

**Table 6-1. Erosion Sites Selected on the Illinois Waterway
for Detailed Data Collection**

<i>Site #</i>	<i>Date</i>	<i>Time</i>	<i>RM</i>	<i>up/mp/dn</i>	<i>RDB/LDB</i>	<i>Pool</i>	<i>Length (miles)</i>	<i>Stage (msl)</i>	<i>Stage Recurrence Frequency (%)</i>	<i>OHW (msl)</i>	<i>NP (msl)</i>
UP1	18-Sep-95	04:15 PM	270.8*	up	RDB	Marseilles Pool		483.9	90	486.6	483.3
UP1	18-Sep-95	03:30 PM	270.8	mp	RDB	Marseilles Pool		483.9	90	486.6	483.3
UP1	18-Sep-95	04:00 PM	270.8*	dn	RDB	Marseilles Pool		483.9	90	486.6	483.3
UP2	18-Sep-95	04:30 PM	270.8	mp	LDB	Marseilles Pool		483.9	90	486.6	483.3
UP3	19-Sep-95	08:20 AM	264.3	up	LDB	Marseilles Pool		483.7	80	485.7	483.3
UP3	20-Sep-95	07:30 AM	264.3	mp	LDB	Marseilles Pool	0.15	483.7	80	485.7	483.3
UP3	20-Sep-95	08:00 AM	264.3	dn	LDB	Marseilles Pool		483.7	80	485.7	483.3
UP4	20-Sep-95	10:30 AM	262.2	up	LDB	Marseilles Pool		483.7	90	485.5	483.3
UP4	20-Sep-95	10:00 AM	262.1	mp	LDB	Marseilles Pool	0.34	483.7	90	485.5	483.3
UP4	20-Sep-95	10:20 AM	262.0	dn	LDB	Marseilles Pool		483.7	90	485.5	483.3
UP5	20-Sep-95	11:00 AM	262.1	mp	RDB	Marseilles Pool		483.7	90	485.5	483.3
1	28-Aug-95	12:45 PM	242.9	up	LDB	Starved Rock Pool		458.6	90	460.0	458.5
1	28-Aug-95	10:45 AM	242.8	mp	LDB	Starved Rock Pool	0.24	458.8	90	460.1	458.5
2	28-Aug-95	11:45 AM	243.4	mp	LDB	Starved Rock Pool		459.4	50	460.3	458.5
3	28-Aug-95	04:00 PM	235.7	up	RDB	Starved Rock Pool		459.0	75	459.5	458.5
3	28-Aug-95	04:13 PM	235.7	mp	RDB	Starved Rock Pool	0.14	459.0	75	459.3	458.5
3	28-Aug-95	03:20 PM	235.7	dn	RDB	Starved Rock Pool		459.0	75	459.3	458.5
4	28-Aug-95	06:25 PM	228.1	up	LDB	Peoria Pool		441.6	75	446.1	440.0
4	28-Aug-95	06:40 PM	228.0	mp	LDB	Peoria Pool	0.24	441.6	75	446.0	440.0
4	28-Aug-95	07:00 PM	228.0	dn	LDB	Peoria Pool		441.6	75	446.0	440.0
5	28-Aug-95	07:40 PM	229.0	up	RDB	Peoria Pool		441.6	75	446.4	440.0
5	28-Aug-95	07:25 PM	228.75	mp	RDB	Peoria Pool	0.21	441.6	75	446.2	440.0
5	28-Aug-95	07:30 PM	228.5	dn	RDB	Peoria Pool		441.6	75	446.3	440.0
6	29-Aug-95	10:35 AM	210.0	up	RDB	Peoria Pool		441.1	75	444.3	440.0
6	29-Aug-95	10:40 AM	210.0	mp	RDB	Peoria Pool	0.34	441.1	75	444.3	440.0
6	29-Aug-95	11:15 AM	209.7	dn	RDB	Peoria Pool		441.1	75	444.2	440.0
7	29-Aug-95	12:15 PM	203.8	up	LDB	Peoria Pool		441.1	75	443.9	440.0
7	29-Aug-95	12:00 PM	203.8	mp	LDB	Peoria Pool	0.20	441.1	75	443.9	440.0
7	29-Aug-95	12:45 PM	203.5	dn	LDB	Peoria Pool		441.1	75	443.9	440.0

Note: River mile at the mid-point of a reach is used if the river miles at the upstream or downstream points are unknown.

**Table 6-1. Erosion Sites Selected on the Illinois Waterway
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<i>Site #</i>	<i>Date</i>	<i>Time</i>	<i>RM</i>	<i>up/mp/dn</i>	<i>RDB/LDB</i>	<i>Pool</i>	<i>Length (miles)</i>	<i>Stage (msl)</i>	<i>Stage Recurrence Frequency (%)</i>	<i>OHW (msl)</i>	<i>NP (msl)</i>
8	29-Aug-95	02:45 PM	184.9	up	LDB	Peoria Pool		441.1	73	442.6	440.0
8	29-Aug-95	02:30 PM	184.8	mp	LDB	Peoria Pool	0.26	441.1	73	442.6	440.0
8	29-Aug-95	03:05 PM	184.7	dn	LDB	Peoria Pool		441.1	73	442.6	440.0
9	29-Aug-95	03:50 PM	179.9	up	LDB	Peoria Pool		440.6	90	442.4	440.0
9	29-Aug-95	03:45 PM	179.8	mp	LDB	Peoria Pool	0.21	440.6	90	442.4	440.0
9	29-Aug-95	04:05 PM	179.7	dn	LDB	Peoria Pool		440.6	90	442.4	440.0
10	29-Aug-95	06:25 PM	160.0	up	RDB	Peoria Pool		440.5	50	441.4	440.0
10	29-Aug-95	06:20 PM	160.0	mp	RDB	Peoria Pool	0.11	440.5	50	441.4	440.0
10	29-Aug-95	06:45 PM	160.0	dn	RDB	Peoria Pool		440.5	50	441.4	440.0
11	30-Aug-95	11:00 AM	155.5	up	RDB	La Grange Pool		432.8	70	440.8	429.5
11	30-Aug-95	08:15 AM	155.3	mp	RDB	La Grange Pool	0.54	432.8	70	440.8	429.5
11	30-Aug-95	11:30 AM	155.1	dn	RDB	La Grange Pool		432.8	70	440.8	429.5
12	30-Aug-95	08:45 AM	154.6	up	LDB	La Grange Pool		432.8	70	440.7	429.5
12	30-Aug-95	09:40 AM	154.4	mp	LDB	La Grange Pool	0.62	432.8	70	440.7	429.5
12	30-Aug-95	10:40 AM	154.2	dn	LDB	La Grange Pool		432.8	70	440.7	429.5
13	30-Aug-95	12:15 PM	150.6	up	LDB	La Grange Pool		432.3	75	440.5	429.5
13	30-Aug-95	12:10 PM	150.5	mp	LDB	La Grange Pool	0.18	432.3	75	440.5	429.5
13	30-Aug-95	12:45 PM	150.5	dn	LDB	La Grange Pool		432.3	75	440.5	429.5
14	30-Aug-95	04:15 PM	129.4	up	RDB	La Grange Pool		431.2	80	438.5	429.5
14	30-Aug-95	04:15 PM	129.3	mp	RDB	La Grange Pool	0.28	431.2	80	438.5	429.5
14	30-Aug-95	04:45 PM	129.2	dn	RDB	La Grange Pool		431.2	80	438.5	429.5
15	30-Aug-95	06:35 PM	116.7	up	RDB	La Grange Pool		430.8	75	437.0	429.5
15	30-Aug-95	06:45 PM	116.5	mp	RDB	La Grange Pool	0.95	430.8	75	437.0	429.5
15	30-Aug-95	07:10 PM	116.3	dn	RDB	La Grange Pool		430.8	75	437.0	429.5
16	31-Aug-95	11:05 AM	109.5	up	LDB	La Grange Pool		430.6	75	435.8	429.9
16	31-Aug-95	10:25 AM	109.5	mp	LDB	La Grange Pool	0.18	430.6	75	435.7	429.9
16	31-Aug-95	10:38 AM	109.5	dn	LDB	La Grange Pool		430.6	75	435.6	429.9
17	31-Aug-95	10:00 AM	109.6	up	RDB	La Grange Pool		430.6	75	435.7	429.9
17	31-Aug-95	09:15 AM	109.5	mp	RDB	La Grange Pool	0.18	430.6	75	435.7	429.9

**Table 6-1. Erosion Sites Selected on the Illinois Waterway
for Detailed Data Collection (Concluded)**

<i>Site #</i>	<i>Date</i>	<i>Time</i>	<i>RM</i>	<i>up/mp/dn</i>	<i>RDB/LDB</i>	<i>Pool</i>	<i>Length (miles)</i>	<i>Stage (msl)</i>	<i>Stage Recurrence Frequency (%)</i>	<i>OHW (msl)</i>	<i>NP (msl)</i>
17	31-Aug-95	10:30 AM	109.4	dn	RDB	La Grange Pool		430.6	75	435.7	429.9
18	31-Aug-95	02:40 AM	94.2	up	RDB	La Grange Pool		429.9	75	433.7	429.9
18	31-Aug-95	02:15 PM	94.2	mp	RDB	La Grange Pool	0.09	429.9	75	433.7	429.9
18	31-Aug-95	02:20 PM	94.2	dn	RDB	La Grange Pool		429.9	75	433.7	429.9
19	31-Aug-95	03:05 PM	91.2	up	RDB	La Grange Pool		429.9	65	433.3	429.9
19	31-Aug-95	04:00 PM	91.2	mp	RDB	La Grange Pool	0.22	429.9	65	433.3	429.9
19	31-Aug-95	04:30 PM	91.1	dn	RDB	La Grange Pool		429.9	65	433.3	429.9
20	31-Aug-95	07:40 PM	79.6	up	RDB	Alton Pool		420.6	90	NA	NA
20	31-Aug-95	07:15 PM	79.4	mp	RDB	Alton Pool	0.67	420.6	90	NA	NA
20	31-Aug-95	07:20 PM	79.2	dn	RDB	Alton Pool		420.6	90	NA	NA
21	01-Sep-95	11:00 AM	61.8	up	RDB	Alton Pool		420.6	80	NA	NA
21	01-Sep-95	10:45 AM	61.7	mp	RDB	Alton Pool	0.23	420.6	80	NA	NA
21	01-Sep-95	10:40 AM	61.6	dn	RDB	Alton Pool		420.6	80	NA	NA
22	01-Sep-95	01:00 PM	45.1	up	RDB	Alton Pool		419.9	85	NA	NA
22	01-Sep-95	12:50 PM	45.1	mp	RDB	Alton Pool	0.14	419.9	85	NA	NA
22	01-Sep-95	01:30 PM	45.1	dn	RDB	Alton Pool		419.9	85	NA	NA
23	01-Sep-95	04:30 PM	23.5	up	RDB	Alton Pool		419.3	90	NA	NA
23	01-Sep-95	04:20 PM	23.4	mp	RDB	Alton Pool	0.18	419.3	90	NA	NA
23	01-Sep-95	04:45 PM	23.3	dn	RDB	Alton Pool		419.3	90	NA	NA
24	01-Sep-95	06:30 PM	13.1	up	RDB	Alton Pool		419.3	90	NA	NA
24	01-Sep-95	06:00 PM	13.0	mp	RDB	Alton Pool	0.24	419.3	90	NA	NA
24	01-Sep-95	06:15 PM	12.9	dn	RDB	Alton Pool		419.3	90	NA	NA

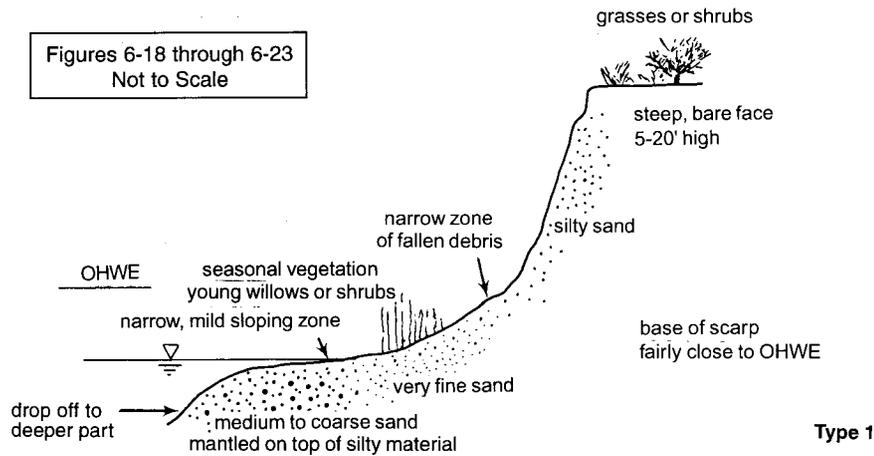


Figure 6-18. Type 1 bank on the ILWW: steep bank with high bare face. The ordinary high water elevation is low as compared to the bank elevation

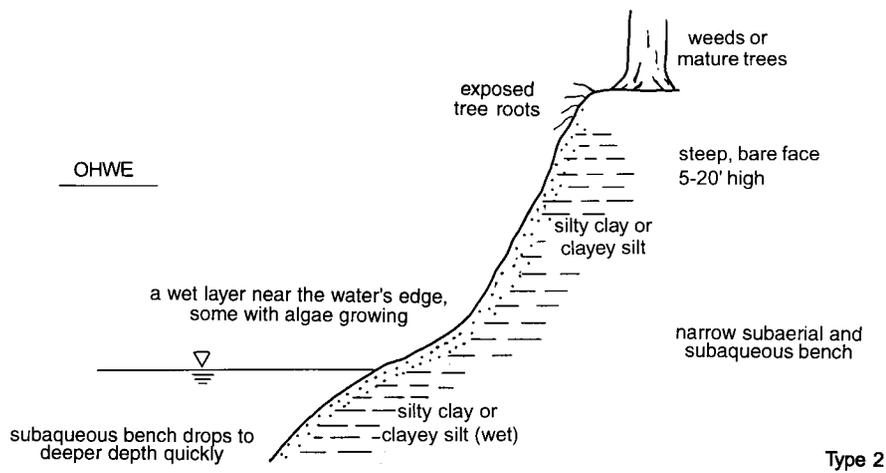


Figure 6-19. Type 2 bank on the ILWW: steep bank with high bare face. The ordinary high water elevation is comparable to the elevation at top of the bank

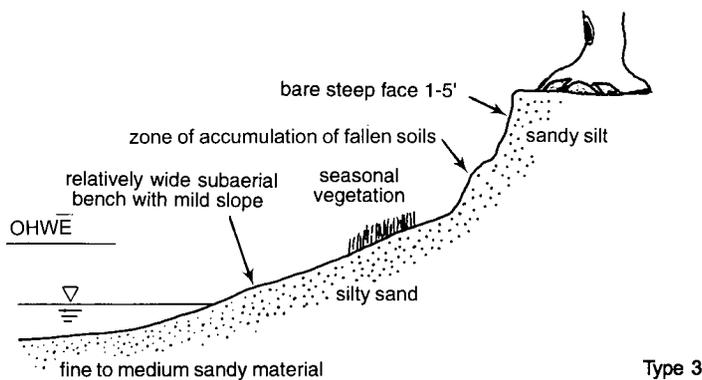


Figure 6-20. Type 3 bank on the ILWW: short scarp face and fairly long bench. The ordinary high water elevation is low as compared to the bank elevation

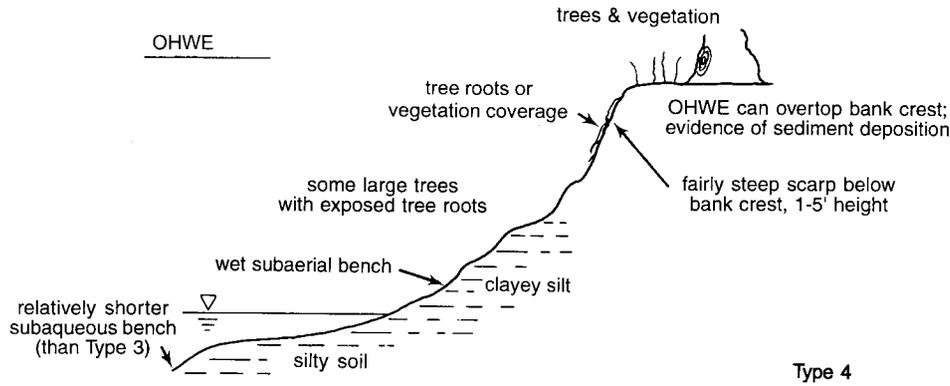


Figure 6-21. Type 4 bank on the ILWW: small scarp face with bare bank. The ordinary high water elevation can overtop bank crest or reach the face of scarp.

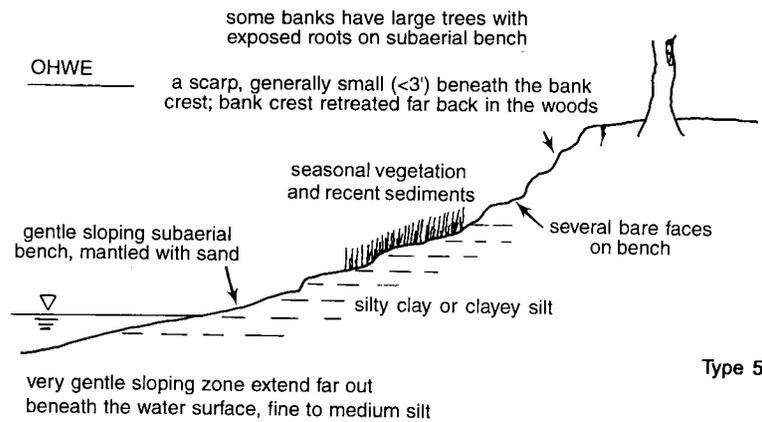


Figure 6-22. Type 5 bank on the ILWW: small scarp face and fairly long bench. The subaqueous bench has a gentle slope and extends far-out.

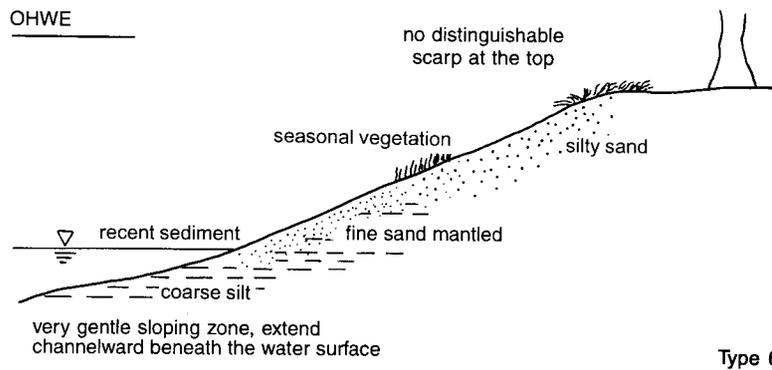


Figure 6-23. Type 6 bank on the ILWW: a gently slope bench with extended subaqueous bench.

Table 6-2. Bank Erosion Types, Main Features, and Erosion Potential on the Illinois Waterway

<i>Type</i>	<i>Main Features</i>	<i>Erosion Potential</i>
Type 1	<ul style="list-style-type: none"> • Steep to fairly steep scarp face, 5' ~ 20' height • Roots drape or exposed roots on upper portion of the bank • A narrow, mild sloping subaerial bench, some seasonal vegetation growing • Limited extend of subaqueous bench, drop-off at deeper part • Primarily silty sand to sandy materials • Near bank and underwater materials have similar characteristics • OHWE is close or falls below the base of scarp 	<ul style="list-style-type: none"> • Rework, transport of failed soils or recent sediment by waves and currents. Basal failure induces further bank slips • Piping or seepage sluice out coarse material, weakens basal support • Overland drainage • Man-made disturbance • Debris induced flow disturbance • Freeze/thaw cycles, weathering processes • Removal of surficial bank materials by waves and currents during high water or floods
Type 2	<ul style="list-style-type: none"> • Steep to fairly steep scarp face, 5' ~ 20' height • Exposed roots or vegetation cover on scarp • Narrow subaerial and subaqueous bench • Subaqueous bench drop to deeper depth quickly • Primarily silty clay or clayey silt materials • A persistent wet layer near the water's edge, some with algae growing • OHWE is on the scarp 	<ul style="list-style-type: none"> • Piping or seepage-processes weakens the basal support or strength of the bank • Scour by waves and currents; Bank slips follows the failure of basal support • Surficial block failures by waves or high water after the formation of tension cracks • Freeze - thaw - desiccation cycles, weathering processes • Debris induced local flow disturbances • Overland drainage • Man-made impact
Type 3	<ul style="list-style-type: none"> • Steep scarp face below bank crest, 1' ~ 5' height • A fairly extended subaerial bench with mild slope • Berm section is relatively wide • Extended subaqueous bench with gentle slope • Subaerial bench has recent sediment, some with desiccation cracks, seasonal vegetation growing • Primarily silty sand or sandy silt materials • OHWE is close to or fall below base of scarp 	<ul style="list-style-type: none"> • Transport of bench materials by waves and currents • Removal of surficial bank materials during high stages or floods • Overland drainage induced rill erosion on bench • Freeze - thaw - desiccation cycles, weathering • Piping or seepage induced failure • Wet and dry cycle induced tension cracks

Table 6-2. Bank Erosion Types, Main Features, and Erosion Potential on the Illinois Waterway(Concluded)

<i>Type</i>	<i>Main Features</i>	<i>Erosion Potential</i>
Type 4	<ul style="list-style-type: none"> • Fairly steep scarp below bank crest, 1'~5' height • Tree roots exposed on scarp • Sediment deposition on top of bank • Subaerial bench has a mild slope • Smaller scarps on subaerial bench • Generally subaerial bench is wet or has springs • Trees with exposed roots on bench zone • Shorter subaqueous bench than Type 3 • Primarily silt or silty clay materials • OHWE is on the scarp or higher than bank top 	<ul style="list-style-type: none"> • Transport bench material or recent sediment by waves and current • Piping and seepage related process • Removal of surficial bank materials during high water or floods • Overland drainage • Wave wash and seepage creates scarps on bench area • Freeze - thaw - desiccation cycles, weathering processes
Type 5	<ul style="list-style-type: none"> • A small scarp (< 3') remain on top of bank section, some with several bare scarps on the upper bank • Sediment deposition on top of bank, buried tree roots • No clear division of berm and bench • Gentle sloping bench, mantled with sand (recent sediment) • Gentle sloping subaqueous bench, extends far out • Primarily fine to medium silt materials • OHWE may submerge bank crest 	<ul style="list-style-type: none"> • Transport bench materials by waves and currents • Removal of surficial bank materials during high water or floods • Overland drainage • Seepage related process
Type 6	<ul style="list-style-type: none"> • Seldom has distinguishable scarp or bare faces • Sediment deposition on bank crest, deposition around trees • No distinguishable berm and bench • Recent sediment on bench area • Gentle sloping bench zone • Very gentle bench slope, subaqueous bench extend far into channel • Primarily fine to medium silt materials • OHWE may overtop the bank 	<ul style="list-style-type: none"> • Rework and transport of bench materials by waves and current • Removal of surficial bank materials during high water or floods • Seepage related process (wet/dry, poor drainage, piping) • Overland drainage

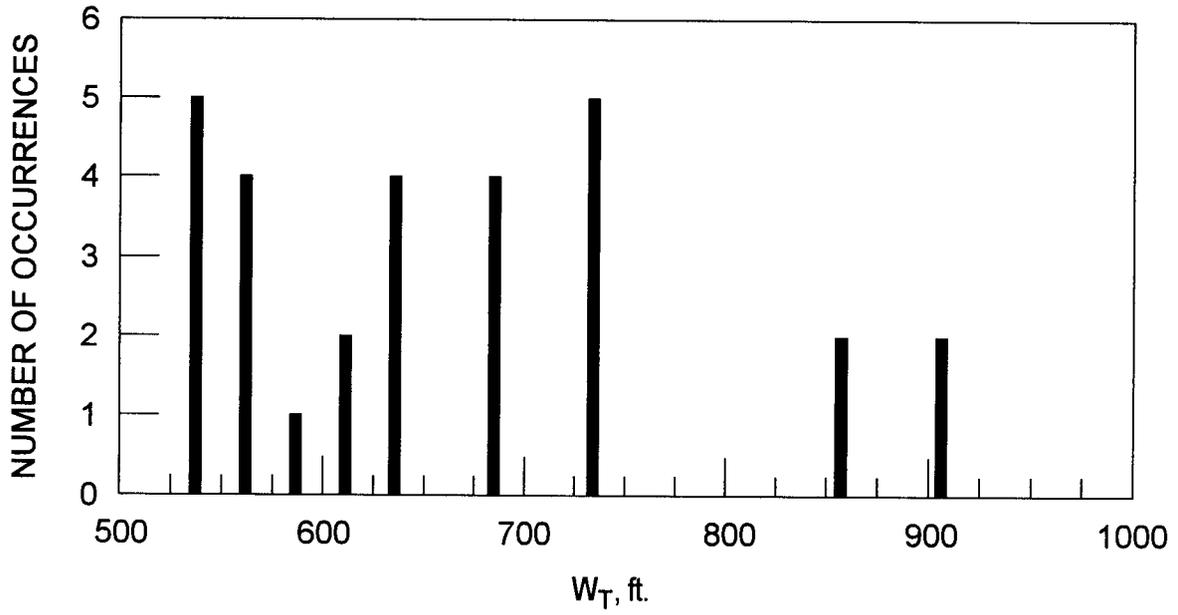


Figure 6-24. Histogram of the top widths, W_T , at the mid section measuring station of the Illinois River

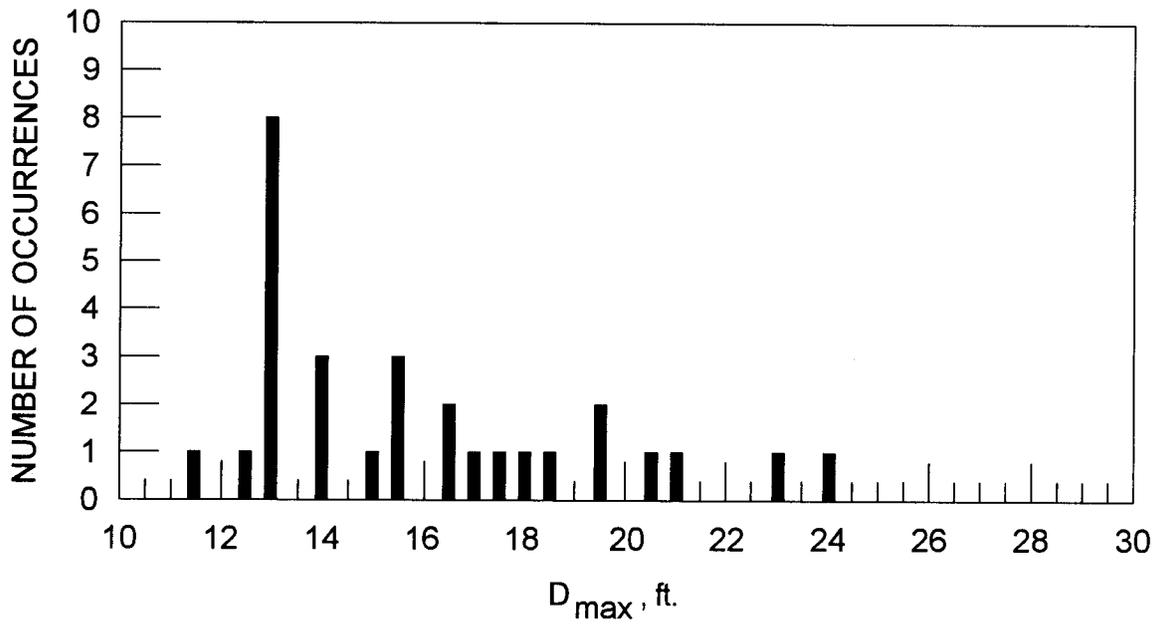


Figure 6-25. Histogram of the maximum depths, D_{max} , at the mid section measuring station of the Illinois River

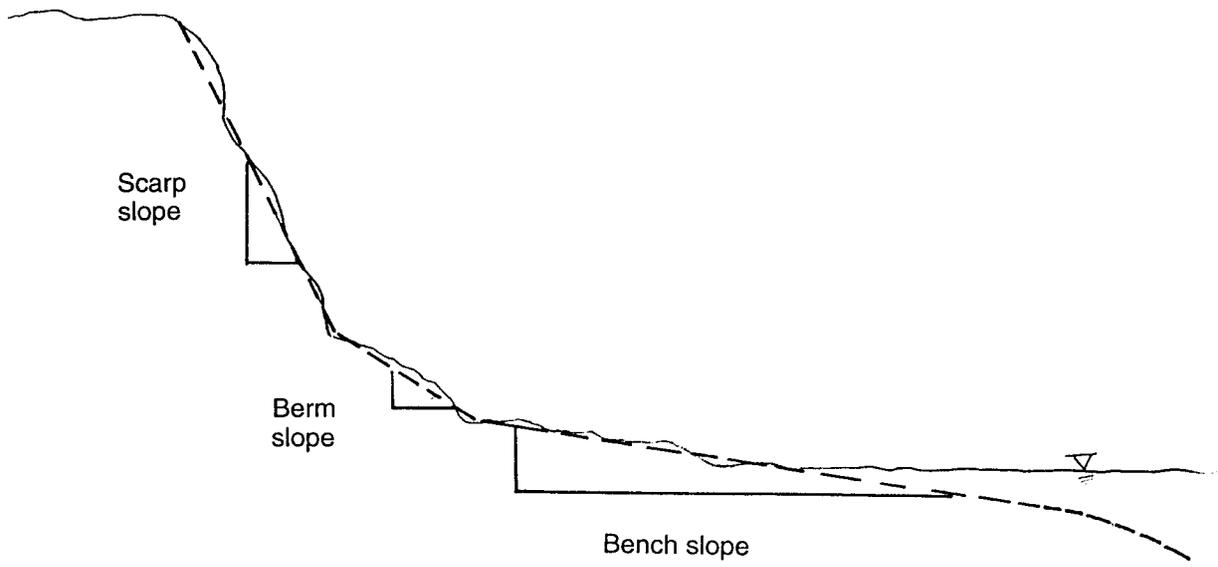


Figure 6-26. Definition sketch for scarp, berm and bench slopes

Figures 6-27 shows plots of histograms for these three parameters, respectively. The scarp slope varied from 1V:3.2H to 1V:0.04H with a median value of 1V:95H. Similarly, the berm slope varied from 1V:8.33H to 1V:0.83H with a median value of 1V:2.84H and a Standard Deviation of 0.23. The bench slope varied from 1V:81.00H to 1V:1H with a median value of 1V:11.1H.

Scarp and bench slopes did not vary as much as the berm slopes. The majority of the scarp slopes were close to 1V:0.71H or 1V:0.48H, and most bench slopes were between 1V:20H and 1V:10H. Most berm slopes, on the other hand, were between 1V:3.33H and 1V:2.5H.

Bank soils. A total of 174 surficial bank samples, including 81 core samples, were analyzed. Figure 6-28 shows histograms of d_{50} and d_{85} sizes of the bank soils and core samples collected from the Illinois River. For 141 of the samples, the d_{50} was in the range of 0.002 mm to 0.696 mm. The median value was 0.024 mm and the standard deviation was 0.133. The surficial soils and sediments at the eroded sites are well graded.

For about 151 samples, the d_{85} values range from 0.014 mm to 5.073 mm. The median value is equal to 0.169 mm with a standard deviation of 0.802 mm. From the figures it is safe to state that the most frequent occurrence of d_{50} values is less than 0.015 mm.

The uniformity of the bank soils is examined by the value and spread of standard deviation, σ , and uniformity coefficient, U. Histograms for these two values for all the samples are given in figure 6-29. Whenever the particles are quite uniform, then the values of σ and U approach one. Significant deviations from the value of 1 indicate the presence of graded materials. Figure 6-29 indicates that the values of σ and U are close to 2 or more, showing that the surficial soils and sediments at the eroded sites are well graded.

Site Lengths. These length limits were accurately determined using a portable GPS, which was mentioned earlier. Figure 6-30 shows the distribution of these measured site length vary from a minimum of 0.09 mile to about 0.95 mile. The median values is 0.22 mile with a standard deviation of 0.21 mile. Most of the sites clustered around values of 0.15 mile to 0.25 mile (figure 6-30).

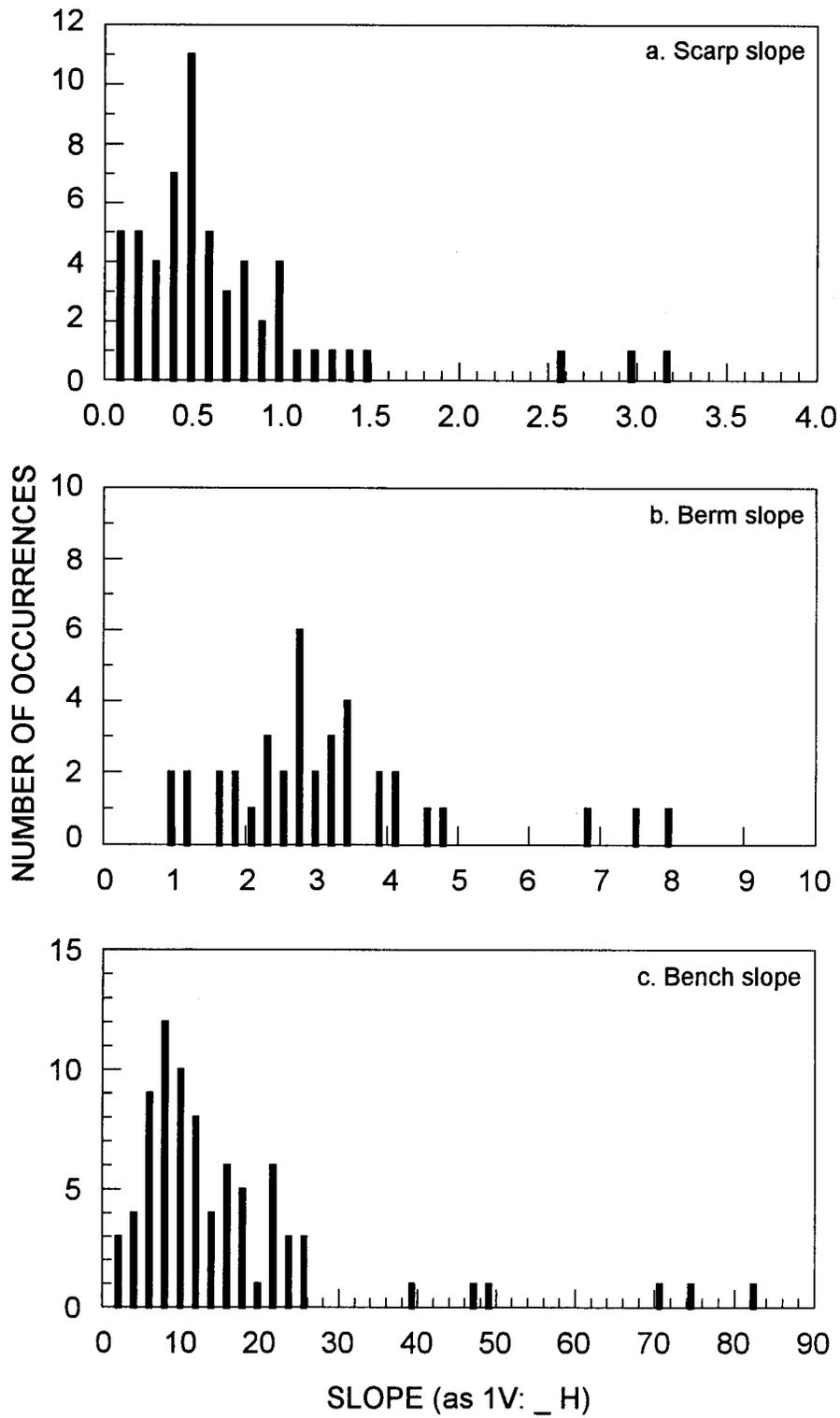


Figure 6-27. Histograms of scarp, berm, and bench slopes for the Illinois Waterway

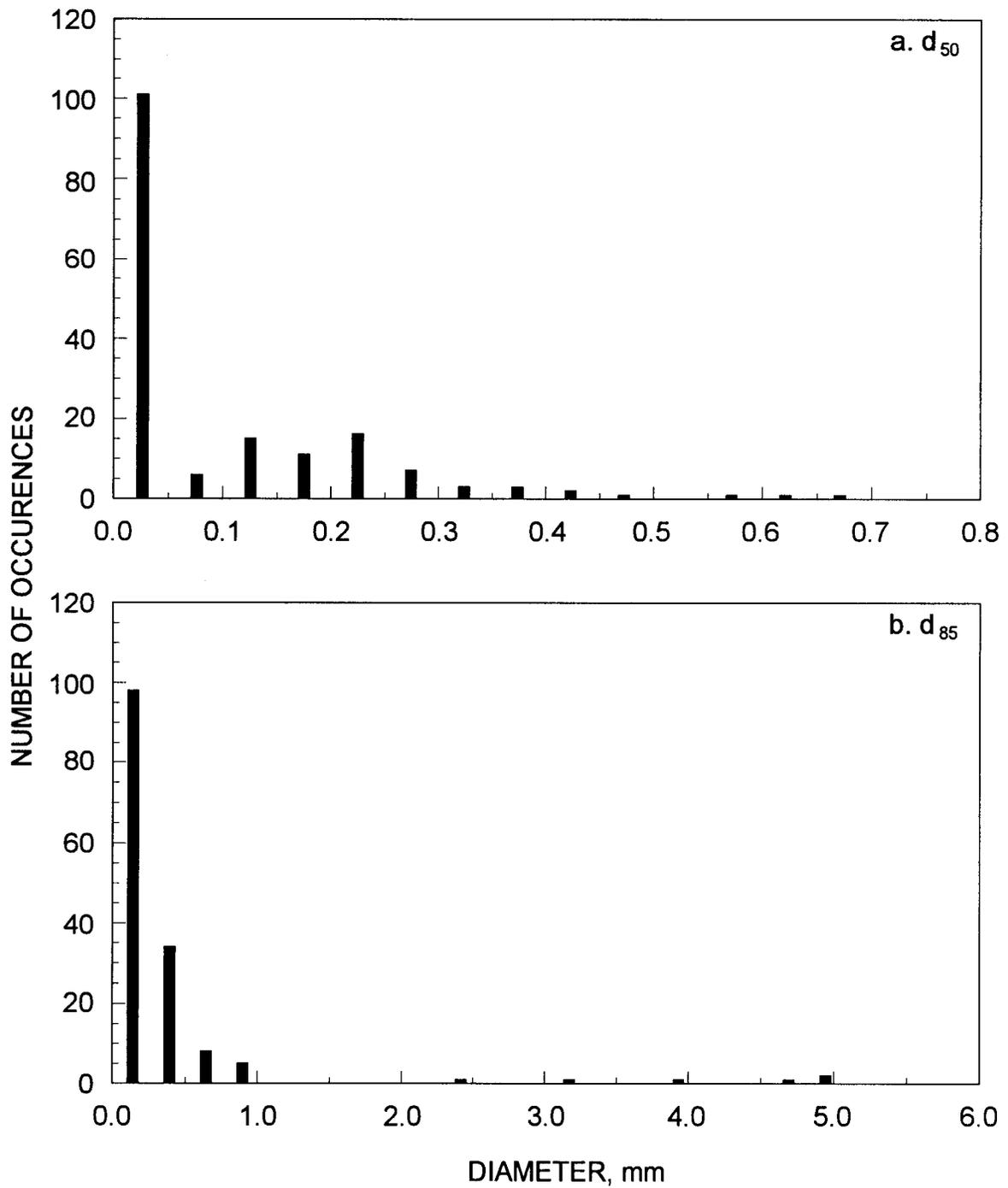


Figure 6-28. Histograms of d_{50} and D_{85} sizes of the bank materials on the Illinois Waterway

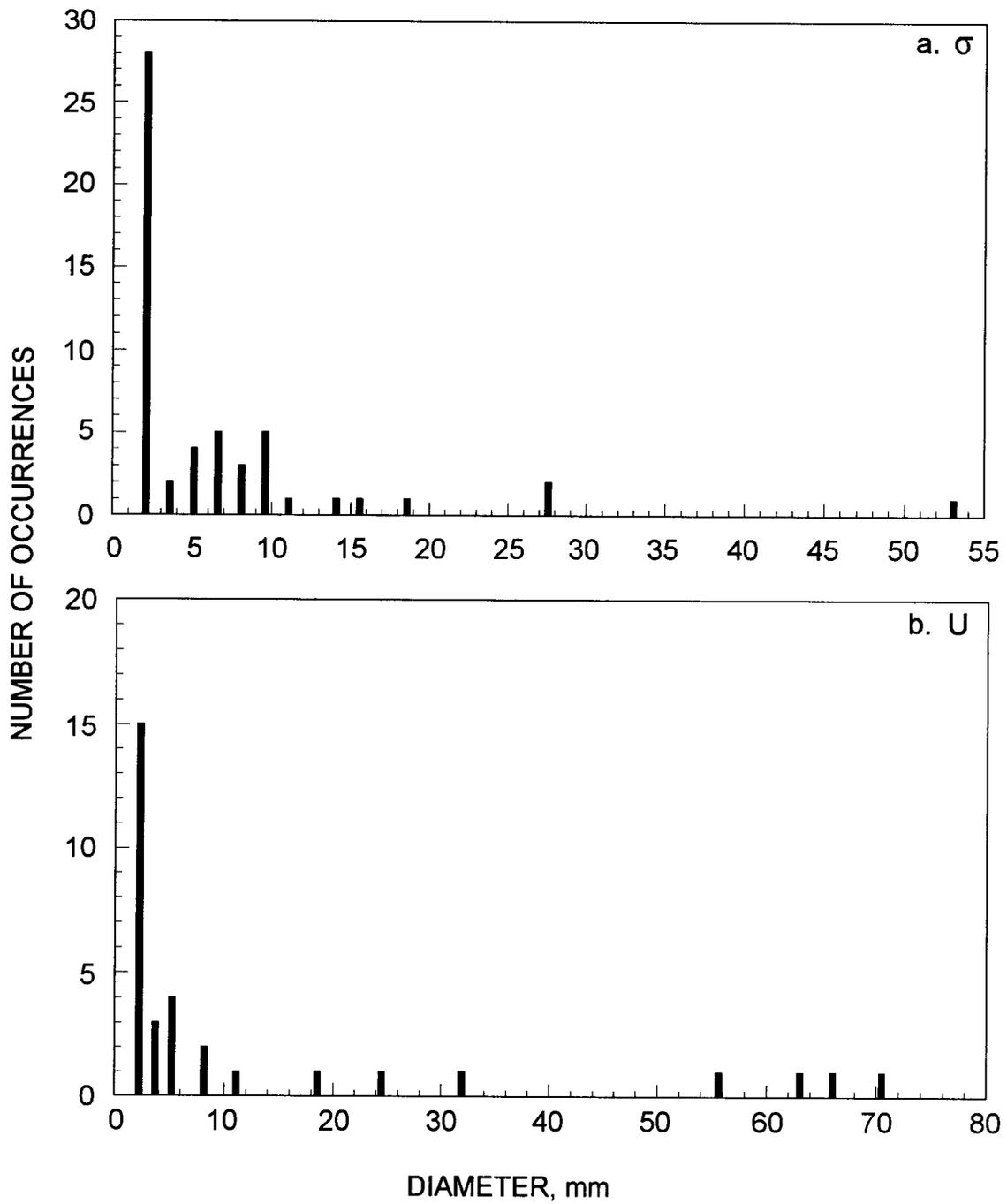


Figure 6-29. Histograms of σ and U for all the bank materials from the Illinois Waterway

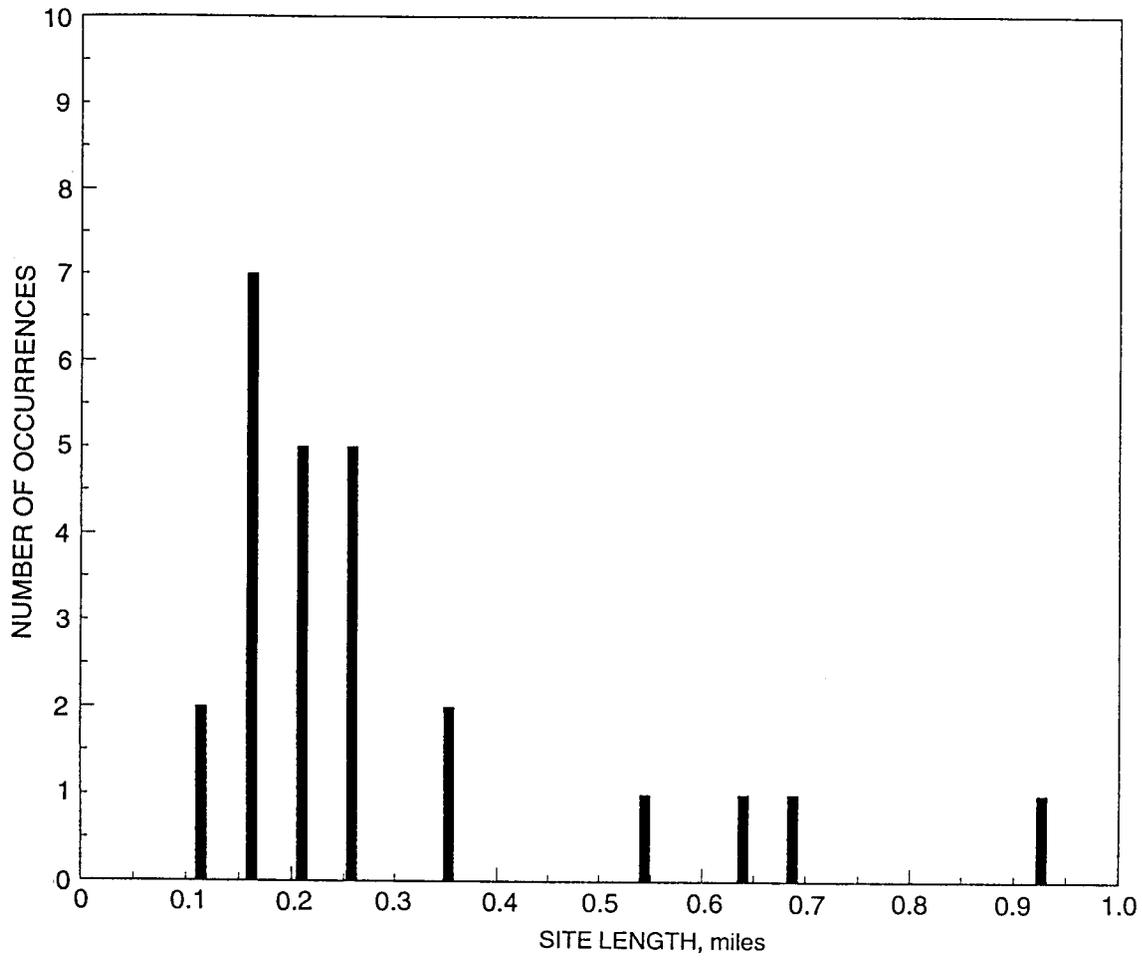


Figure 6-30. Histograms of site lengths for the Illinois Waterway bank erosion study

Geomorphic and Land Cover Characteristics For the sites where field data were collected, geomorphic characteristics were listed as Right Descending Bank (RDB), Left Descending Bank (LDB), straight or curve reaches, inside or outside of a bend, crossover position, and island sites. Land covers on the bank crests were recorded as: urban, agriculture, grass/weeds, and wooded.

Figure 6-31 shows geomorphic characteristics and land cover. Examination of this illustration shows that 17 sites on the RDB, 12 sites on the LDB, 13 sites on the straight reaches, 11 sites on the outside of the bank, 3 sites on the inside of the bank, and only 2 sites on the crossover. The dominant land covers on the bank crest were wooded followed by agricultural crops, grasses, or weeds. Furthermore, most of the selected sites were natural banks, with the remaining belonging to levees and railroad embankment.

The geomorphic parameters are also indicated on the IWW profiles map and are shown in figure 6-32. Most of the straight-reach sites selected for the present study were from the upper- and lowermost portions of the waterway, whereas erosion sites selected from the outside bank are distributed over the entire river length. Three inside-bend sites are all located in the La Grange Pool. Only one site is located on a crossover, in the Peoria Pool.

Table 6-3 shows the relative positions of these sites with respect to portions of the pools.

Table 6-3. Location of Surveyed Site in Navigation Pool, the Illinois Waterway

<i>Pool</i>	<i>Upper 1/3</i>	<i>Middle 1/3</i>	<i>Lower 1/3</i>
Marseilles	UP1, UP2, UP3, UP4 UP5		
Starved Rock	1, 2	3	
Peoria	4, 5, 6	7, 8	9, 10
La Grange	11, 12, 13	14, 15, 16, 17	18, 19
Alton	20, 21	22	23, 24

Summary:

- 13 sites are in the upper 1/3 of a pool
- 8 sites are in the middle 1/3 of a pool
- 8 sites are in the lower 1/3 of a pool

Table 6-4 provides additional parameters associated with the IWW erosion sites. Table 6-5 is a summary of bank characteristics, which can serve as the basis for selecting future study sites.

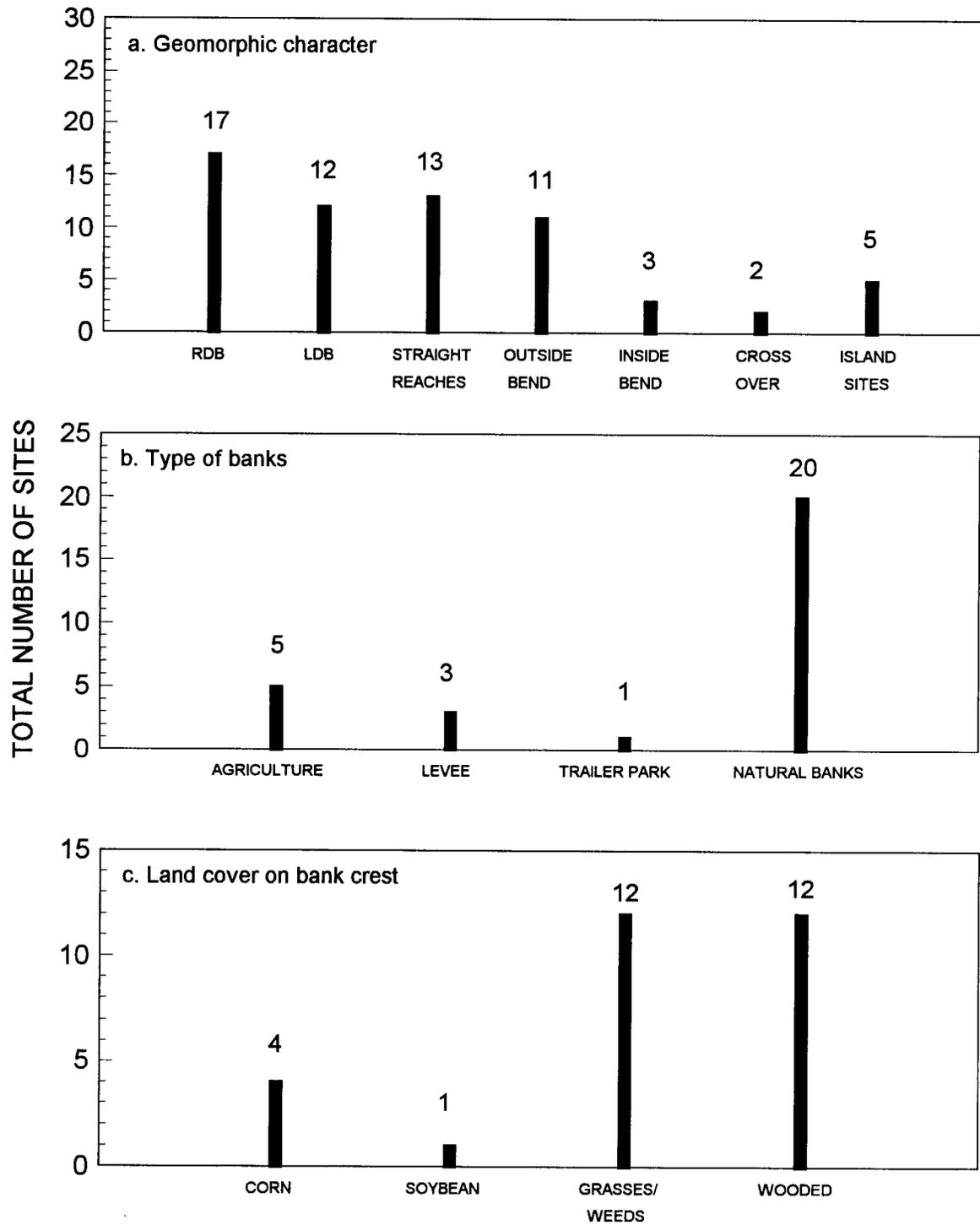


Figure 6-31. Histograms of geomorphic and land use characteristics of the erosion sites on the Illinois Waterway

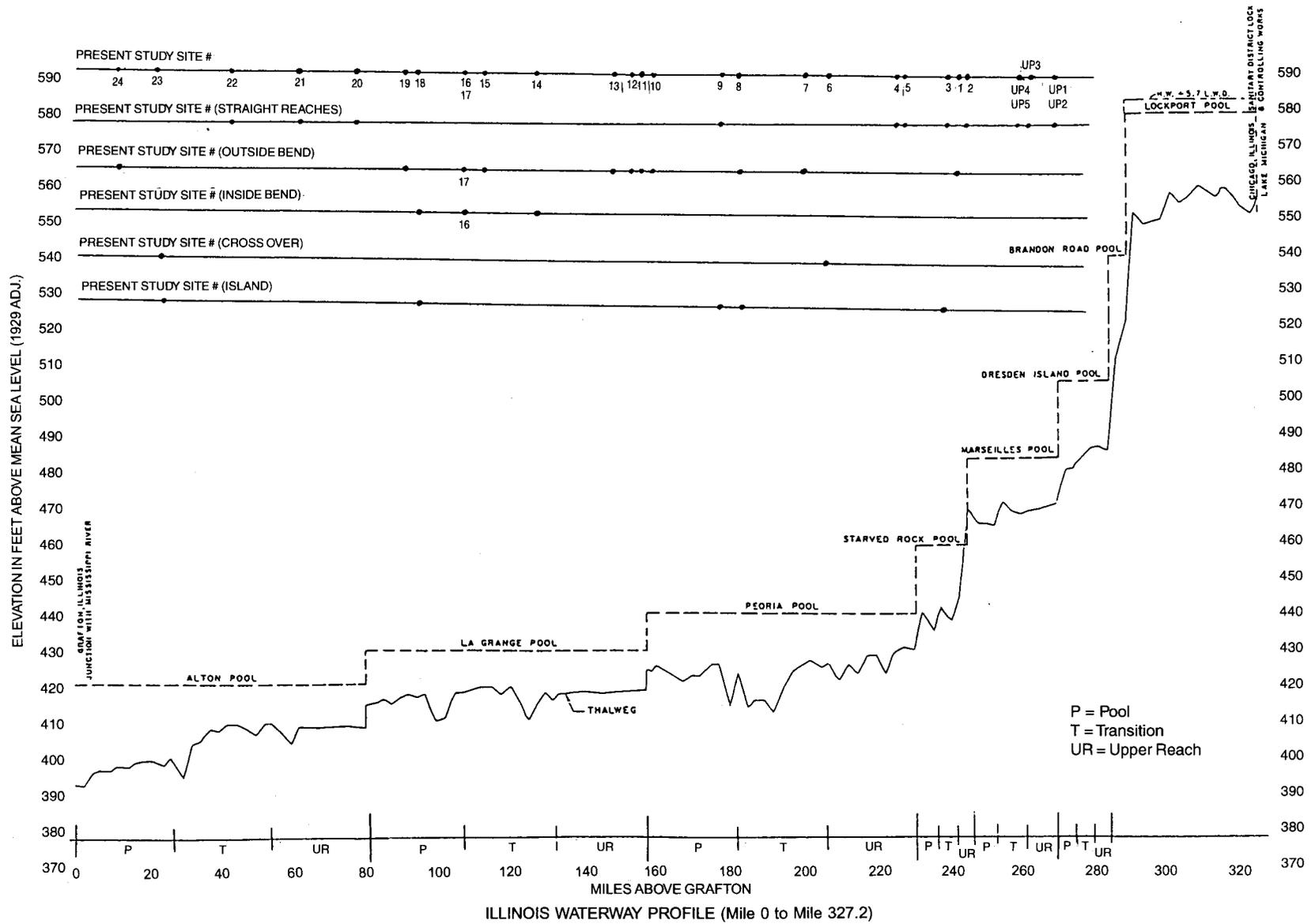


Figure 6-32. Relative locations of selected sites on the Illinois Waterway

Table 6-4. Selected Parameters Associated with the Illinois Waterway Erosion Sites

Site#	Date in 1995	Time	RM	Section	Side	Pool	Length (miles)	Stage (msl)	f (%)	OHW (msl)	NP (msl)	Type	Remarks
UP1	18/09	04:15 PM	270.8	up	RDB	Marseilles		483.9	90	486.6	483.3	1&3	
UP1	18/09	03:30 PM	270.8	mp	RDB	Marseilles		483.9	90	486.6	483.3	1&3	
UP1	18/09	04:00 PM	270.8	dn	RDB	Marseilles		483.9	90	486.6	483.3	1&3	
UP2	18/09	04:30 PM	270.8	mp	LDB	Marseilles		483.9	90	486.6	483.3	5	
UP3	19/09	08:20 AM	264.3	up	LDB	Marseilles		483.7	80	485.7	483.3	3	
UP3	20/09	07:30 AM	264.3	mp	LDB	Marseilles	0.15	483.7	80	485.7	483.3	3	
UP3	20/09	08:00 AM	264.3	dn	LDB	Marseilles		483.7	80	485.7	483.3	3	
UP4	20/09	10:30 AM	262.2	up	LDB	Marseilles		483.7	90	485.5	483.3	2&3	} Fleeting Area Silty clay bank, sandy bench
UP4	20/09	10:00 AM	262.1	mp	LDB	Marseilles	0.34	483.7	90	485.5	483.3	2&3	
UP4	20/09	10:20 AM	262.0	dn	LDB	Marseilles		483.7	90	485.5	483.3	2&3	
UP5	20/09	11:00 AM	262.1	mp	RDB	Marseilles		483.7	90	485.5	483.3	4&5	Silty clay bank, subaqueous scour
1	28/08	12:45 PM	242.9	up	LDB	Starved Rock		458.6	90	460.0	458.5	1	Aggregated silt blocks
1	28/08	10:45 AM	242.8	mp	LDB	Starved Rock	0.24	458.8	90	460.1	458.5	1	
2	28/08	11:45 AM	243.4	mp	LDB	Starved Rock		459.4	50	460.3	458.5	2&6	extended shallow bench
3	28/08	04:00 PM	235.7	up	RDB	Starved Rock		459.0	75	459.5	458.5	1&6	extended shallow bench
3	28/08	04:13 PM	235.7	mp	RDB	Starved Rock	0.14	459.0	75	459.3	458.5	1&6	
3	28/08	03:20 PM	235.7	dn	RDB	Starved Rock		459.0	75	459.3	458.5	1&6	
4	28/08	06:25 PM	228.1	up	LDB	Peoria		441.6	75	446.1	440.0	5	
4	28/08	06:40 PM	228.0	mp	LDB	Peoria	0.24	441.6	75	446.0	440.0	5	
4	28/08	07:00 PM	228.0	dn	LDB	Peoria		441.6	75	446.0	440.0	5	
5	28/08	07:40 PM	229.0	up	RDB	Peoria		441.6	75	446.4	440.0	3&5	} downstream of a barge terminal piping at lower bank, wave wash on bench area subaqueous scour
5	28/08	07:25 PM	228.75	mp	RDB	Peoria	0.21	441.6	75	446.2	440.0	3&5	
5	28/08	07:30 PM	228.75	dn	RDB	Peoria		441.6	75	446.3	440.0	3&5	
6	29/08	10:35 AM	210.0	up	RDB	Peoria		441.1	75	444.3	440.0	4	
6	29/08	10:40 AM	210.0	mp	RDB	Peoria	0.34	441.1	75	444.3	440.0	5	
6	29/08	11:15 AM	209.7	dn	RDB	Peoria		441.1	75	444.2	440.0	6	
7	29/08	12:15 PM	203.8	up	LDB	Peoria		441.1	75	443.9	440.0	5	} levee
7	29/08	12:00 PM	203.8	mp	LDB	Peoria	0.20	441.1	75	443.9	440.0	5	
7	29/08	12:45 PM	203.5	dn	LDB	Peoria		441.1	75	443.9	440.0	5	

Note: River mile at the mid-point of a reach is used if the river miles at the upstream or downstream points are unknown.

**Table 6-4. Selected Parameters Associated with the
Illinois Waterway Erosion Sites (Continued)**

<i>Site#</i>	<i>Date in 1995</i>	<i>Time</i>	<i>RM</i>	<i>Section</i>	<i>Side</i>	<i>Pool</i>	<i>Length (miles)</i>	<i>Stage (msl)</i>	<i>f (%)</i>	<i>OHW (msl)</i>	<i>NP (msl)</i>	<i>Type</i>	<i>Remarks</i>
8	29/08	02:45 PM	184.9	up	LDB	Peoria		441.1	73	442.6	440.0	4&5	} piping at lower scarp, extended subaqueous bench
8	29/08	02:30 PM	184.8	mp	LDB	Peoria	0.26	441.1	73	442.6	440.0	4&5	
8	29/08	03:05 PM	184.7	dn	LDB	Peoria		441.1	73	442.6	440.0	4&5	
9	29/08	03:50 PM	179.8	up	LDB	Peoria		440.6	90	442.4	440.0	6	
9	29/08	03:45 PM	179.9	mp	LDB	Peoria	0.21	440.6	90	442.4	440.0	6	
9	29/08	04:05 PM	179.7	dn	LDB	Peoria		440.6	90	442.4	440.0	6	
10	29/08	06:25 PM	160.0	up	RDB	Peoria		440.5	50	441.4	440.0	4&5	} extended subaqueous bench
10	29/08	06:20 PM	160.0	mp	RDB	Peoria	0.11	440.5	50	441.4	440.0	4&5	
10	29/08	06:45 PM	160.0	dn	RDB	Peoria		440.5	50	441.4	440.0	4&5	
11	30/08	11:00 AM	155.5	up	RDB	La Grange		432.8	70	440.8	429.5	6	
11	30/08	08:15 AM	155.3	mp	RDB	La Grange	0.54	432.8	70	440.8	429.5	6	
11	30/08	11:30 AM	155.1	dn	RDB	La Grange		432.8	70	440.8	429.5	6	
12	30/08	08:45 AM	154.6	up	LDB	La Grange		432.8	70	440.7	429.5	5	
12	30/08	09:40 AM	154.4	mp	LDB	La Grange	0.62	432.8	70	440.7	429.5	5	
12	30/08	10:40 AM	154.2	dn	LDB	La Grange		432.8	70	440.7	429.5	5	
13	30/08	12:15 PM	150.6	up	LDB	La Grange		432.3	75	440.5	429.5	4	} water surface on scarp face may be scraped by traffic
13	30/08	12:10 PM	150.5	mp	LDB	La Grange	0.18	432.3	75	440.5	429.5	4	
13	30/08	12:45 PM	150.5	dn	LDB	La Grange		432.3	75	440.5	429.5	4	
14	30/08	04:15 PM	129.4	up	RDB	La Grange		431.2	80	438.5	429.5	4	
14	30/08	04:15 PM	129.3	mp	RDB	La Grange	0.28	431.2	80	438.5	429.5	4	levee
14	30/08	04:45 PM	129.2	dn	RDB	La Grange		431.2	80	438.5	429.5	4	subaqueous scour
15	30/08	06:35 PM	116.7	up	RDB	La Grange		430.8	75	437.0	429.5	3&5	} levee
15	30/08	06:45 PM	116.5	mp	RDB	La Grange	0.95	430.8	75	437.0	429.5	3&5	
15	30/08	07:10 PM	116.3	dn	RDB	La Grange		430.8	75	437.0	429.5	3&5	
16	31/08	11:05 AM	109.5	up	LDB	La Grange		430.6	75	435.8	429.9	2	
16	31/08	10:25 AM	109.5	mp	LDB	La Grange	0.18	430.6	75	435.7	429.9	2	
16	31/08	10:38 AM	109.5	dn	LDB	La Grange		430.6	75	435.6	429.9	3	near Anderson Lake
17	31/08	10:00 AM	109.6	up	RDB	La Grange		430.6	75	435.7	429.9	5	
17	31/08	09:15 AM	109.5	mp	RDB	La Grange	0.18	430.6	75	435.7	429.9	5	
17	31/08	10:30 AM	109.4	dn	RDB	La Grange		430.6	75	435.7	429.9	4	
18	31/08	02:40 AM	94.2	up	RDB	La Grange		429.9	75	433.7	429.9	4	
18	31/08	02:15 PM	94.2	mp	RDB	La Grange	0.09	429.9	75	433.7	429.9	2&4	
18	31/08	02:20 PM	94.2	dn	RDB	La Grange		429.9	75	433.7	429.9	4	

**Table 6-4. Selected Parameters Associated with the
Illinois Waterway Erosion Sites (Concluded)**

<i>Site#</i>	<i>Date in 1995</i>	<i>Time</i>	<i>RM</i>	<i>Section</i>	<i>Side</i>	<i>Pool</i>	<i>Length (miles)</i>	<i>Stage (msl)</i>	<i>f (%)</i>	<i>OHW (msl)</i>	<i>NP (msl)</i>	<i>Type</i>	<i>Remarks</i>
19	31/08	03:05 PM	91.2	up	RDB	La Grange		429.9	65	433.3	429.9	2&4	downstream of barge terminals
19	31/08	04:00 PM	91.2	mp	RDB	La Grange	0.22	429.9	65	433.3	429.9	2&4	
19	31/08	04:30 PM	91.1	dn	RDB	La Grange		429.9	65	433.3	429.9	2&4	
20	31/08	07:40 PM	79.6	up	RDB	Alton		420.6	90	NA	NA	2	d/s La Grange L & D
20	31/08	07:15 PM	79.4	mp	RDB	Alton	0.67	420.6	90	NA	NA	2	
20	31/08	07:20 PM	79.2	dn	RDB	Alton		420.6	90	NA	NA	2	
21	01/09	11:00 AM	61.8	up	RDB	Alton		420.6	80	NA	NA	5	} wet bench small scarp on top of bank, wet bench, shorter subaqueous bench
21	01/09	10:45 AM	61.7	mp	RDB	Alton	0.23	420.6	80	NA	NA	4	
21	01/09	10:40 AM	61.6	dn	RDB	Alton		420.6	80	NA	NA	5	
22	01/09	01:00 PM	45.1	up	RDB	Alton		419.9	85	NA	NA	4&5	
22	01/09	12:50 PM	45.1	mp	RDB	Alton	0.14	419.9	85	NA	NA	4&5	
22	01/09	01:30 PM	45.1	dn	RDB	Alton		419.9	85	NA	NA	4&5	
23	01/09	04:30 PM	23.5	up	RDB	Alton		419.3	90	NA	NA	4	
23	01/09	04:20 PM	23.4	mp	RDB	Alton	0.18	419.3	90	NA	NA	4	
23	01/09	04:45 PM	23.3	dn	RDB	Alton		419.3	90	NA	NA	2	
24	01/09	06:30 PM	13.1	up	RDB	Alton		419.3	90	NA	NA	2&5	
24	01/09	06:00 PM	13.0	mp	RDB	Alton	0.24	419.3	90	NA	NA	2&5	
24	01/09	06:15 PM	12.9	dn	RDB	Alton		419.3	90	NA	NA	2&5	

Note: OHW = Ordinary High Water Level; NP = Normal Pool Level

Table 6-5. Classification of the Erosion Sites on the Illinois Waterway

<i>Parameters</i>	<i>Most frequent values</i>	<i>Second most frequent values</i>
Bench Slopes	18* (0.025-0.05)	15 (0.1-0.125)
Berm Slopes	4 (3 ranges)	3 (3 ranges)
Scarp Slopes	16 (1.4-2.1)	13 (0.7-1.4)
d ₅₀	101 (0.0-0.05)	16 (0.18-0.23)
d ₈₅	98 (0.0-0.14)	34 (0.14-0.39)
σ	28 (2-3)	5 (6-7; 9-10) (2 ranges)
U	15 (2-3)	4 (5-6)
Site Lengths	7 (0.15-0.2)	5 (0.2-0.25) (2 ranges)
Sites with Natural Banks	28	---
Top Width	5 (525-550) (2 ranges)	4 (550-575) (3 ranges)
Max Depth	8 (12.5-13.0)	3 (14-14.5) (2 ranges)

Relative Locations: 17 on the RDB, 12 on the LDB;

13 on straight reach, 11 on outside bend, 3 on inside bend, and 2 on cross-over;

5 sites were located on islands

Note: number of occurrence; a and b in the parenthesis (a:b) represent the lower and upper values of a range.

Site Descriptions

Overall, 80 bank sections at 29 sites were measured during the field trip, 183 bank soil samples were collected, and 174 samples were analyzed. River cross sections were also measured at 29 locations.

For each site, a site location map, a representative site photograph, all the bank sections and channel cross sections measured for the site are presented. In the bank section plots, d_{50} values (in mm) at surficial sampling locations, the ordinary high water surface elevation (OHW) and the normal pool elevation (NP), noted soil classifications (see Table 5-1 for acronyms) and other observations are noted. Readers are referred to figure 6-16 and table 6-1 for specific locations. All the sites are described starting at the upstream end of the IWW. Types of erosion at each site will be cross-referenced with the “Types” shown in figures 6-18 - 6-23 and described in table 6-2. In order to reduce the number of illustrations within the main body of the report, all the plots associated with the determination of the bank soil size distributions and the river cross sections are included in appendices F and G, respectively.

Site UP1, Marseilles Pool, 9/18/95. This site is located on the Right Descending Bank (RDB) of the Illinois River at RM 270.8, a straight reach approximately 0.8 miles downstream of the Dresden Island L&D (RM 271.5). Figure 6-33 shows the position of the site on a GIS-based map of the Illinois navigation chart, and figure 6-34 shows one photograph of the site.

The site is about 180 feet from the sailing line and no major tributary enters the IWW at this location. An Elgin Joliet and Eastern Railroad bridge is located at RM 270.6. In two earlier studies Bhowmik and Schicht (1980) indicated erosion on the RDB while Hagerty (1988) indicated erosion on both banks.

An almost vertical failure face approximately 15 to 20 feet high is present at this site. Recession of the bank line is close to the support of a nearby powerline frame. One of the four legs of a nearby powerline support was only 3 feet away from the bank face.

Only one river cross section was measured at this site, and the detailed cross section and coordinates are shown in appendix G. Three bank sections were measured at this site, as given in figure 6-35 with the computed values of bench slopes and median diameters of the bank soils. For site UP1, the OHW is at 486.6 and NP is at 483.3 feet above msl, respectively. The NP elevation

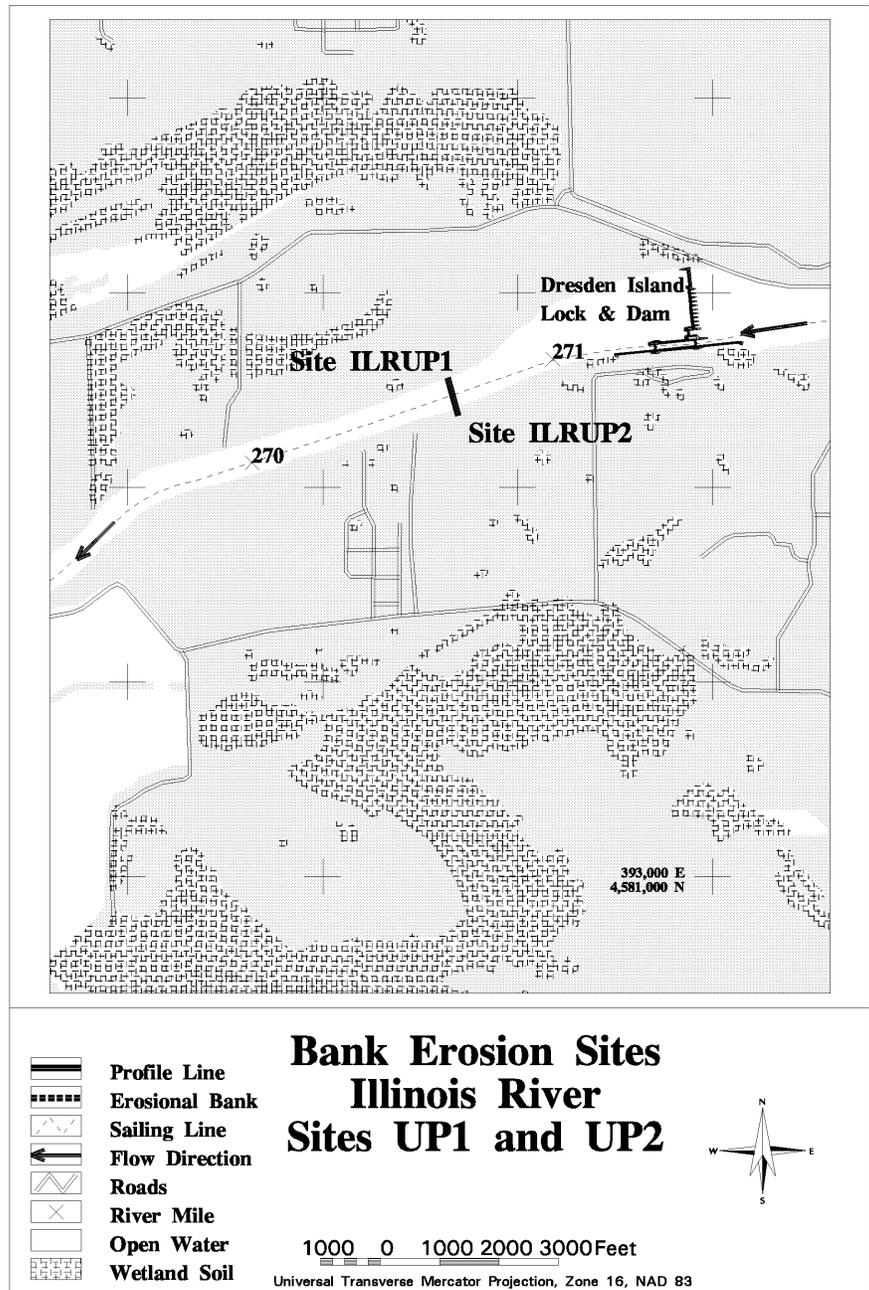


Figure 6-33. Locations of sites UP1 and UP2 on the Illinois Waterway



Figure 6-34. Site UP1 on the Illinois Waterway

corresponds to a break in the subaqueous bench slope. There were weeds growing on the bench near the base of the scarp. The bank above the OHW line is relatively high as compared to local stage fluctuations. According to 10-year stage data (see table 6-6), the OHW reaches the base of the scarp and only high stages (less than 10% exceedence frequency, or approximately at 489.9 feet) can reach the existing scarp face. Otherwise, normal stage fluctuations (the range between OHW and NP) occur mostly on the bench area.

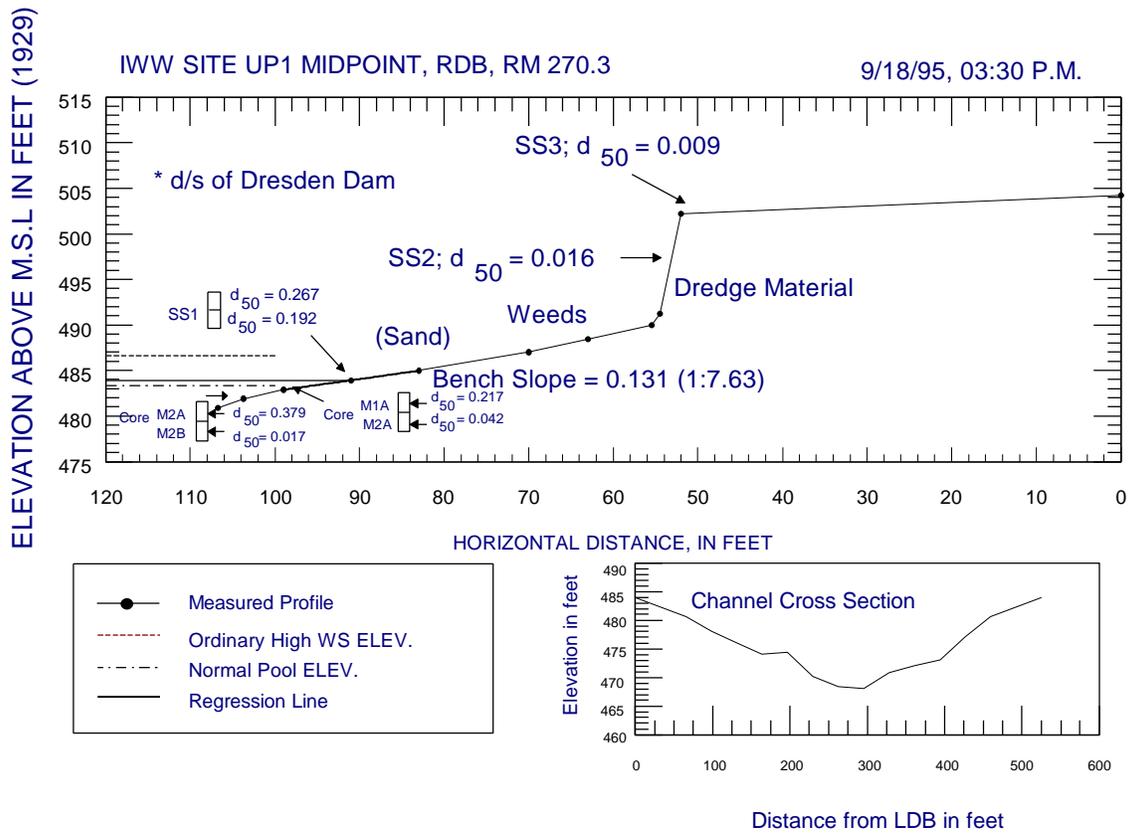
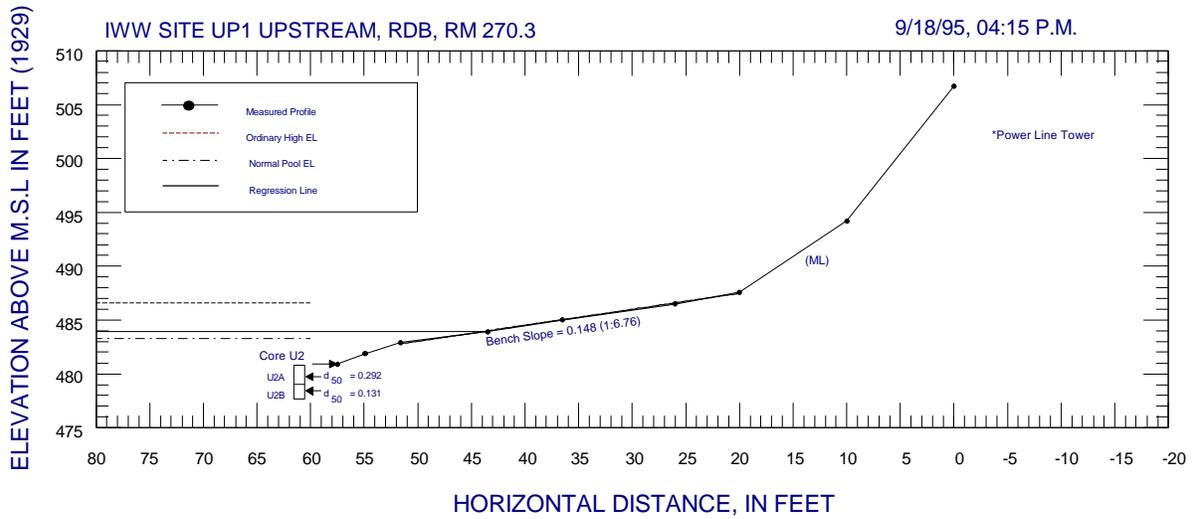


Figure 6-35. Bank sections at site UP1