management Technical Center
575 Lester Avenue
Onalaska, WI 54650-8552
608/783-7550