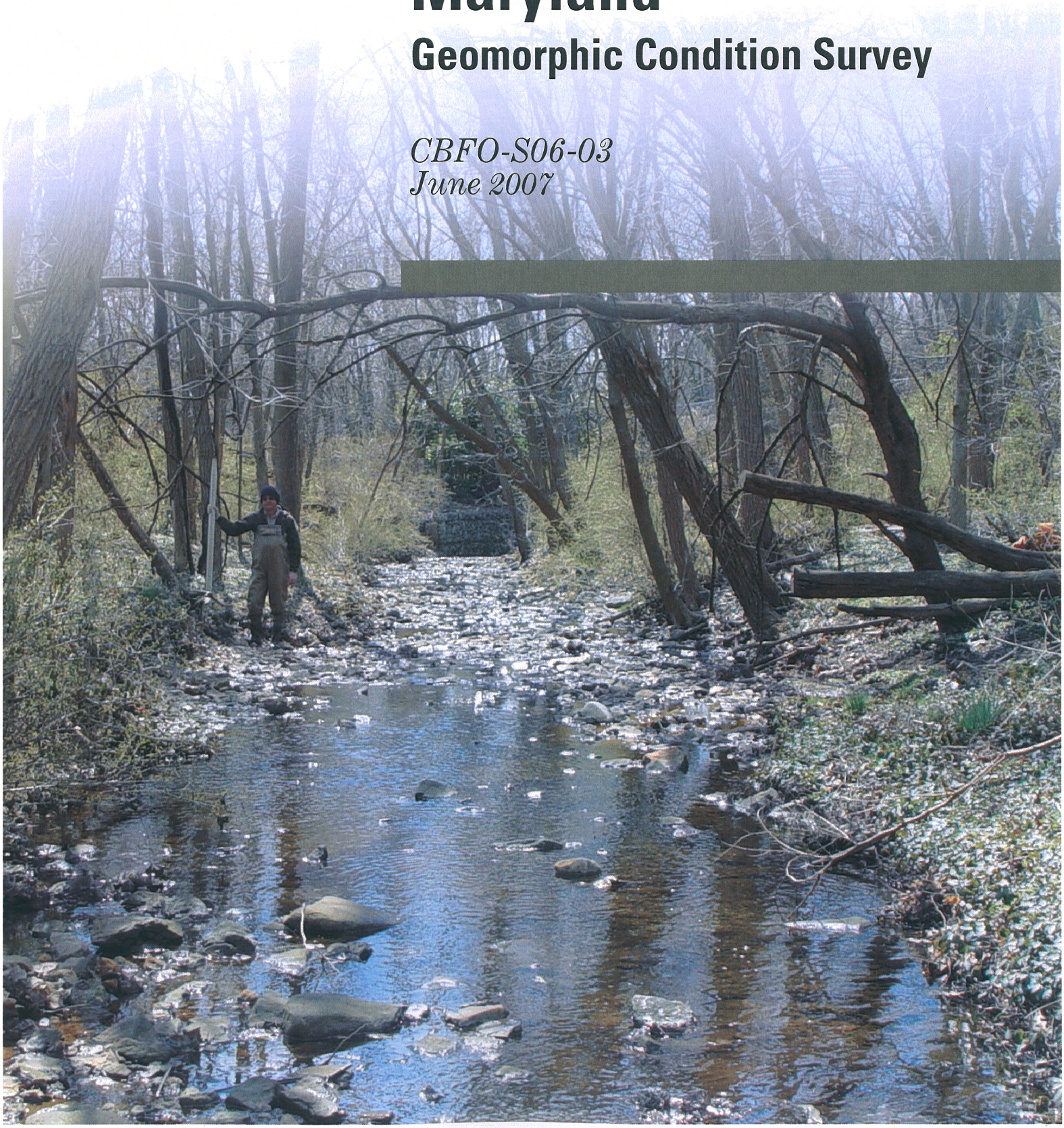
U.S. Fish & Wildlife Service

Stony Run Baltimore City, Maryland

Geomorphic Condition Survey

CBFO-S06-03
June 2007



STONY RUN, BALTIMORE CITY, MARYLAND
GEOMORPHIC BASELINE SURVEY

By: Christopher K. Eng, Karl M. Fleming, and Richard R. Starr

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Stream Habitat Assessment and Restoration Program
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

CBFO-S06-03

Prepared in cooperation with:
City of Baltimore, Department of Public Works, Bureau of Water and Wastewater

Annapolis, MD
June 2007

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I. INTRODUCTION

The City of Baltimore (City) and the U.S. Fish and Wildlife Service (Service) – Chesapeake Bay Field Office have entered into a partnership agreement (Agreement 51410-1902-5047) to enhance cooperation and coordination between the City and the Service to allow for the conservation, enhancement, and restoration of stream and riparian habitats in the Baltimore City watershed.

Under this partnership agreement, the Service conducted a limited geomorphic survey for the portion of Stony Run located between Northern Parkway and Wyndhurst Avenue, in Baltimore City, Maryland (Figure 1). The Service's efforts are part of a baseline study initiated by the City in 2001 to document existing stream conditions.

The City plans to restore this portion of Stony Run in 2006. As part of the restoration effort, the City contracted STV Incorporated (STV) to conduct a stream stability study in 2001 (STV Incorporated 2001). The purpose of the study was to assess and document the baseline stream characteristics and stability conditions. The study included monumented cross section surveys, limited longitudinal profile surveys, pebble counts, bar samples, cross section bank erosion hazard index and near bank shear stress assessments, and bank pin surveys. Later in 2001, STV resurveyed the monumented cross sections to validate their original erosion predictions.

The City requested the Service to conduct another study to document the baseline stream conditions prior to the restoration of Stony Run. This study documents active channel adjustments, and will allow the City to compare pre- and post restoration stream conditions to document the benefits of the restoration.

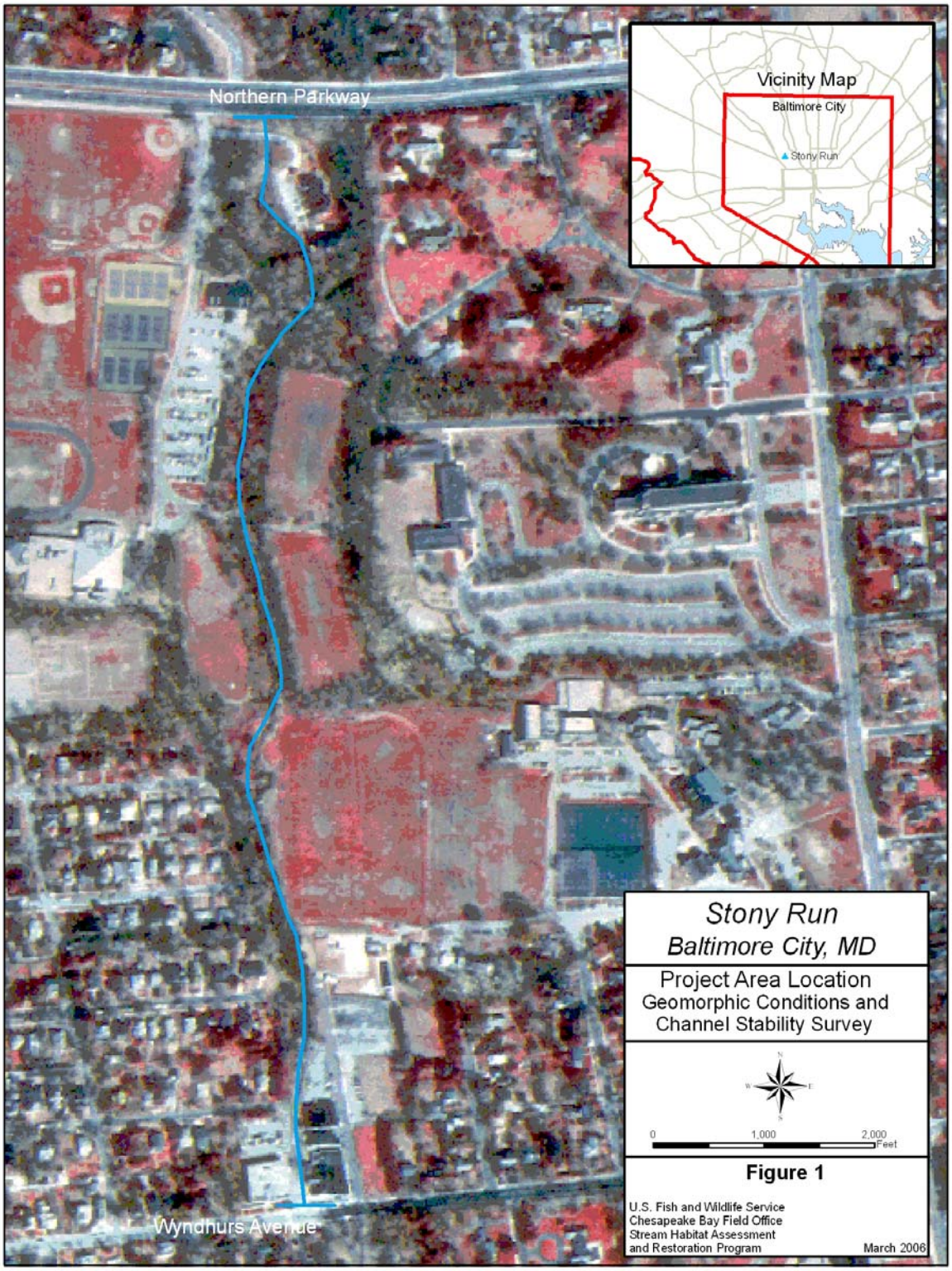
This report presents the methods used to conduct the baseline study, and a summary of the field data collected by the Service. The field data summary also contains cross section and bank erosion comparisons.

II. METHODOLOGY

This section presents the process the Service used to conduct the limited geomorphic survey. This information is a general work plan, and is not a stepwise instruction manual. Detailed longitudinal profile and cross section survey procedures are presented in the manual *Stream Channel Reference Sites: an Illustrated Guide to Field Technique* (Harrelson et al. 1994).

The project area was partitioned into six individual study reaches. The Service prepared a geomorphic map of the assessment area. The Service installed benchmarks and conducted a longitudinal profile to document existing facet feature (*e.g.*, riffle and pool) characteristics. The City can compare pre- and post restoration characteristics to evaluate changes in the stream.

The Service resurveyed nine existing monumented cross sections, as well as two additional cross sections to replace two un-recoverable original cross sections. The Service overlaid the plots of the 2001 and 2006 cross section surveys and compared channel characteristics.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Project Area Location
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0
1,000
2,000
Feet
Figure 1
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The Service did not conduct pebble counts because of the potential human health risks associated with poor water quality. The Service photographed and characterized the channel substrate based on field observations.

The Service identified and assessed 42 stream banks using the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) assessment. Procedures for bank profile surveys, bank erosion hazard index (BEHI) assessment, near bank shear stress (NBS) assessment, and bank erosion predictions are presented in the articles presented by Dave Rosgen at the 2001 Federal Interagency Sediment Conference (2001a and 2001b).

III. FIELD DATA SUMMARY

In this section, the Service presents and discusses its bankfull determination. The section also presents a summary of the field data collected during the 2006 survey. The Service separately presents the geomorphic map, cross section, longitudinal profile, and BEHI and NBS assessments.

A. Bankfull Discharge Determination

The Service identified geomorphic indicators that could potentially represent the bankfull discharge throughout the Stony Run assessment area and found two consistent and clearly defined indicators. In some locations, the indicators were less defined or absent because of active erosion or where the stream has a high entrenchment; and non-existent where there were bank revetments.

The lower indicator is typically the first significant slope break or the top/back of a depositional feature. The previous surveys in 2001 selected this indicator as bankfull. However, this feature is most likely formed in response to flashy flow regime and low base flows, and is not associated with bankfull flow events. The Service surveyed and observed this low indicator in several other urban streams, including Moores Run (Eng 2004) in Baltimore City, Maryland, and Hickey Run (Starr 2005), Oxon Run (Brown 2003), and Watts Branch (Eng 2002) in Washington, D.C. The Service also determined that this low indicator was not associated with bankfull events in those streams.

The higher indicator is typically the second significant slope break or back of bench. The Service selected the higher indicator as bankfull, and compared representative cross section dimensions with the Maryland Piedmont regional curve (McCandless and Everett 2002), and the Baltimore County Urban Curve (Gemmill, et al. 2003) (Table 1).

Table 1. Regional Curve Bankfull Characteristics

Bankfull Characteristics	Representative Cross Section[1]	Maryland Piedmont Regional Curve[2]	Baltimore County Urban Curve[3]
Area (ft^2)	30.82	14.94	36.85
Width (ft)	20.51	13.61	21.12
Depth (ft)	1.50	1.10	1.70

1. Stony Run - Reach 4: Cross Section USFWS 1 (Riffle)

2. Maryland Stream Survey: Bankfull Discharge and Channel Characteristics of Streams in the Piedmont Hydrologic Region (McCandless and Everett 2002)

3. The Development of Regional Regression Curves from Rural and Urban Stream Reaches in the Piedmont of Maryland and Delaware (Gemmill, et. al. 2003)

The Service developed the Maryland Piedmont regional curve using streams located in predominately rural watersheds, while the Baltimore County urban curve was developed from streams located in urban watersheds with higher impervious surfaces. The Stony Run watershed is highly urbanized and the Baltimore County urban curve best represents the watershed and stream conditions found at Stony Run.

B. Rosgen Stream Types

The Service delineated three Rosgen stream types (*i.e.*, Bc4, C4 and F4) in the Stony Run assessment area (Rosgen 1996). The Bc4 stream type represents 51 percent, the F4 stream type represents 36 percent, and the C stream type represents 13 percent of the assessment area. In the assessment area, the bed material is predominately gravel.

Study reaches 1 and 6 are Rosgen F4 stream types, which are highly entrenched with moderate width/depth ratios, and moderately steep slopes, with a gravel substrate. Study reaches 2, 3, and 5 are a Rosgen Bc4 stream type, which are moderately entrenched with a moderate width/depth ratio, and lower than typical stream slope, with a gravel substrate. Study reach 4 is a Rosgen C4 stream type that is slightly entrenched with good access to its floodplain. C4 stream types also have a moderate width/depth ratio, a moderately steep slope, and a gravel substrate.

Table 2. Rosgen Stream Type Classification Delineation Values

Reach	Classification Cross Section	Entrenchment Ratio	Width/Depth Ratio	Sinuosity	Reach Slope (ft/ft)	Rosgen Stream Type	Substrate
1	XS 1	1.11	20.92	1.02[1]	0.0191	F	Gravel (4)
2	XS 1	2.34	14.54		0.0113	C	
3	XS 2	1.44	12.97		0.0136	Bc	
4	XS USFWS 1	3.71	13.67	1.13	0.0134	C	
5	XS USFWS 1	1.45	15.06	1.02[1]	0.0115	Bc	
6	No Cross Section Surveyed				0.0072	F	

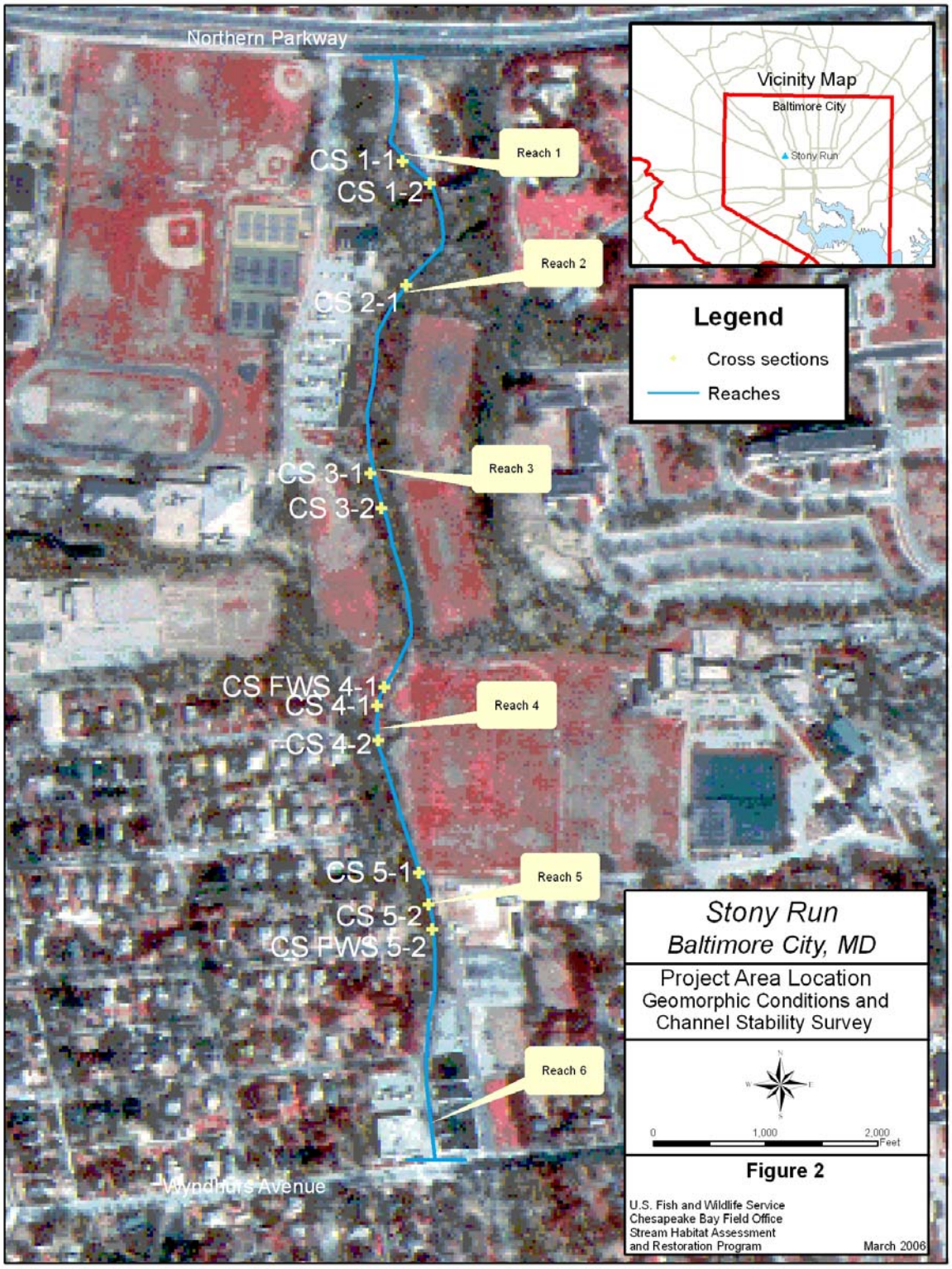
1. The Service calculated one value for sinuosity for these study reaches because these reaches lacked any significant sinuosity.

C. Geomorphic Map

The Stony Run project area starts at a box culvert located near Northern Parkway, and ends at a box culvert located near Wyndhurst Avenue, in Baltimore City, Maryland (Figure 2). Five study reaches were identified in the previous surveys; however, the Service identified six reaches (Figure 2, Table 3). Previous surveys did not conduct any work in Reach 6 because of the concrete crib wall and gabion basket stabilized banks.

Table 3. Study Reach Lengths

Reach	Reach Length (ft)	Reach	Reach Length (ft)
1	778	5	598
2	462	6	366
3	536	Total	3,157
4	417		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Using aerial photographs overlaid by mylar, the Service illustrated the geomorphic conditions of the stream. The geomorphic map documents the geomorphic conditions (*i.e.*, channel conditions and stability, adjacent land uses and land cover, and anthropogenic structures) at the time of the survey. The Service has provided the geomorphic maps in Appendix A and study reach photographs in Appendix B.

D. Cross Sections

The 2001 survey established nine monumented cross sections. The Service recovered seven of the nine cross sections during the 2006 survey (Table 4). The Service surveyed two additional non-monumented cross sections to replace the un-recovered cross sections and characterize the study reaches. Figure 2 shows the approximate locations of the cross sections.

Table 4. Cross Section Resurvey

Reach	Cross Section	Facet Feature	Recovered in 2006	Overlay Quality
1	1	Riffle	Yes	Good[1]
	2	Pool	Yes	Good
2	1	Riffle	Yes	Good
3	1	Study Bank	Yes	Good
	2	Riffle	Yes	Good
4	1	Riffle	No	N/A
	2	Pool	Yes	Poor
5	1	Study Bank	Yes	Good
	2	Pool	No	N/A

1. Reasonable overlay using only the right monument.

For the resurveyed cross sections, the Service overlaid the cross section plots from each year, by aligning both of the cross section monuments. The Service was unable to align the monuments of two cross sections: Reach 1- Cross Section 1 and Reach 4 – Cross Section 2. For those cross sections, the Service attempted to align the overlays using only the left or right monument, and evaluating the quality of the overlay. The Service found that reach 1 – cross section 1 had a reasonable overlay using the right monument, but the Service was unable to reasonably overlay Reach 4 – Cross Section 2.

The Service entered the 2001 and 2006 cross section field data into a Microsoft Excel template, plotted the cross section and calculated the bankfull cross sectional dimensions (*i.e.*, area, width, mean depth, maximum depth, wetted perimeter, and hydraulic radius) (Table 5). The Service provided the cross section plots and overlays in Appendix C.

Although the cross section summary shows both years of data, the Service did not make a direct comparison of the cross section characteristics because two different geomorphic indicators were selected as bankfull. The previous survey selected the low geomorphic feature (*i.e.*, first significant slope break) and the Service selected the high geomorphic feature (*i.e.*, second significant slope break).

Table 5. Cross Section Summary

Cross Section			Year		Cross Section			Year	
			2001	2006				2001	2006
Reach 1	XS 1 (Riffle)	Width (ft)	17.80	27.20	Reach 4	XS USFWS 1 (Riffle)	Width (ft)		20.51
		Depth (ft)	0.45	1.30			Depth (ft)		1.50
		Max. Depth (ft)	0.86	1.85			Max. Depth (ft)		2.19
		Area (ft^2)	8.01	30.82			Area (ft^2)		30.82
		Wetted Perimeter (ft)	18.18	27.69			Wetted Perimeter (ft)		23.51
		Hydraulic Radius	0.44	1.10			Hydraulic Radius		1.31
		Entrenchment Ratio	1.34	1.11			Entrenchment Ratio		3.71
		Width/Depth Ratio	39.56	20.92			Width/Depth Ratio		13.67
	XS 2 (Pool)	Width (ft)	12.84	20.33		XS 2 (Pool)	Width (ft)	16.66	20.75
		Depth (ft)	0.83	1.39			Depth (ft)	0.93	1.48
		Max. Depth (ft)	1.27	2.41			Max. Depth (ft)	2.20	2.80
		Area (ft^2)	10.68	28.27			Area (ft^2)	15.54	30.62
		Wetted Perimeter (ft)	13.39	22.74			Wetted Perimeter (ft)	18.74	22.93
		Hydraulic Radius	0.80	1.24			Hydraulic Radius	0.83	1.33
		Entrenchment	1.81	1.76			Entrenchment	2.15	1.66
		Width/Depth Ratio	15.47	14.63			Width/Depth Ratio	17.91	14.02
Reach 2	XS 1 (Riffle)	Width (ft)	17.00	22.25	Reach 5	XS 1 (Bank Study - Pool)	Width (ft)	24.97	28.13
		Depth (ft)	0.62	1.53			Depth (ft)	0.83	1.77
		Max. Depth (ft)	0.88	1.94			Max. Depth (ft)	1.82	3.19
		Area (ft^2)	10.59	34.03			Area (ft^2)	20.77	46.69
		Wetted Perimeter (ft)	17.28	24.07			Wetted Perimeter (ft)	25.49	30.40
		Hydraulic Radius	0.61	1.41			Hydraulic Radius	0.81	1.63
		Entrenchment	1.10	2.34			Entrenchment	1.11	1.46
		Width/Depth Ratio	27.42	14.54			Width/Depth Ratio	30.08	15.89
Reach 3	XS 1 (Bank Study - Riffle)	Width (ft)	18.40	29.00		XS USFWS 1 (Riffle)	Width (ft)		20.48
		Depth (ft)	0.53	0.96			Depth (ft)		1.36
		Max. Depth (ft)	1.19	1.81			Max. Depth (ft)		2.24
		Area (ft^2)	9.84	27.91			Area (ft^2)		27.82
		Wetted Perimeter (ft)	18.69	30.03			Wetted Perimeter (ft)		21.66
		Hydraulic Radius	0.53	0.93			Hydraulic Radius		1.28
		Entrenchment	1.13	1.15			Entrenchment		1.45
		Width/Depth Ratio	34.72	30.21			Width/Depth Ratio		15.06
	XS 2 (Riffle)	Width (ft)	15.53	20.50					
		Depth (ft)	0.70	1.58					
		Max. Depth (ft)	0.93	2.00					
		Area (ft^2)	10.87	32.30					
		Wetted Perimeter (ft)	15.76	21.55					
		Hydraulic Radius	0.69	1.50					
		Entrenchment	1.25	1.44					
		Width/Depth Ratio	22.19	12.97					

The bankfull dimensions for the 2006 cross sections at the riffles ranged from 27.82 to 34.03 ft^2, and the pool cross sectional area ranged from 28.27 to 46.69 ft^2. The largest pool cross sectional area (Reach 5 - Cross Section 1) may be larger than what is typical because of a large culvert located just upstream of the cross section.

E. Longitudinal Profile

The Service measured the longitudinal profile, surveying 3,157 feet of stream (Appendix D). During the longitudinal profile survey, the Service established three benchmarks located at the middle, and upstream and downstream limits of the assessment area. Benchmark monument maps and GPS coordinates are provided in Appendix D.

The Service entered the longitudinal profile field data into a Microsoft Excel spreadsheet and plotted the longitudinal profile. The Service delineated the study reaches and identified the road crossings on the longitudinal profile plots.

From the longitudinal profile, the Service measured study reach slopes, which range from 0.0072 to 0.0191 ft/ft (Table 6). The lowest gradient is at the downstream limit of the assessment area, in Reach 6, and the steepest gradient is at the upstream limit of the assessment area, in Reach 1. Overall, the Stony Run assessment area has an average slope of 0.015 ft/ft.

Table 6. Study Reach Slopes

Reach	Slope (ft/ft)	Reach	Slope (ft/ft)
1	0.0191	4	0.0134
2	0.0113	5	0.0115
3	0.0136	6	0.0072

The Service also measured facet feature characteristics (*i.e.*, depth, slope, and spacing) (Table 7). The average riffle depth is 2.07 ft, and the pool maximum depth is 3.94 ft. The average riffle slope is 0.0303 ft/ft, and the average pool slope is 0.0022 ft/ft. The average riffle spacing is 200.60 ft, and the average pool spacing is 171.72 ft.

Table 7. Facet Feature Summary

Facet Characteristics		Riffle	Run	Pool	Glide	Run[1]
Depth (ft)	Minimum	1.30	2.02	2.90	1.55	2.75
	Maximum	2.70	3.80	5.15	3.21	3.15
	Average	2.07	3.20	3.94	2.5	2.90
Slope (ft/ft)	Minimum	0.0190	0.03	0.0004	0.0002	0.01
	Maximum	0.0410	0.20	0.0052	0.0015	0.04
	Average	0.0303	0.06	0.0022	0.0006	0.02
Spacing (ft)	Minimum	109	N/A[2]	94	N/A[2]	N/A[2]
	Maximum	413		304		
	Average	201		172		

1. Run facet feature not associated with the pool complex.

2. Run and glide spacing is not typically reported.

F. Substrate Characterization

The Service did not conduct a reach average pebble count because of potential human health risks associated with poor water quality. Based on field observations, the Service characterized the representative substrate as gravel for the six study reaches. The Service has provided substrate photographs in Appendix E.

G. Reach Bank Erosion Hazard Index and Near Bank Shear Stress

To determine the reach BEHI and NBS ratings, the Service assessed 5,900 feet of stream bank of the total 6,274 feet of bank (Figure 3). The Service did not assess banks with significant deposition. The Service has provided detailed reach BEHI criteria and scores in Appendix F. The Service summarized the reach BEHI and NBS ratings in Table 9.

The BEHI ratings range from very low to extreme. The very low and low ratings represent 45 percent of the banks while the moderate rating represents 23 percent of the banks. The high and very high ratings represent 25 percent, and the extreme rating represents 3 percent of the banks. NBS ratings range from low to very high. The low ratings represent 83 percent, while the moderate rating represents 2 percent of the banks. The high rating represents 8 percent of the banks, and the extreme rating represents 3 percent of the banks.

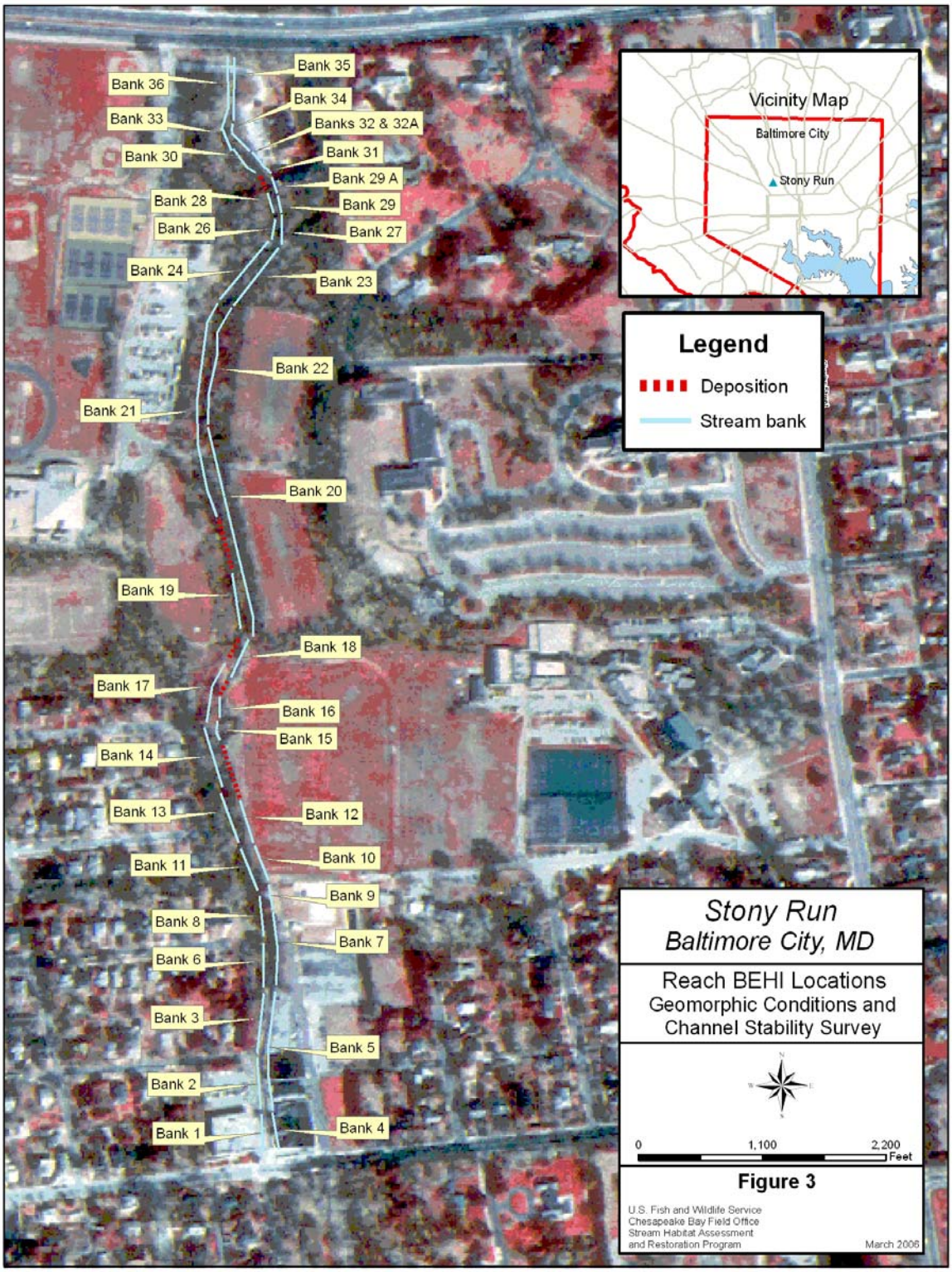
H. Bank Erosion Predictions

The Service used reach BEHI and NBS ratings, bank dimensions, and a bank erodibility curve to predict reach average erosion quantities and rates for the study reaches. In 2005, the Service developed a *draft* bank erodibility curve for District of Columbia (D.C.). The Service compared measured erosion rates at Moores Run in Baltimore City, Maryland, and found the erosion rates to be similar to the D.C. curve (Eng *et al*, 2006). The Service selected the D.C. curve to make erosion estimates at Stony Run because it better represents the watershed and stream conditions than other available erosion curves (*e.g.*, Yellowstone National Park, Rosgen 2001a). The Service has provided the bank erosion predictions in Appendix G.

The Service summarized the total predicted bank erosion for each reach in Table 8. The total predicted bank erosion is 380 tons/year with individual study reaches ranging from 0 tons/year (Reach 6) to 217 tons/year (Reach 1). The overall erosion rate is 0.12 tons/year/feet, with individual study reaches ranging from 0.00 (Reach 6) to 0.28 tons/year/feet (Reach 1). The lack of bank erosion in Reach 6 is due to extensive bank revetments, including a concrete crib wall and gabion baskets.

Table 8. Bank Erosion Predictions

	Bank Erosion			Bank Erosion	
Reach	**Total (tons/year)**	**Rate (tons/year/feet)**	**Reach**	**Total (tons/year)**	**Rate (tons/year/feet)**
1	217	0.28	5	99	0.17
2	2	0.004	6	0	0.00
3	33	0.06	Total	380	0.12
4	29	0.07			


Bank 35
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0
1,100
2,200
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Table 9. Reach BEHI and NBS Ratings

Reach	BEHI Bank		BEHI Rating	NBS Rating
	Number	Length		
1	36	190	Very Low	Low
	35	190	Very Low	Low
	34	152	Very High	Low
	33	192	Extreme	Very High
	32a	51	Very High	Low
	32	52	Moderate	Low
	32	24	Moderate	High
	31	98	Low	Low
	30	204	Moderate	Low
	29	53	Very High	High
	29a	32	Very Low	Low
	28	65	High	Low
	28	56	High	High
	27	121	High	Low
	26	88	Low	Low
	25	88	Low	Low
2	24	462	Low	Low
	23	462	Low	Low
3	22	167	Low	Low
	21	453	Moderate	Low
	20	349	High	Low
	19	98	Low	Low
4	18	78	High	High
	17	153	Moderate	Low
	16	72	Moderate	Low
	15	95	High	Low
	14	82	Low	High
	14	77	Low	Low
5	13	93	Moderate	Low
	13	122	Moderate	Moderate
	12	172	High	Low
	11	116	High	Low
	10	135	High	Low
	9	77	Very Low	Low
	8	147	Moderate	Low
	7	129	High	Low
	6	129	Moderate	Low
6	5	255	Very Low	Low
	4	111	Very Low	High
	3	157	Very Low	Low
	2	93	Very Low	Low
	1	116	Very Low	High

I. Bank Erosion Validation

STV surveyed the monumented cross sections in the spring and fall of 2001 to validate lateral bank erosion rates. Although erosion rates are typically assessed over a year, STV stated that at least one bankfull event occurred between the Spring and Fall surveys. Regardless of deviation in procedures, the Service calculated the bank erosion rates for the resurveyed cross sections (Table 10).

Bank erosion rates ranged from 0.14 feet/year to 2.07 feet/year. The lowest bank erosion rate was associated with Reach 1 - Cross Section 2, which had a high BEHI and low NBS rating. The largest bank erosion rate was associated with Reach 4 - Cross Section 1, which had an extreme BEHI and extreme NBS rating.

Table 10. 2001 Bank Erosion Rates

Reach	Cross Section	BEHI	NBS	Lateral Bank Erosion	
				Total (sq. feet)	Rate (feet/year)
1	1	High	Extreme	1.90	0.48
	2	High	Low	0.60	0.14
2	1	N/A[1]	N/A[1]	2.00	0.65
3	1	High	Extreme	4.00	1.06
	2	N/A[1]	N/A[1]	2.00	0.58
4	1	Extreme	Extreme	6.90	2.07
	2	Moderate	Very High	2.20	0.70
5	1	High	Extreme	6.00	1.33
	2	N/A[1]	N/A[1]	N/A[2]	N/A[2]

1. BEHI or NBS was not conducted for the 2001 survey.

2. Cross section was not resurveyed in 2001.

The Service compared the Stony Run erosion rates to the *draft* bank erodibility curve for D.C. In general, the Service found a poor correlation between the Stony Run and D.C. data sets, which may be due to recent changes to the BEHI and NBS assessment procedures provided by Wildland Hydrology, Inc. These procedure changes may change the BEHI and NBS ratings conducted by STV in 2001. Although there was poor correlation between the Stony Run and D.C. data sets, the Service found similar erosion rates at Moores Run in Baltimore City, Maryland to the urban streams used to develop the *draft* bank erodibility curve for D.C. (Eng *et al*, 2004). It is likely that the erosion rates at Stony Run are similar to Moores Run and the streams used to develop the D.C. curve because of the similarities in the stream and watershed conditions.

The City requested the Service to compare Stony Run erosion rates with other urban streams. However, the Service was unable to perform this comparison because the lateral erosion occurred over four years. Potential annual changes in BEHI and NBS conditions, which affect the erodibility of the bank, also prevent the Service from simply dividing the total lateral erosion by four years.

However, the Service evaluated the total lateral erosion for the cross sections that the Service was able to overlay (Table 11). Lateral bank erosion ranged from 0.00 feet (Reach 2 - Cross Section 1) to 1.68 feet (Reach 1 - Cross Section 2).

Table 11. Bank Erosion Summary

Reach	Cross Section	Bank	Bank Erosion	
			Total (sq. feet)	Lateral Erosion (feet)
1	1	Right	3.53	0.94
	2	Left	5.82	1.68
2	1	Right	0.00	0.00
3	1	Right	4.35	0.93
	2	Right	0.79	0.24
4	1	N/A[1]	N/A[1]	N/A[1]
	2	N/A[2]	N/A[2]	N/A[2]
5	1	Right	5.52	1.20
	2	N/A[1]	N/A[1]	N/A[1]

1. Cross seciton not recovered during 2006 survey.

2. Cross section had a poor overlay.

For the resurveyed cross sections, the Service measured bank profiles at cross sections where the STV installed toe pins. The Service extracted bank profile data from the cross section surveys for cross sections with no toe pin. The Service entered the bank profile data into Rivermorph™ to calculate the change in bank area. The Service calculated the lateral erosion by dividing the change in area by the bank height.

IV. RECOMMENDATIONS

The 2001 and 2006 surveys selected two different bankfull geomorphic indicators. The 2001 survey selected the first significant slope break or the top/back of a depositional feature, and the 2006 survey selected the second significant slope break or back of bench.

The Service compared the bankfull dimension for each of the bankfull indicators with the Baltimore County Urban Curve (Gemmill *et al*, 2003), and found that the higher bankfull indicator best matched the urban curve. In addition, the Service observed a similar low and higher geomorphic indicator in several other urban streams, including Moores Run (Eng *et al*, 2004) in Baltimore City, Maryland and Watts Branch (Eng 2002) in Washington, D.C. In those cases, the Service found the higher geomorphic indicator was bankfull.

The Service recommends that the City review the bankfull determinations, and make certain that the correct bankfull determination was used to develop the stream restoration designs. If possible, the City should identify U.S. Geological Survey gages near Stony Run, and conduct a limited gage survey to validate the bankfull determination at Stony Run.

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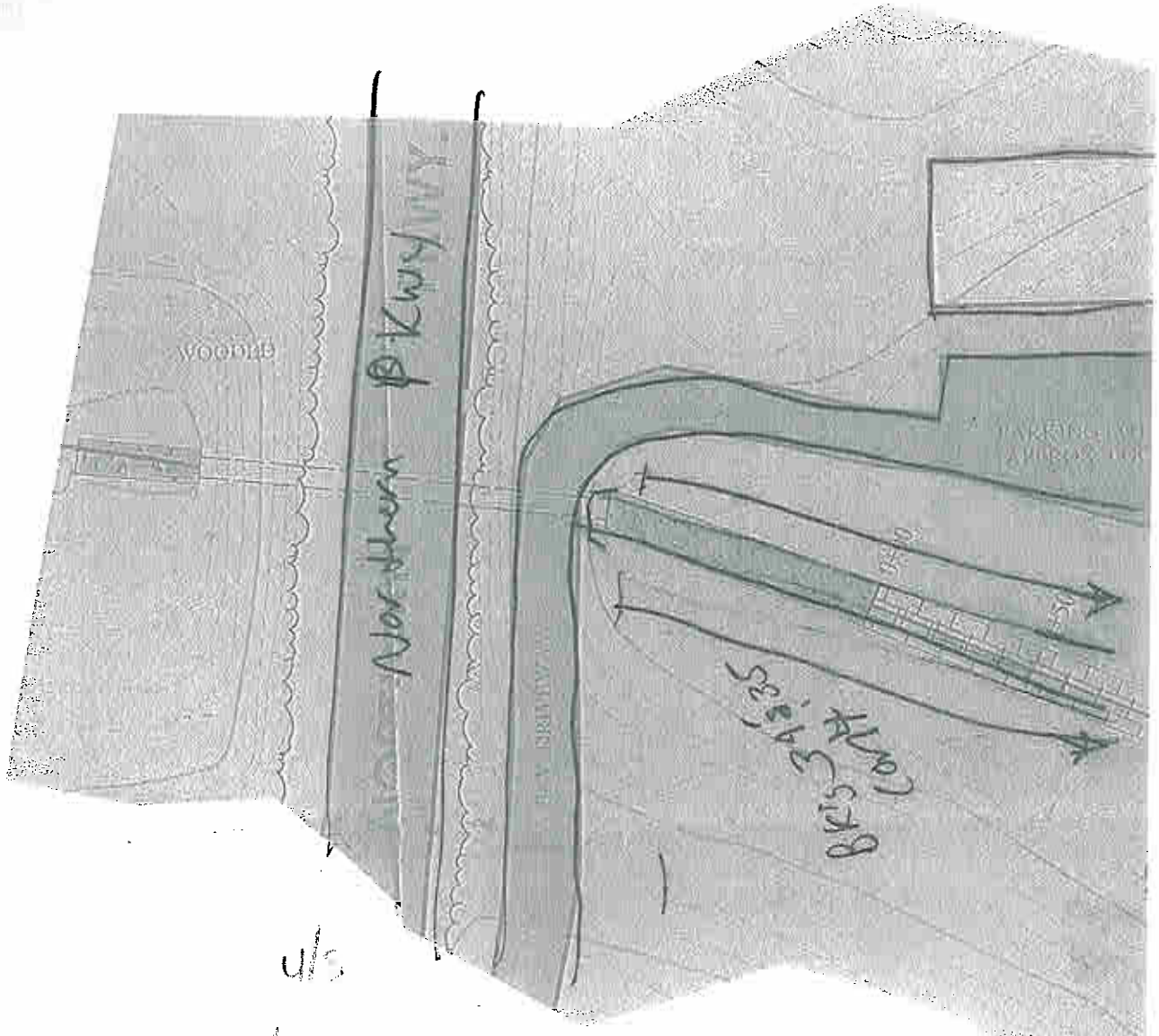
Appendix A – Geomorphic Maps

9 of 9

3/7/06



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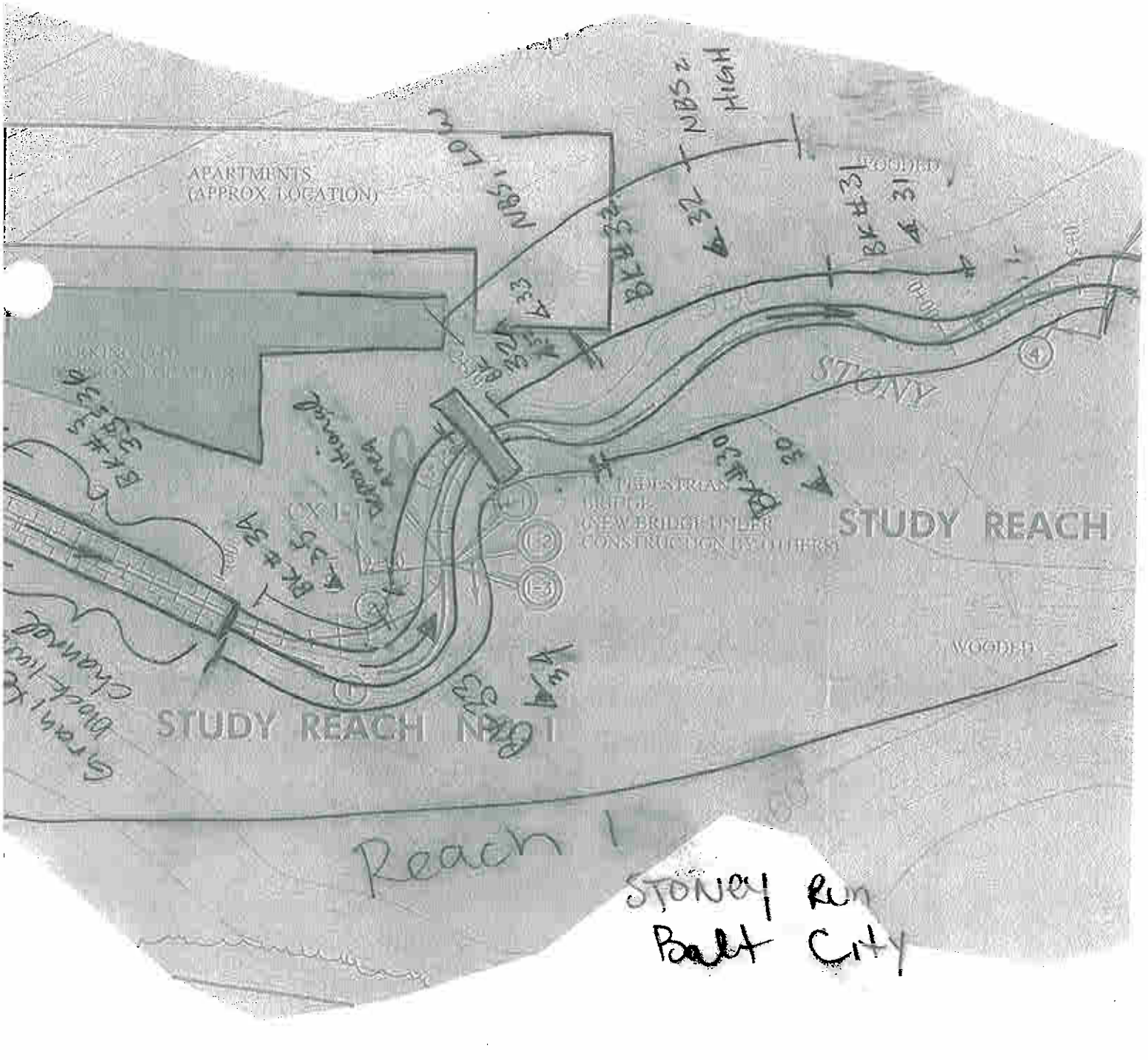
Limit

Stoney Run Park Boyle City

8 of 9
3/7/06

EX. PEDESTRIAN BRIDGE TO BE REPLACED BY OTHERS



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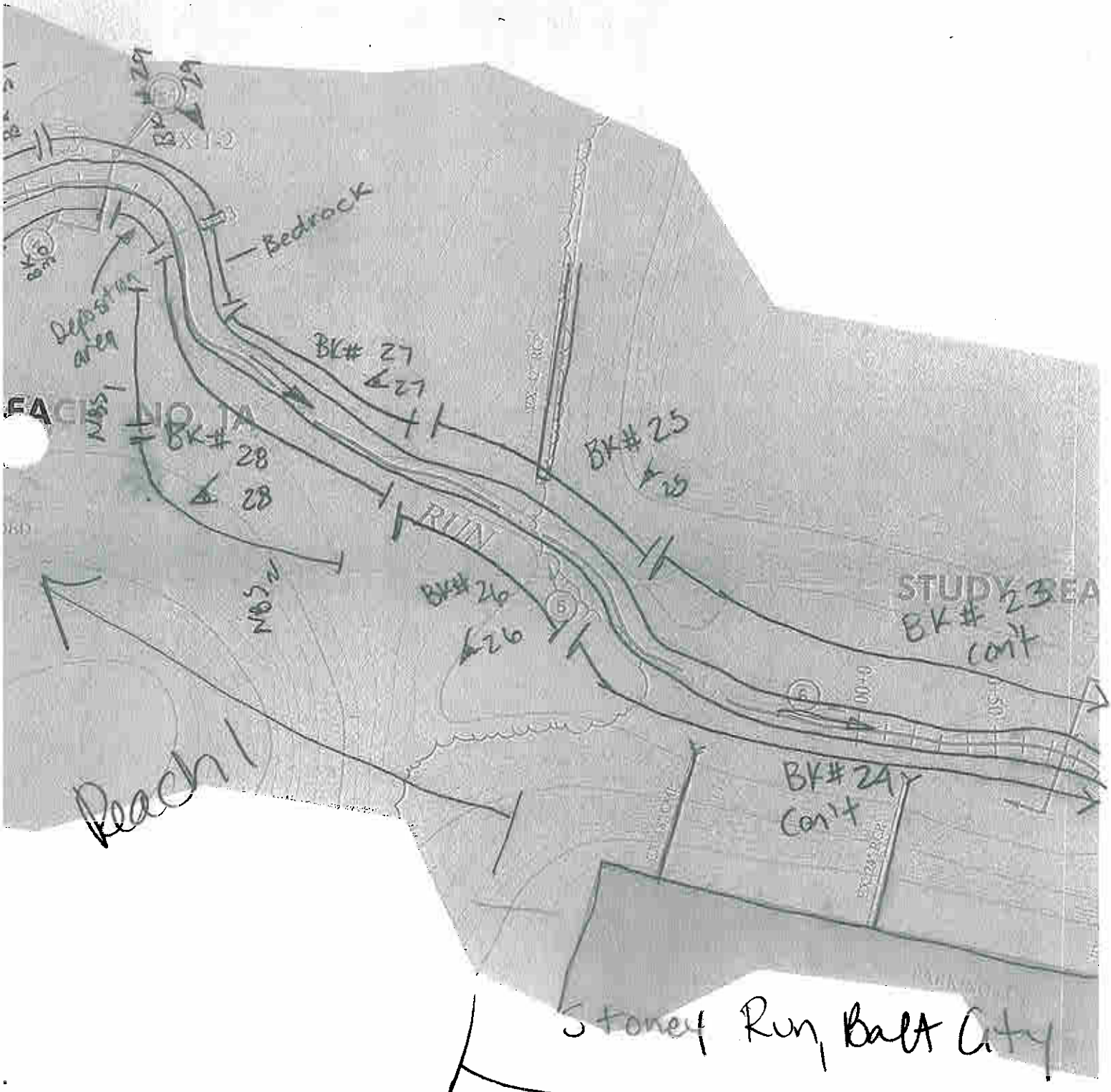

Bedrock
Deposition area
BK# 27
BK# 28
BK# 25
BK# 26
RUN
STUDY REA
BK# 24 con't
Reach 1
Stoney Run, Balt City
Reach 2

3/1/06

. 3.

THIS CULVERT PASSES UNDERNEATH THE PAVED A
THE EXISTING ATHLETIC FIELDS. ALSO SHOWN IS
SCOUR HOLE WHICH HAS DOWNCUT APPROXIMA

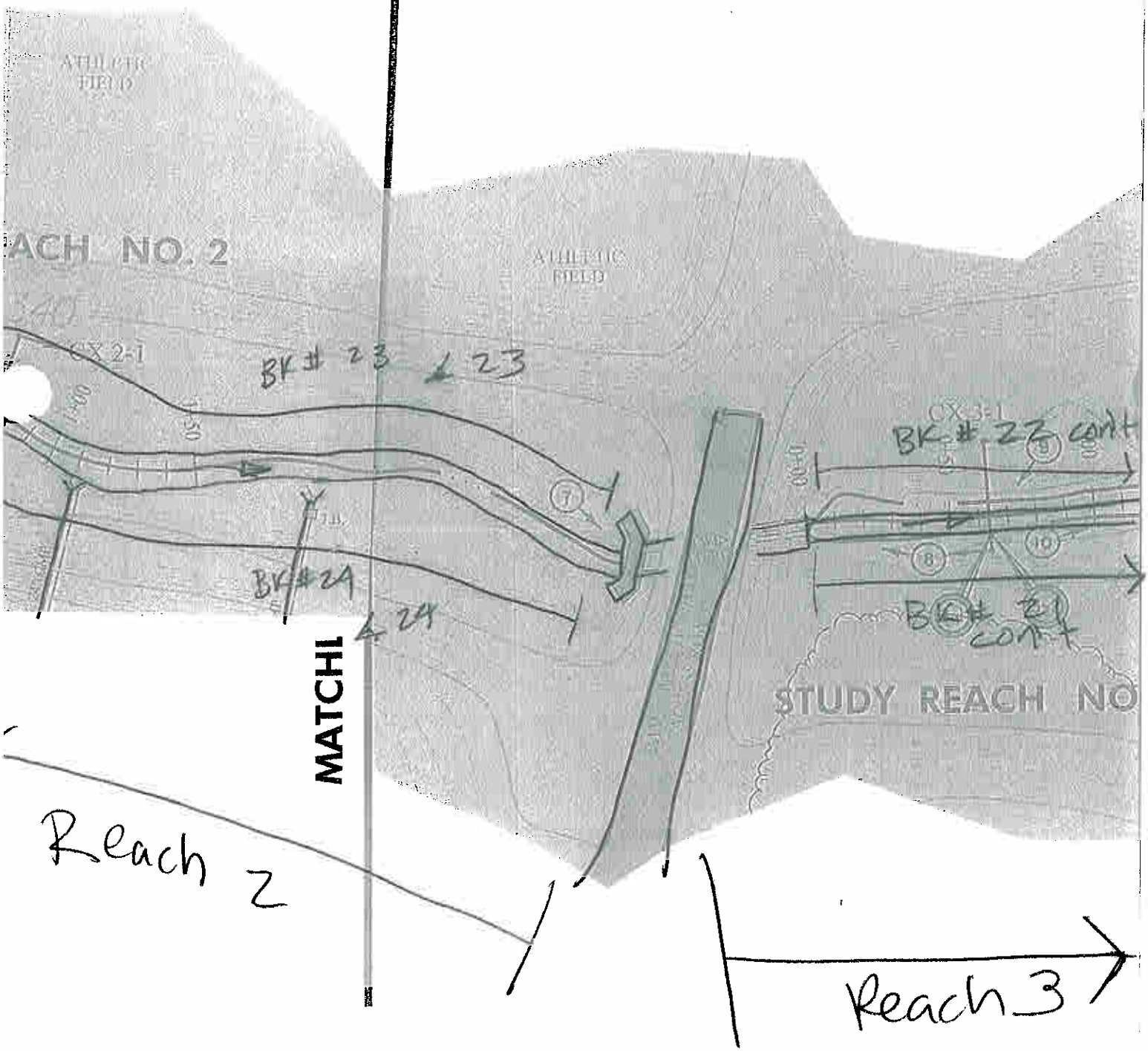
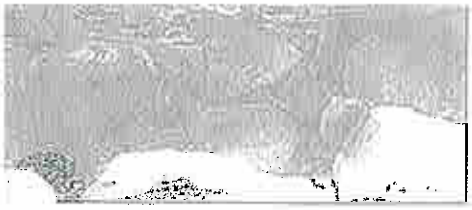


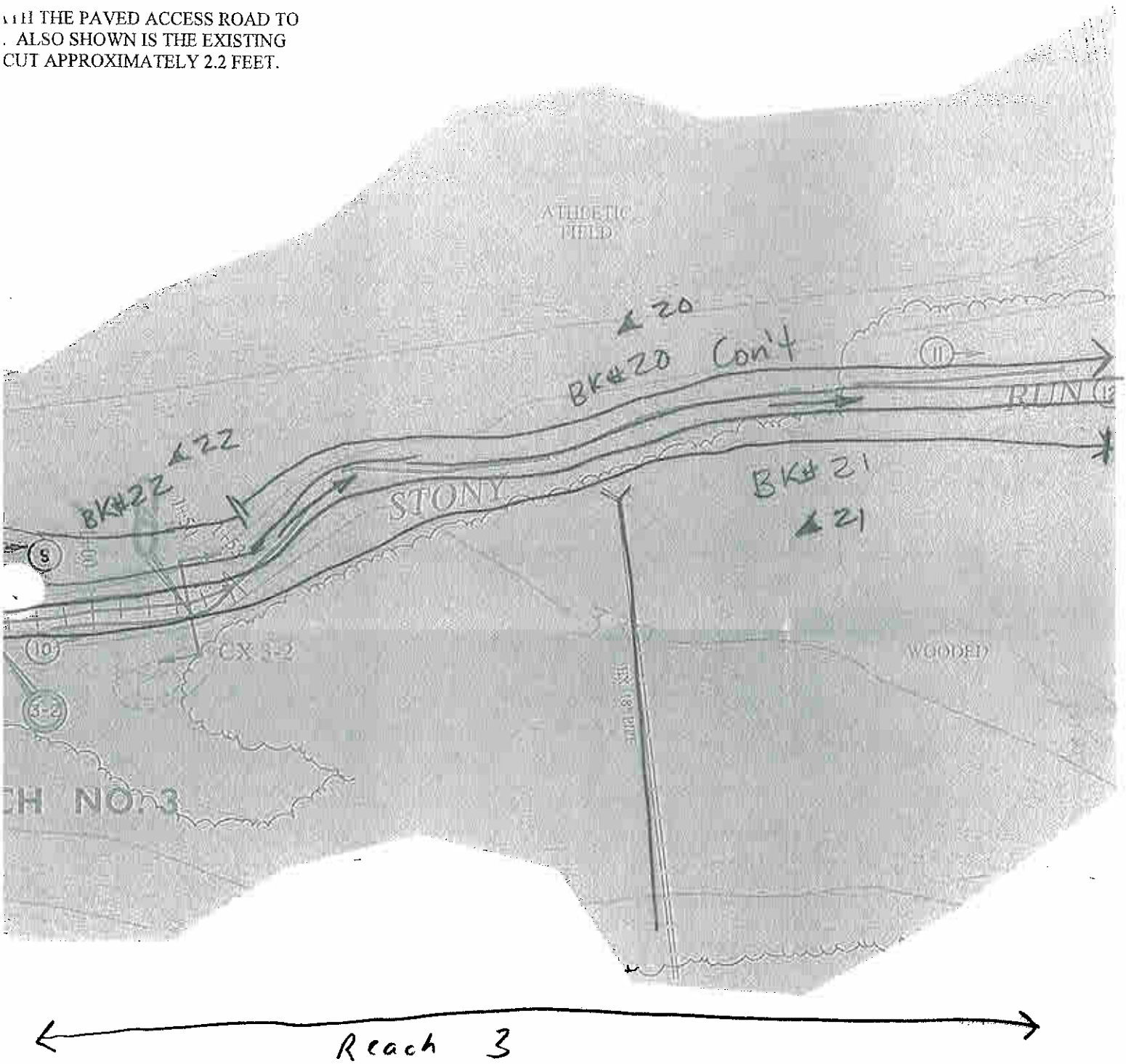
PHOTO 9: CROSS SECTION 3-1 Stoney Run, Balt City



LOOKING DOWNSTREAM TOWARD REACH NO. 4,
JUST UPSTREAM OF THE NEWLY INSTALLED 24" CULVERT SHOWN IN

Page 5 of 9
3/1/06

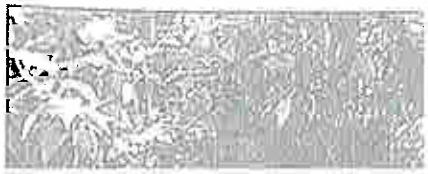
ITH THE PAVED ACCESS ROAD TO
. ALSO SHOWN IS THE EXISTING
CUT APPROXIMATELY 2.2 FEET.



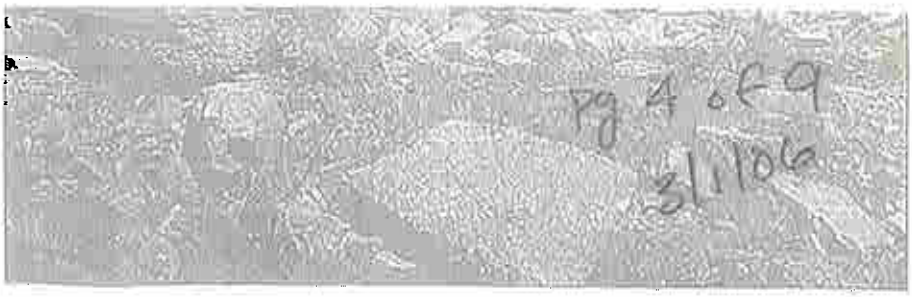
Reach 3

Stoney Run, Balt City

PHOTO 14:



EACH NO. 4,
VERT SHOWN IN PHOTO 12.



THIS RECENTLY INSTALLED CULVERT OUTFALL
PROVIDES ADDITIONAL RUNOFF WITHIN STUDY REACH NO. 4.

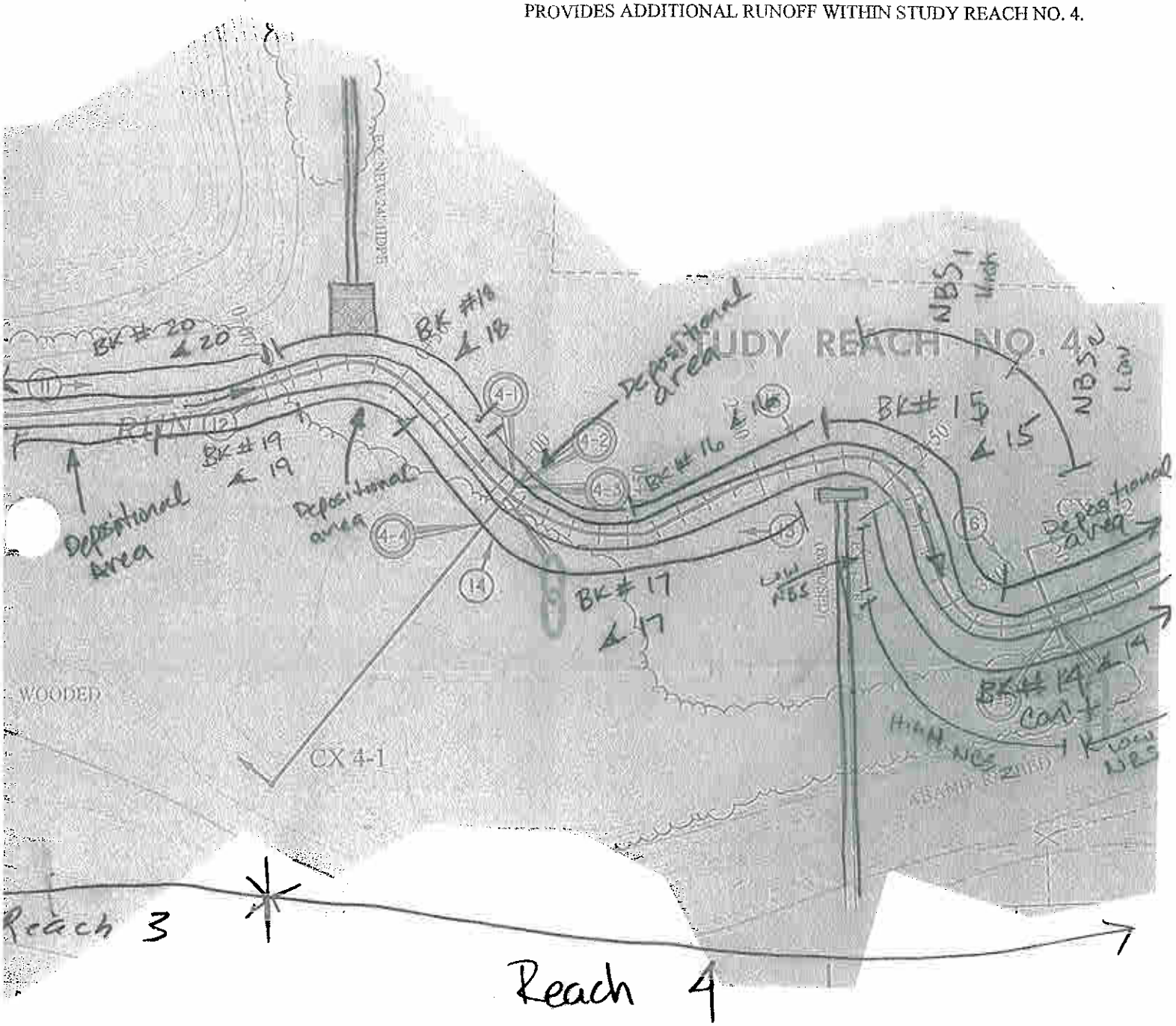


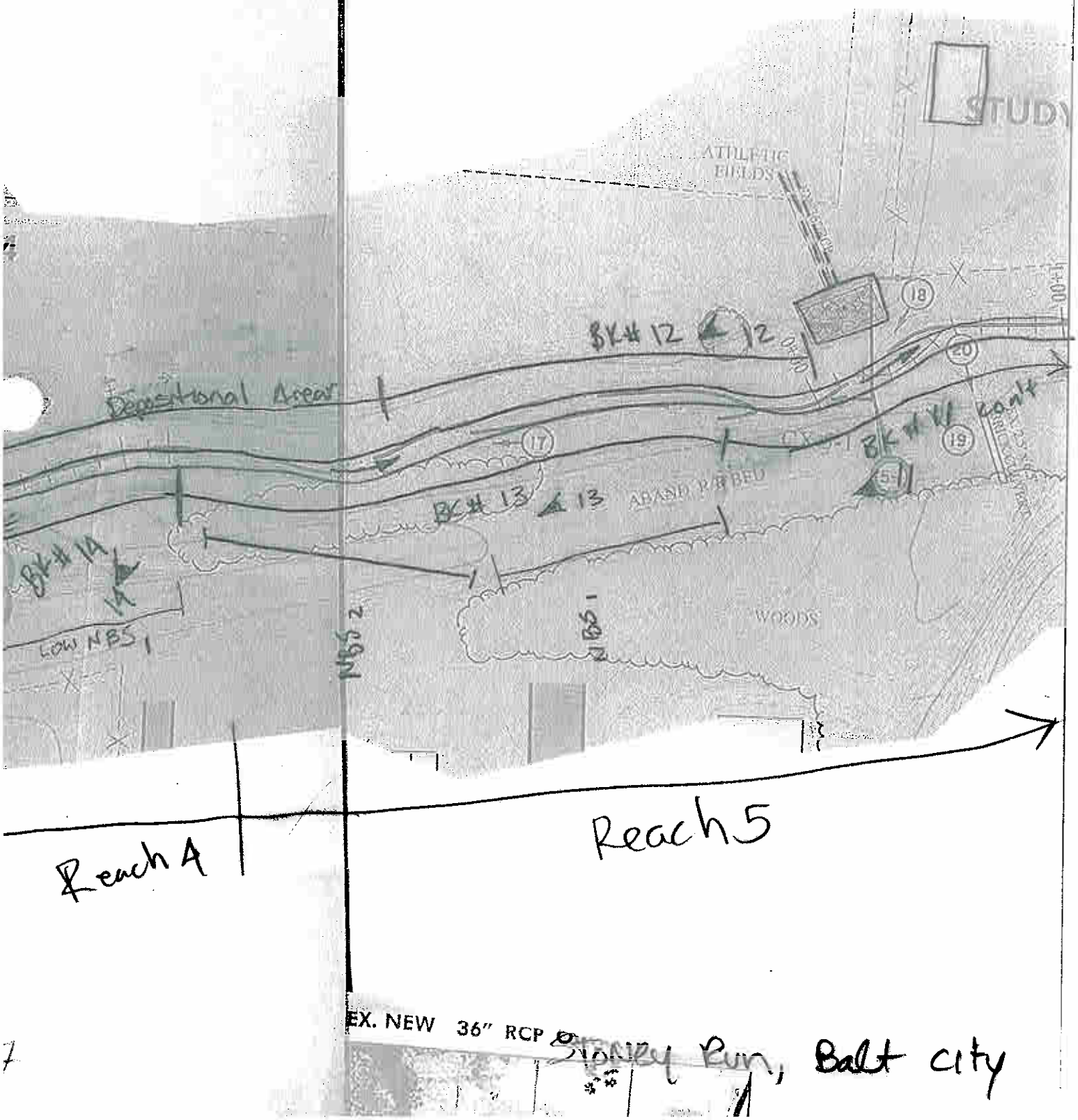
PHOTO 14: CROSS SECTION 4-1

Stoney Run, Balt City

Pg 3 of 9
3/11/06

Sheet 2

NO. 4.



3/1/00

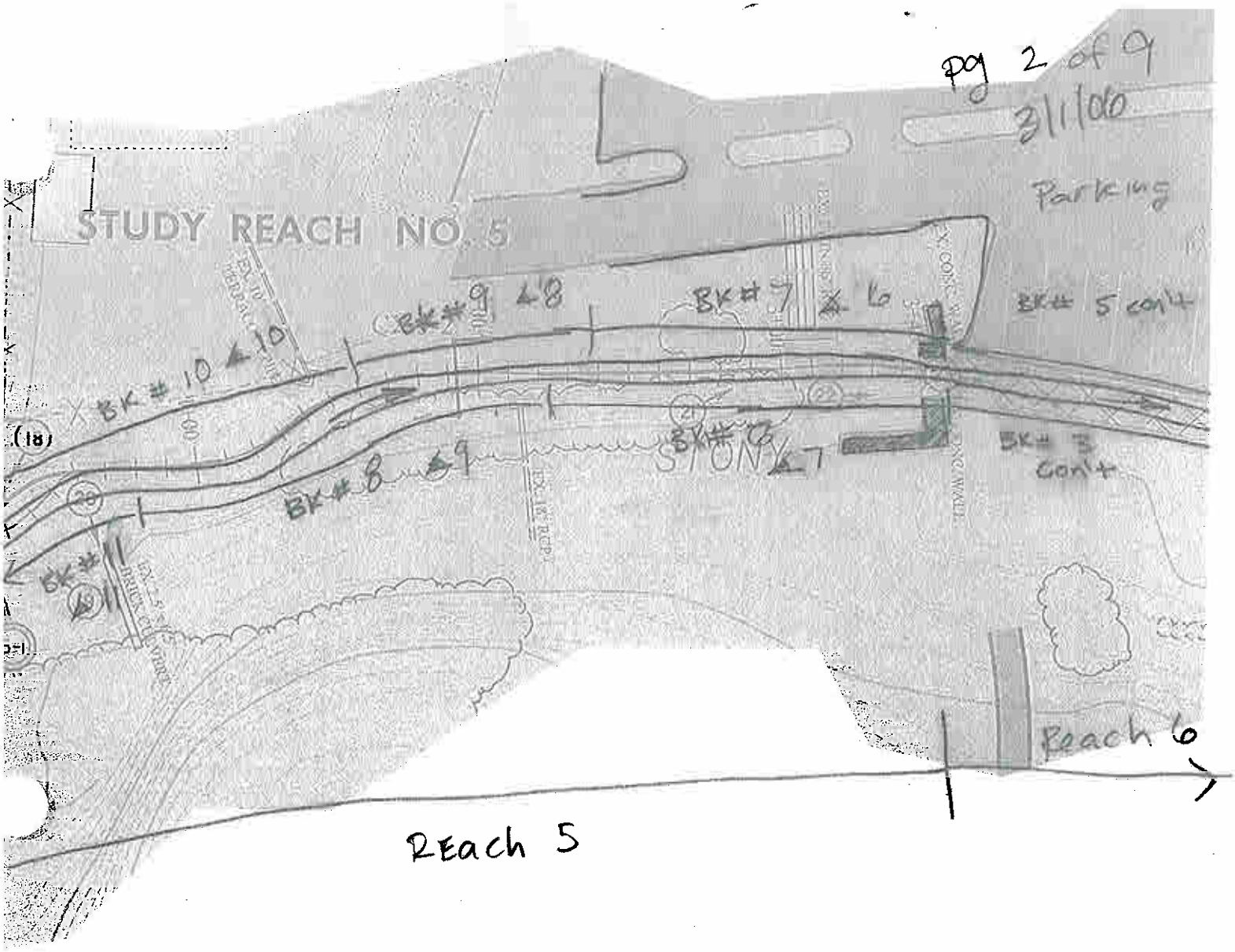


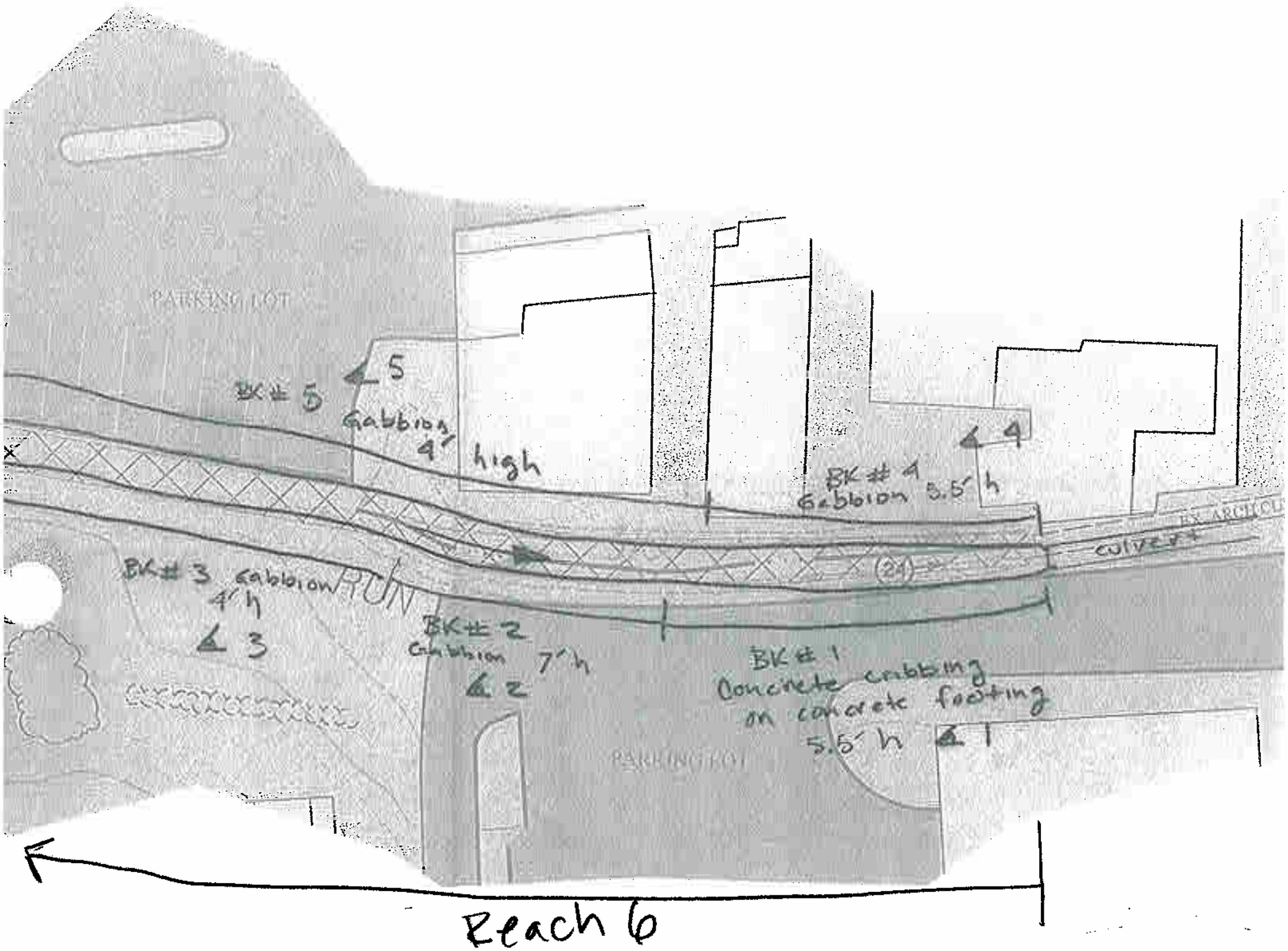
PHOTO 20: EX. SLATE CULVERT

THIS CULVERT WITH DEBRIS JAMS AND FLOW OBSTRUCTIONS PROVIDES DRAINAGE THROUGH THE ABANDONED RAILROAD EMBANKMENT

Stony Run, BALTimore

LOCATED NEAR THE END OF REACH NO. 5,
NOTE THE CONCRETE RUBBLE DEPOSITION IN THE STREAM BED.

3/1/06



(9)

Appendix B – Study Reach Photographs

Photo 1. Reach 1 is a Rosgen F4 stream type with a high entrenchment ratio and width/depth ratio (looking downstream).

Photo 2. Reach 2 is a Rosgen Bc4 stream type with a moderate entrenchment ratio and width/depth ratio, and a lower than typical stream slope (looking upstream).

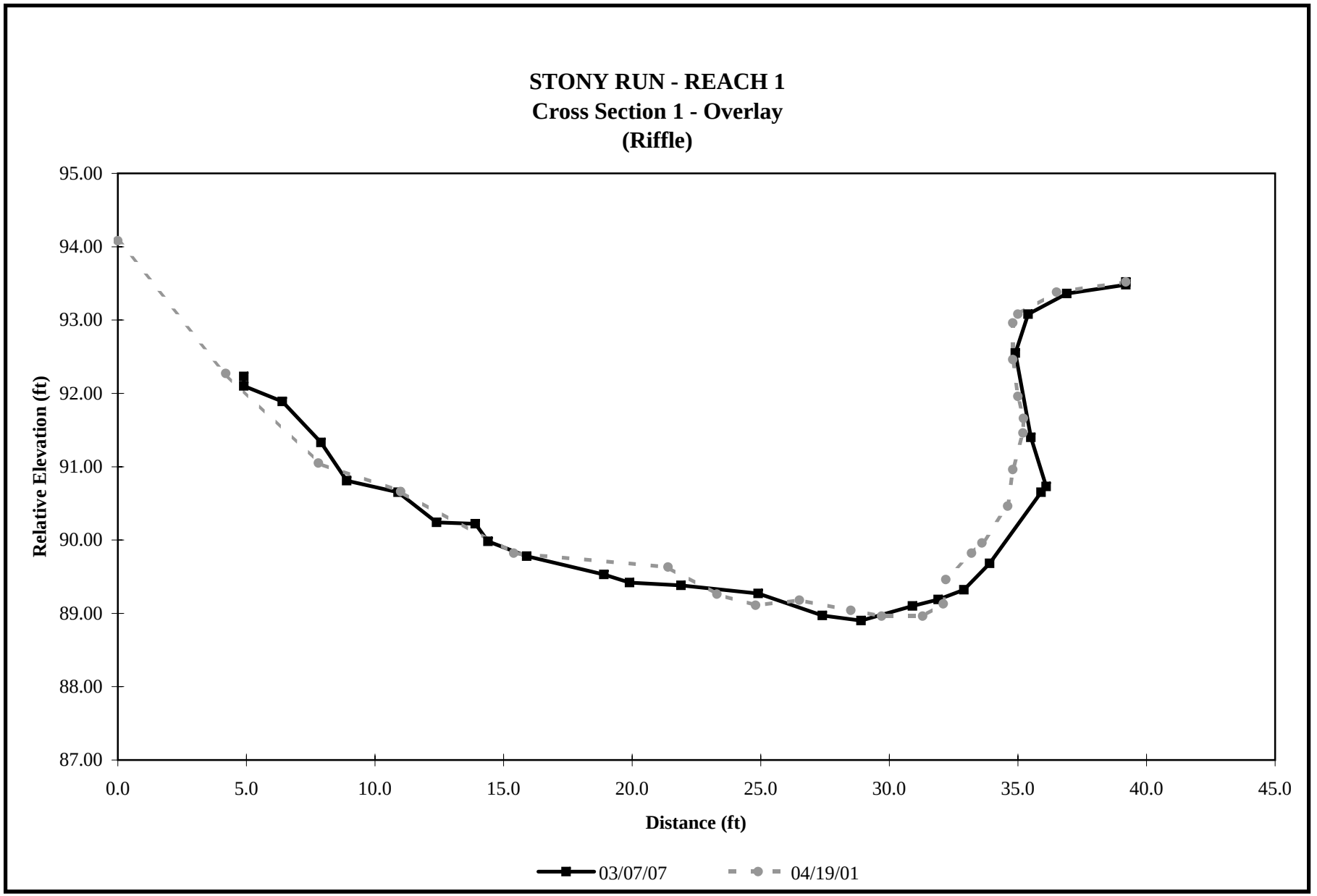
Photo 3. Reach 3 is a Rosgen Bc4 stream type with a moderate entrenchment ratio and width/depth ratio, and a lower than typical stream slope (looking upstream).

Photo 4. Reach 4 is a Rosgen C4 stream type with a low entrenchment ratio, and a moderate width/depth ratio (looking downstream).

Photo 5. Reach 5 is a Rosgen Bc4 stream type with a moderate entrenchment ratio and width/depth ratio, and a lower than typical stream slope (looking upstream).

Photo 10. Reach 6 is a Rosgen F4 stream type with a high entrenchment ratio and width/depth ratio (looking upstream). A majority of the stream banks are concrete crib or gabion basket revetments.

Appendix C – Cross Sections



Path: CD Drive:\Stony Run\Data Cross Sections

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

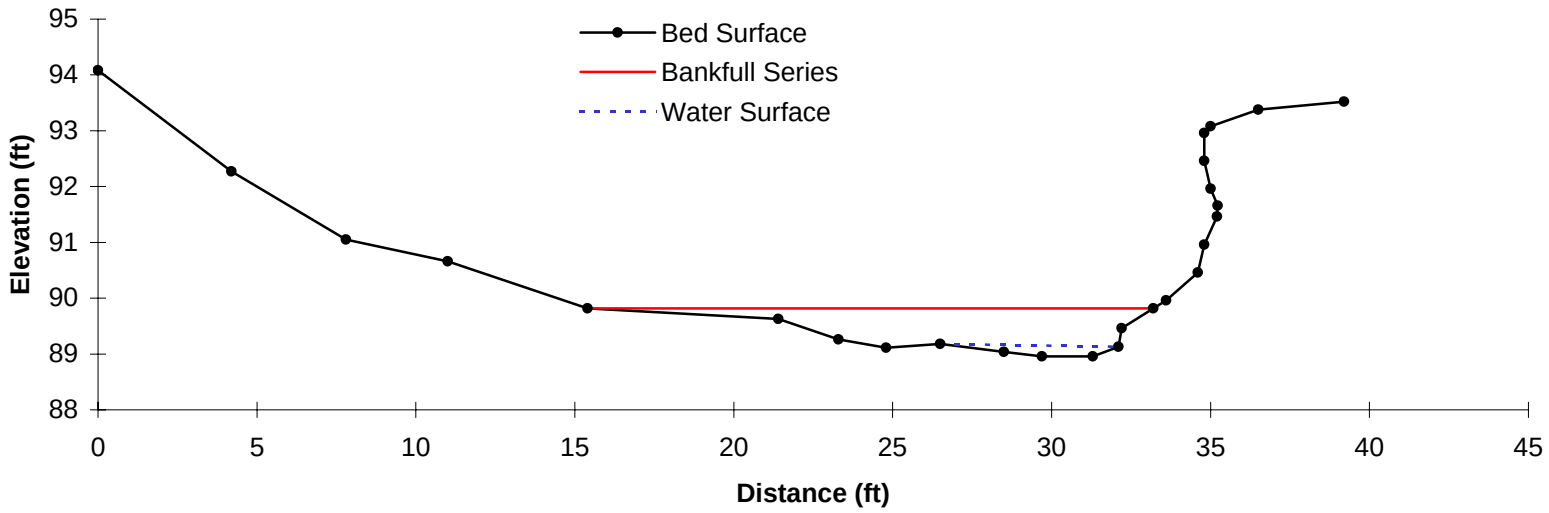
File: Cross Section 1-1
March 2006

STONY RUN - REACH 1 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
17.80	8.01	0.45	0.86	18.18	0.44	Bankfull
5.60	0.68	0.12	0.19	5.63	0.12	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 1 - XS 1 (Riffle)
DATE: 04/19/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	94.08		33.6	89.96
	4.2	92.27		34.6	90.46
	7.8	91.05		34.8	90.96
	11.0	90.66		35.2	91.46
LBF	15.4	89.82			91.66
	21.4	89.63		35.2	91.96
	23.3	89.26		35.0	92.46
	24.8	89.11		34.8	92.96
LEW	26.5	89.18		34.8	93.08
	28.5	89.04		35.0	93.38
	29.7	88.96	TRMON	36.5	93.52
	31.3	88.96			
REW	32.1	89.13			
	32.2	89.46			
RBF	33.2	89.82			



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File: Cross Section 1-1
March 2006

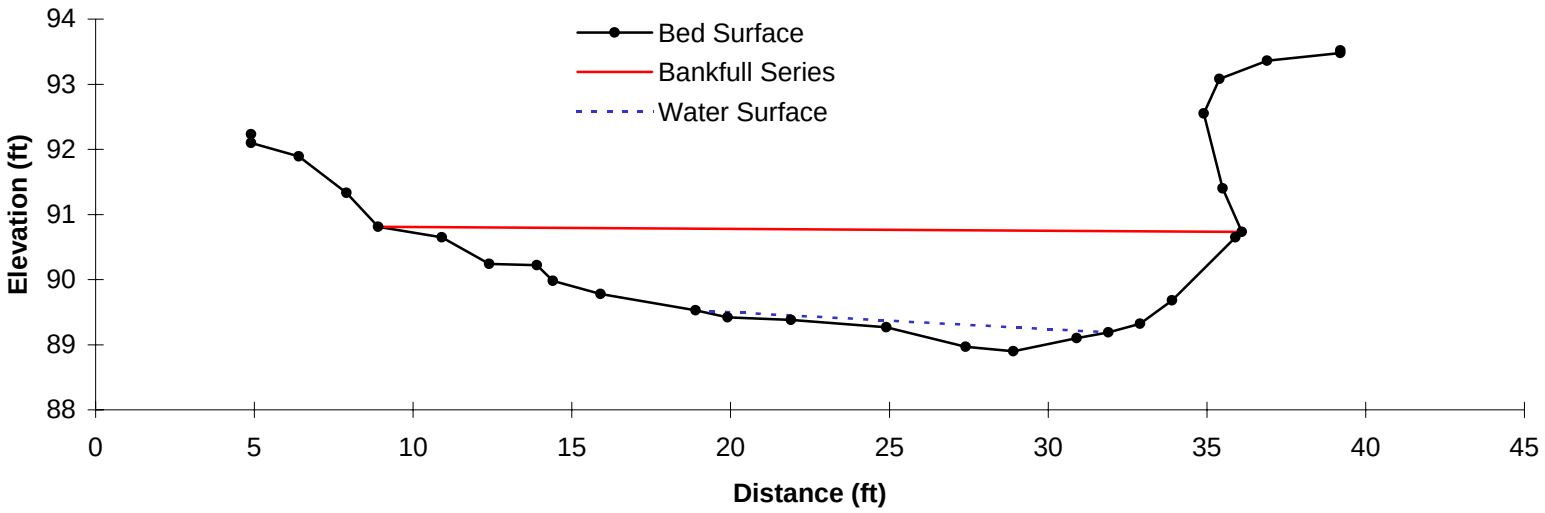
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 1 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
27.20	30.82	1.13	1.85	27.69	1.11	Bankfull
13.00	2.08	0.16	0.37	13.04	0.16	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 1 - XS 1 (Riffle)
DATE: 03/07/06
CREW: RRS, KMF
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	4.9	92.23	TW	28.9	88.90
GLMON	4.9	92.10	CS	30.9	89.10
SLP BRK	6.4	91.89	REW	31.9	89.19
GS	7.9	91.33	CS	32.9	89.32
LBF	8.9	90.81	BK PIN	33.9	89.68
SLP BRK	10.9	90.65	SLP BRK	35.9	90.65
SLP BRK	12.4	90.24	RBF	36.1	90.73
SLP BRK	13.9	90.22	SLP BRK	35.5	91.40
CS	14.4	89.98	SLP BRK	34.9	92.55
CS	15.9	89.78	SLP BRK	35.4	93.08
LEW	18.9	89.53	SLP BRK	36.9	93.36
CS	19.9	89.42	GRMON	39.2	93.48
CS	21.9	89.38	TRMON	39.2	93.52
CS	24.9	89.27			
CS	27.4	88.97			



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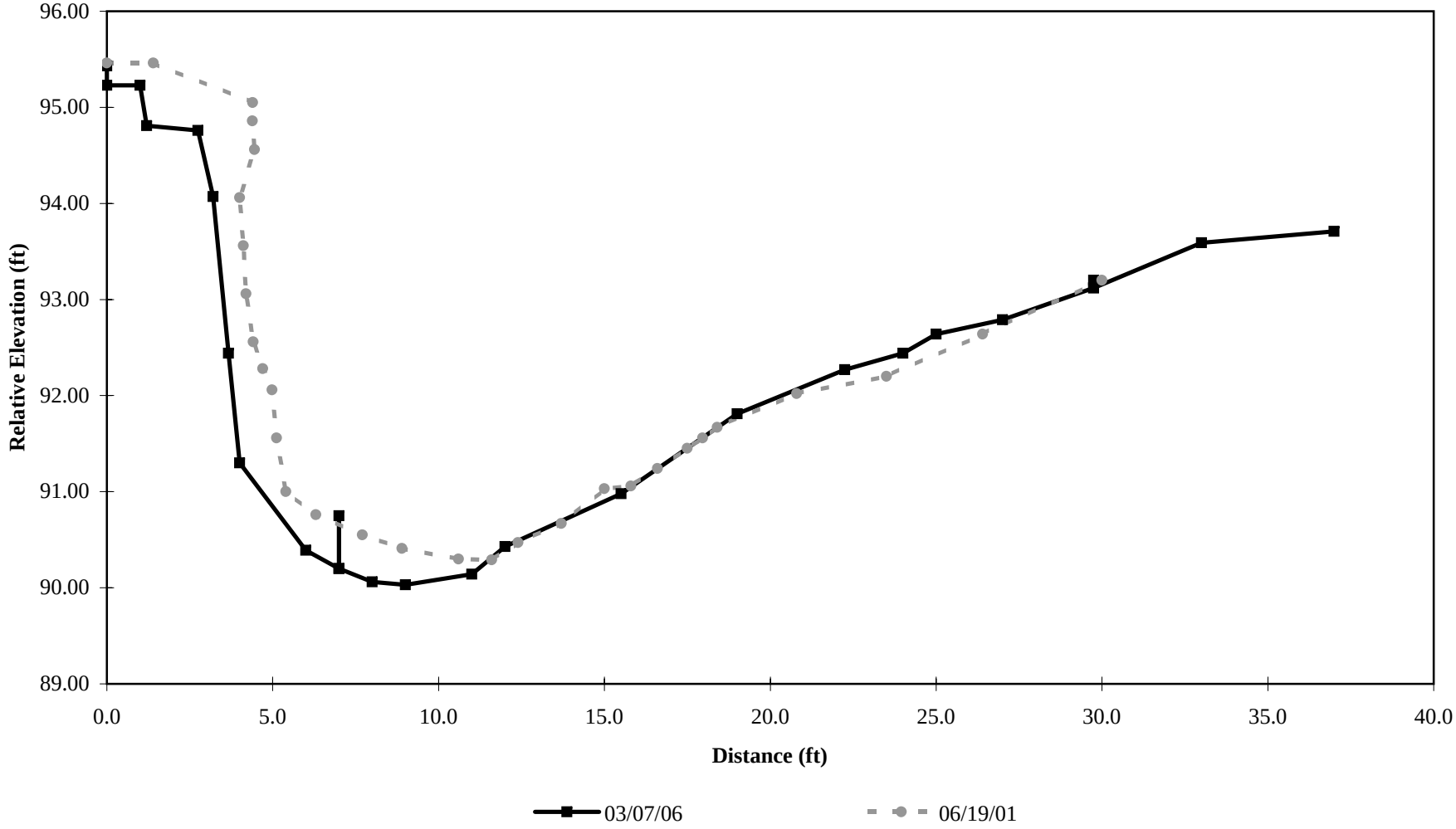
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 1
Cross Section 2 Overlay
(Pool)



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File: Cross Section 1-2
March 2006

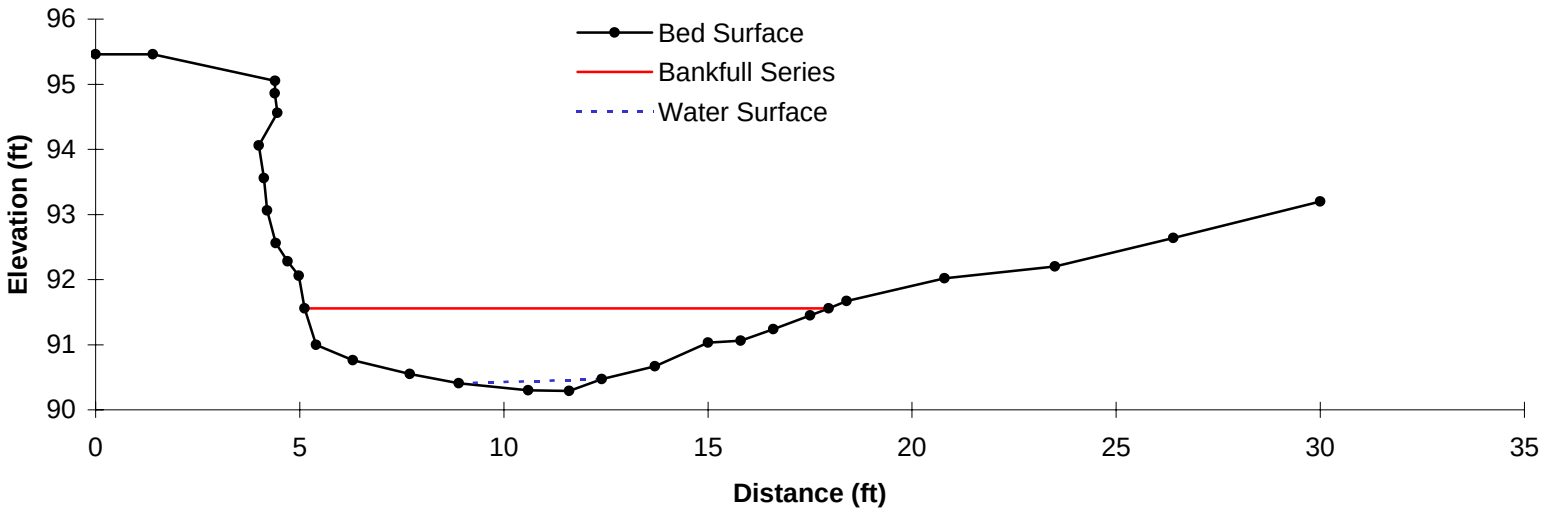
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 1 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
12.84	10.68	0.83	1.27	13.39	0.80	Bankfull
3.50	0.34	0.10	0.17	3.52	0.10	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 1 - XS 2 (Pool)
DATE: 06/19/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	95.46	LEW	8.9	90.41
	1.4	95.46		10.6	90.30
	4.4	95.05		11.6	90.29
	4.4	94.86	REW	12.4	90.47
	4.5	94.56		13.7	90.67
	4.0	94.06		15.0	91.03
	4.1	93.56		15.8	91.06
	4.2	93.06		16.6	91.24
	4.4	92.56		17.5	91.45
	4.7	92.28		18.4	91.67
	5.0	92.06		20.8	92.02
LBF	5.1	91.56		23.5	92.20
	5.4	91.00		26.4	92.64
	6.3	90.76	TRMON	30.0	93.20
	7.7	90.55			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 1-2
March 2006

STONY RUN - REACH 1 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
20.33	28.27	1.39	2.41	22.74	1.24	Bankfull
6.00	1.54	0.26	0.38	7.17	0.21	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 1 - XS 2 (Pool)
DATE: 03/07/06
CREW: RRS, KMF
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	95.43	REW	12.0	90.43
GLMON	0.0	95.23	SLP BRK	15.5	90.98
SLP BRK	1.0	95.23	SLP BRK	19.0	91.81
SLP BRK	1.2	94.81	SLP BRK	22.3	92.27
SLP BRK	2.8	94.76	RBF	24.0	92.44
SLP BRK	3.2	94.07	SLP BRK	25.0	92.64
LBF	3.7	92.44	SLP BRK	27.0	92.79
SLP BRK	4.0	91.30	GRMON	29.8	93.12
LEW	6.0	90.39	TRMON	29.8	93.20
GTOE PIN	7.0	90.20	GRMON	29.8	93.12
T TOE PIN	7.0	90.75	GS	33.0	93.59
GTOE PIN	7.0	90.20	GS	37.0	93.71
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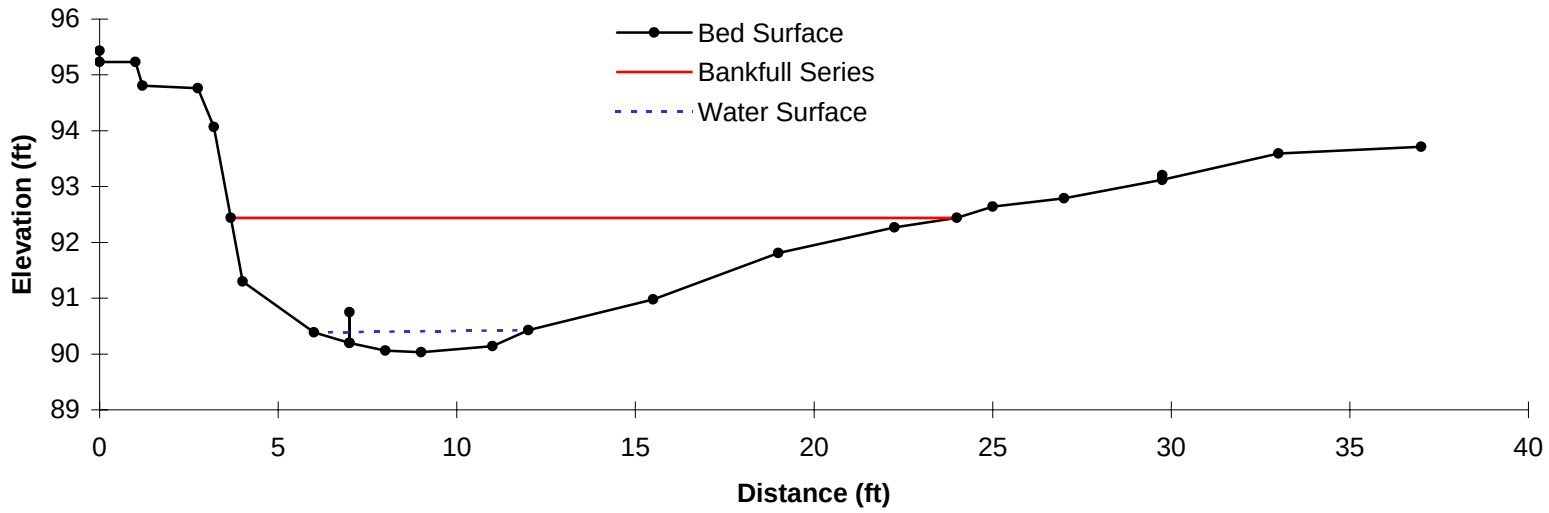
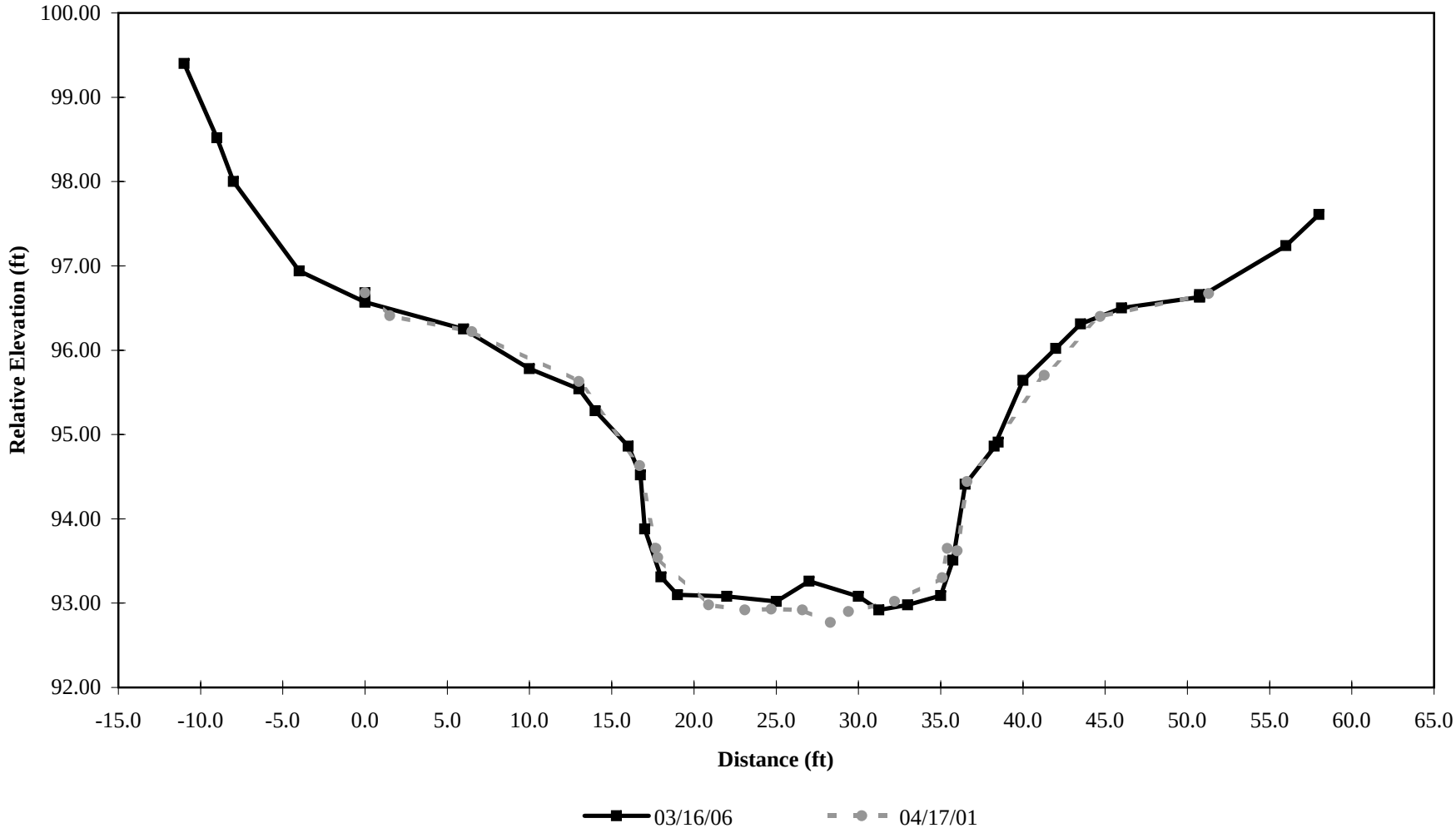
CS	9.0	90.03			
CS	11.0	90.14			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 1-2
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 2
Cross Section 1 Overlay
(Riffle)



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U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

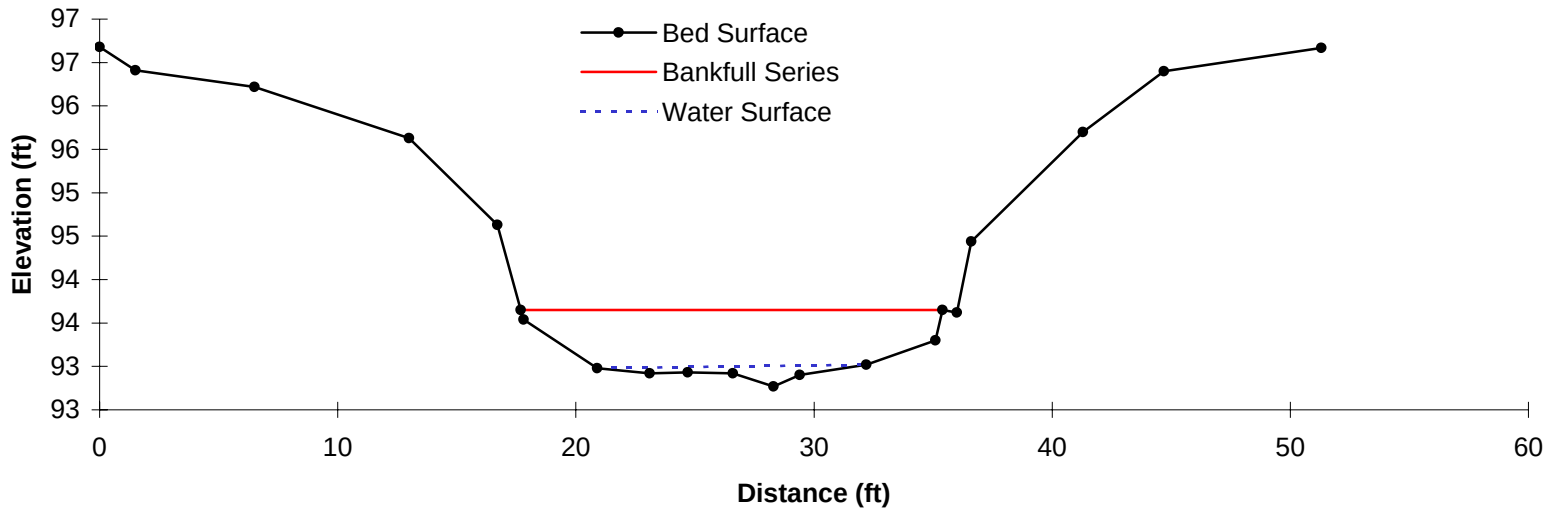
File: Cross Section 2-1
March 2006

STONY RUN - REACH 2 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
17.71	10.96	0.62	0.88	18.00	0.61	Bankfull
11.30	0.93	0.08	0.24	11.32	0.08	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 2 - XS 1 (Riffle)
DATE: 04/17/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	96.68	RBF	35.4	93.65
	1.5	96.41		36.0	93.62
	6.5	96.22		36.6	94.44
	13.0	95.63		41.3	95.70
	16.7	94.63		44.7	96.40
LBF	17.7	93.65	TRMON	51.3	96.67
	17.8	93.54			
LEW	20.9	92.98			
	23.1	92.92			
	24.7	92.93			
	26.6	92.92			
	28.3	92.77			
	29.4	92.90			
REW	32.2	93.02			
	35.1	93.30			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 2-1
March 2006

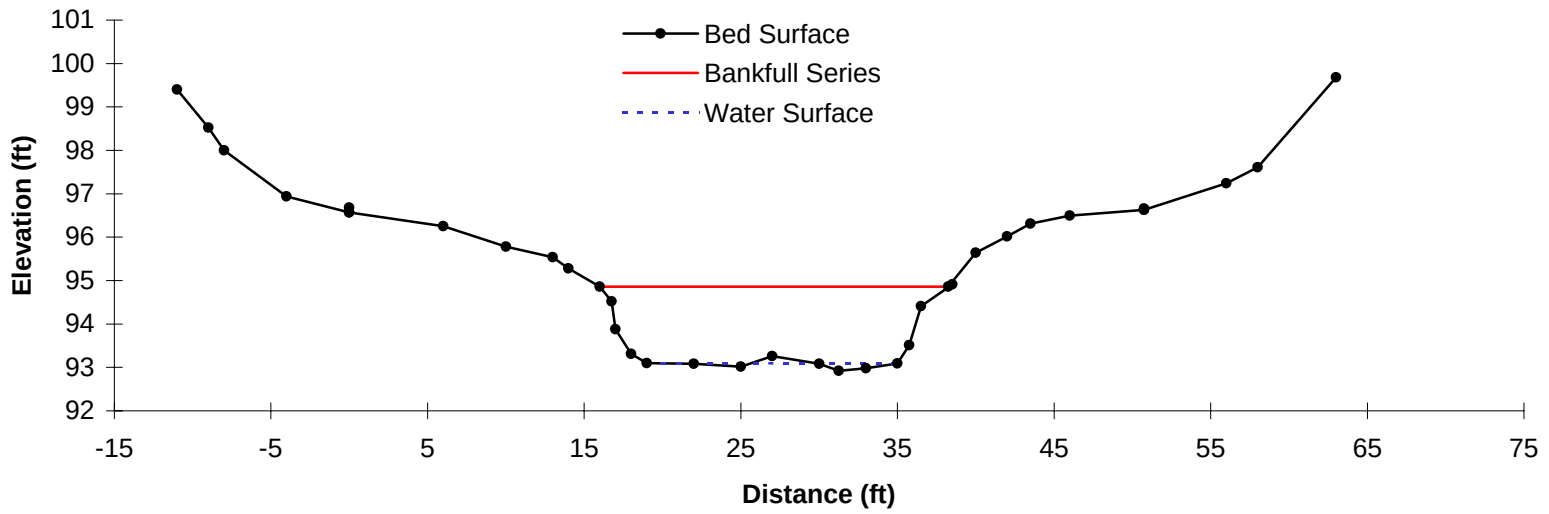
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 2 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
22.25	34.03	1.53	1.94	24.07	1.41	Bankfull
16.00	0.33	0.02	0.17	16.03	0.02	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 2 - XS 1 (Riffle)
DATE: 03/16/06
CREW: CE KMF
DATA: KMF
QA/QC: CE

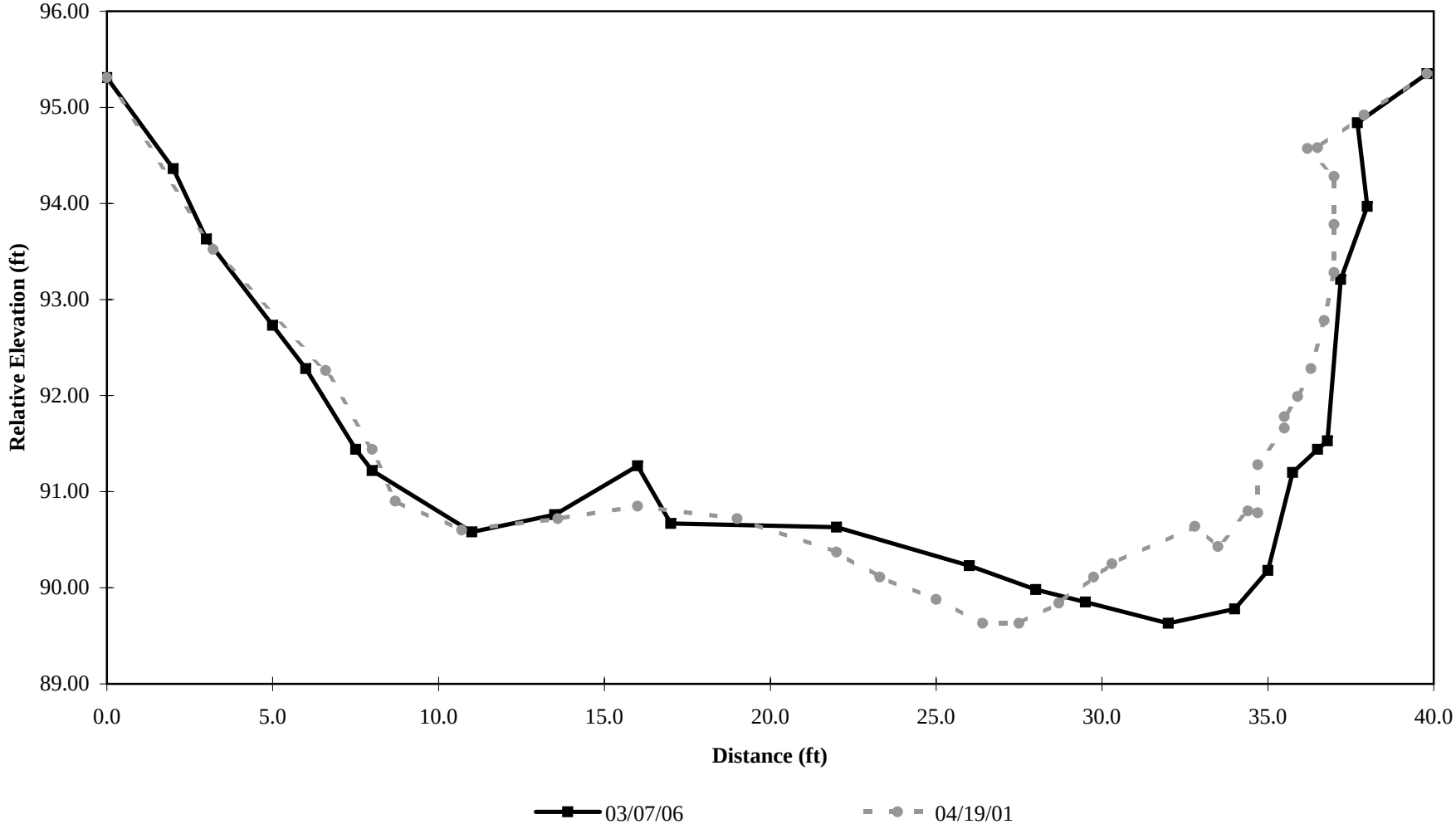
Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
GS	-11.0	99.40	LEW	19.0	93.10	SLP BRK	46.0	96.50
GS	-9.0	98.52	CS	22.0	93.08	GRMON	50.8	96.63
GS	-8.0	98.00	CS	25.0	93.02	TRMON	50.8	96.66
GS	-4.0	96.94	CS	27.0	93.26	GRMON	50.8	96.63
GLMON	0.0	96.57	CS	30.0	93.08	GS	56.0	97.24
TLMON	0.0	96.68	CS	31.3	92.92	GS	58.0	97.61
GLMON	0.0	96.57	CS	33.0	92.98	GS	63.0	99.68
SLP BRK	6.0	96.25	REW	35.0	93.09			
SLP BRK	10.0	95.78	SLP BRK	35.8	93.51			
SLP BRK	13.0	95.54	SLP BRK	36.5	94.41			
SLP BRK	14.0	95.28	SLP BRK	38.5	94.91			
LBF	16.0	94.86	RBF	38.3	94.86			
SLP BRK	16.8	94.52	SLP BRK	40.0	95.64			
SLP BRK	17.0	93.88	SLP BRK	42.0	96.02			
SLP BRK	18.0	93.31	SLP BRK	43.5	96.31			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 2-1
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 3
Cross Section 1 Overlay
(Study Bank)



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 3-1
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

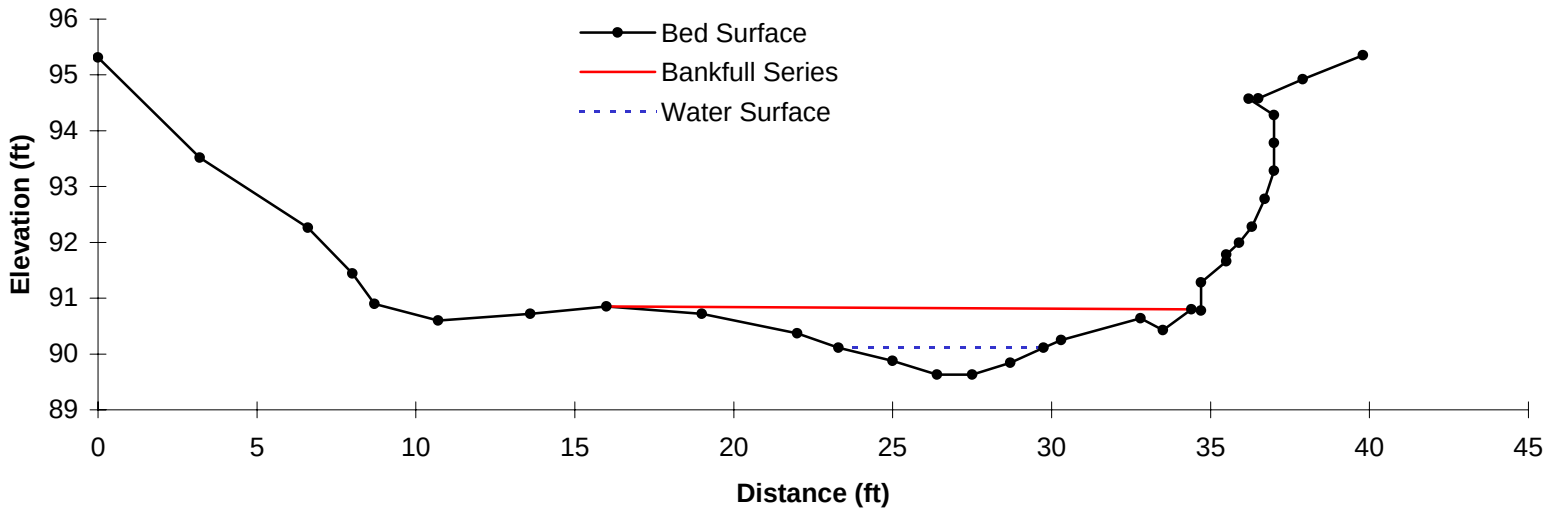
STONY RUN - REACH 3 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
18.40	9.84	0.53	1.19	18.69	0.53	Bankfull
6.45	1.81	0.28	0.48	6.54	0.28	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 3 - XS 1 (Study Bank)
DATE: 04/19/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
LPIN	0.0	95.31		30.3	90.25
	3.2	93.52		32.8	90.64
	6.6	92.26		33.5	90.43
	8.0	91.44	RBF	34.4	90.80
	8.7	90.90		34.7	90.78
	10.7	90.60		34.7	91.28
	13.6	90.72		35.5	91.66
LBF	16.0	90.85		35.5	91.78
	19.0	90.72		35.9	91.99
	22.0	90.37		36.3	92.28
LEW	23.3	90.11		36.7	92.78
	25.0	89.88		37.0	93.28
	26.4	89.63		37.0	93.78
	27.5	89.63		37.0	94.28
	28.7	89.84		36.2	94.57

Identifier	Distance (ft)	Elevation (ft)
	36.5	94.58
	37.9	94.92
RPIN	39.8	95.35



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 3-1
March 2006

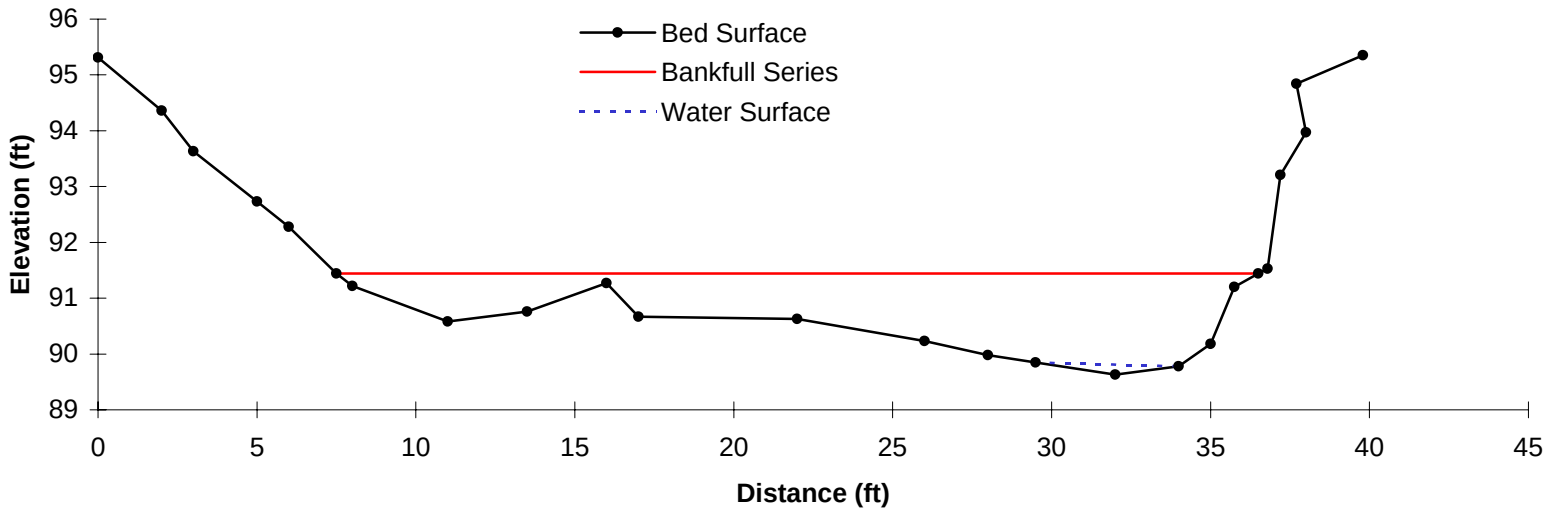
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 3 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
29.00	27.91	0.96	1.81	30.03	0.93	Bankfull
4.50	0.00	0.00	0.00	4.52	0.00	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 3 - XS 1 (Study Bank)
DATE: 03/07/06
CREW: RRS KMF
DATA: KMF
QA/QC: CE

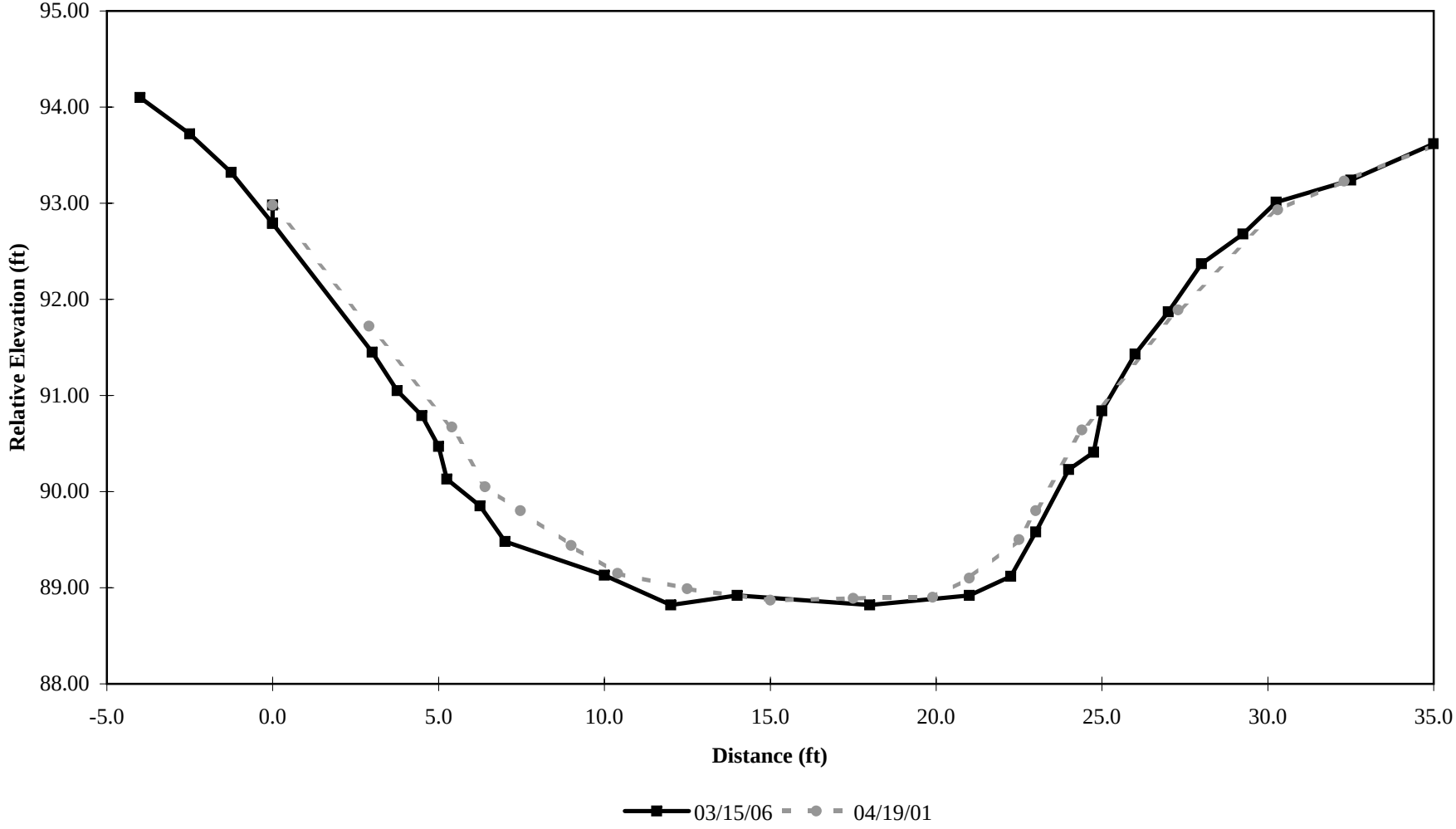
Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	95.31	CS	32.0	89.63
GS	2.0	94.36	REW	34.0	89.78
GS	3.0	93.63	SLP BRK	35.0	90.18
GS	5.0	92.73	SLP BRK	35.8	91.20
SLP BRK	6.0	92.28	RBF	36.5	91.44
LBF	7.5	91.44	BK PIN	36.8	91.53
SLP BRK	8.0	91.22	BK PIN	37.2	93.21
SLP BRK	11.0	90.58	SLP BRK	38.0	93.97
SLP BRK	13.5	90.76	SLP BRK	37.7	94.84
SLP BRK	16.0	91.27	TRMON	39.8	95.35
SLP BRK	17.0	90.67			
SLP BRK	22.0	90.63			
SLP BRK	26.0	90.23			
SLP BRK	28.0	89.98			
LEW	29.5	89.85			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 3-1
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 3
Cross Section 2 Overlay
(Riffle)



Path: CD Drive:\Stony Run\Data\Cross Sections
File:Cross Section 3-2
March 2006

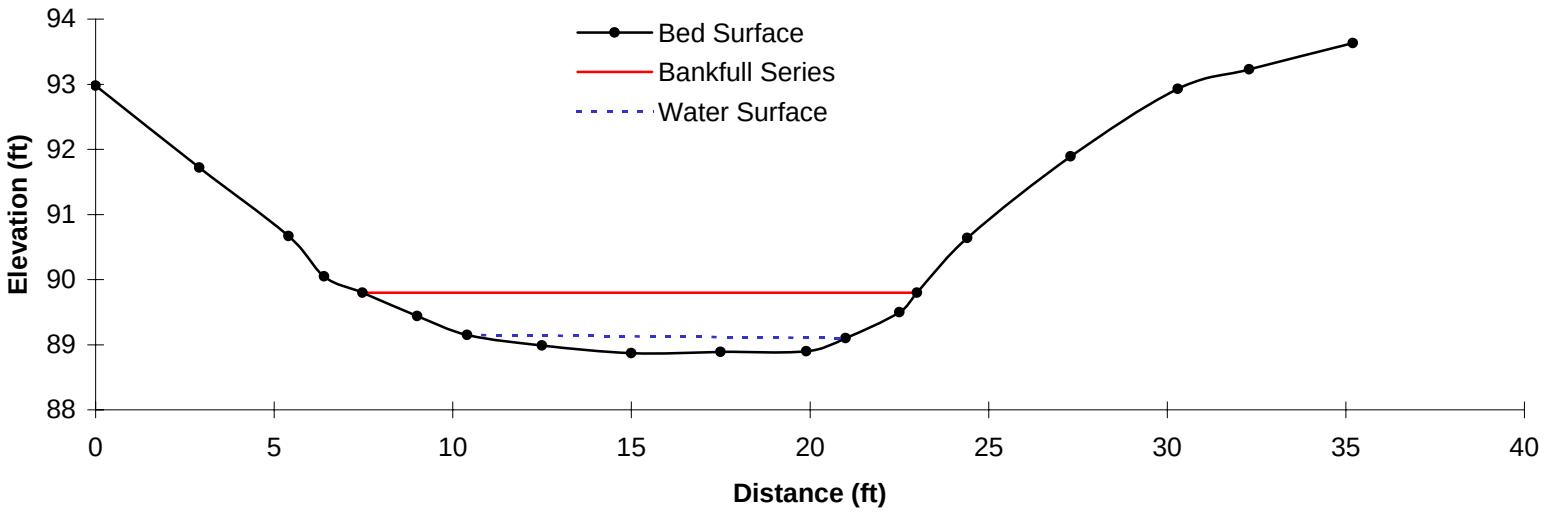
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 3 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
15.53	10.87	0.70	0.93	15.76	0.69	Bankfull
10.60	1.91	0.18	0.26	10.63	0.18	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 3 - XS2 (Riffle)
DATE: 04/19/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	92.98		27.3	91.89
	2.9	91.72		30.3	92.93
	5.4	90.67		32.3	93.23
	6.4	90.05	TRMON	35.2	93.63
LBF	7.5	89.80			
	9.0	89.44			
LEW	10.4	89.15			
	12.5	88.99			
	15.0	88.87			
	17.5	88.89			
	19.9	88.90			
REW	21.0	89.10			
	22.5	89.50			
RBF	23.0	89.80			
	24.4	90.64			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 3-2
March 2006

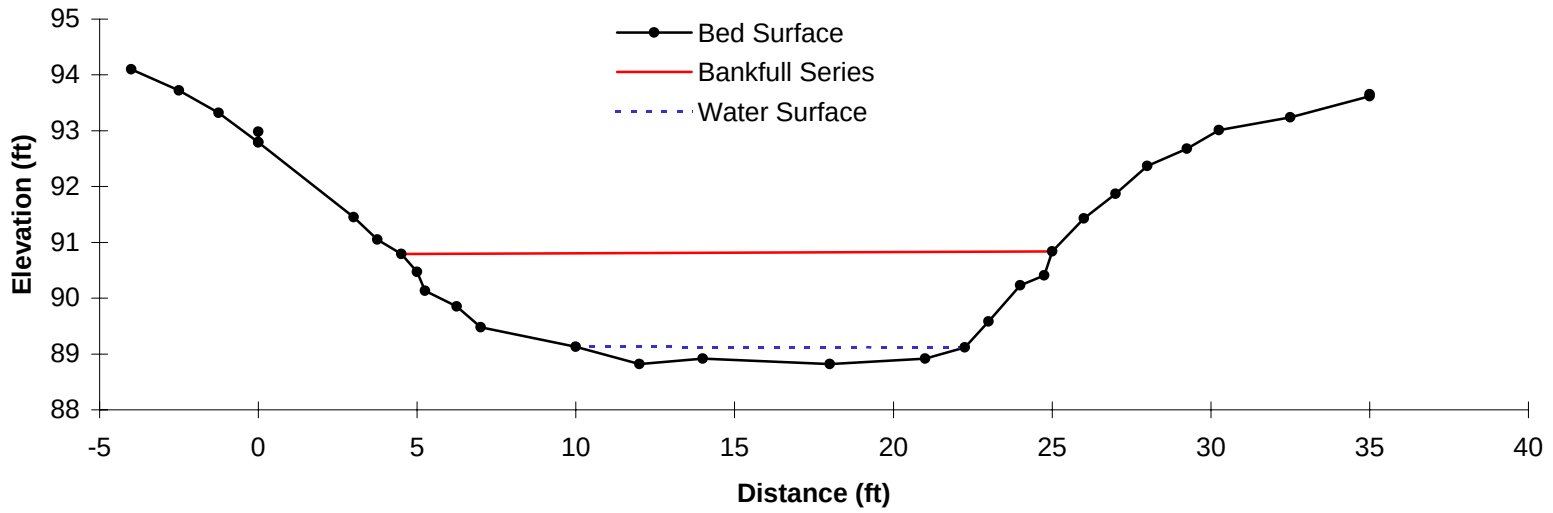
STONY RUN - REACH 3 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
20.50	32.30	1.58	2.00	21.55	1.50	Bankfull
12.25	2.73	0.22	0.31	12.30	0.22	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 3 - XS2 (Riffle)
DATE: 03/15/06
CREW: CE, KMF
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
GS	-4.0	94.10	CS	14.0	88.92
GS	-2.5	93.72	CS	18.0	88.82
SLP BRK	-1.3	93.32	CS	21.0	88.92
GLMON	0.0	92.79	REW	22.3	89.12
TLMON	0.0	92.98	SLP BRK	23.0	89.58
GLMON	0.0	92.79	SLP BRK	24.0	90.23
SLP BRK	3.0	91.45	SLP BRK	24.8	90.41
SLP BRK	3.8	91.05	RBF	25.0	90.84
LBF	4.5	90.79	SLP BRK	26.0	91.43
SLP BRK	5.0	90.47	SLP BRK	27.0	91.87
SLP BRK	5.3	90.13	SLP BRK	28.0	92.37
SLP BRK	6.3	89.85	SLP BRK	29.3	92.68
BAR	7.0	89.48	FRT FLT	30.3	93.01
LEW	10.0	89.13	GS	32.5	93.24
CS	12.0	88.82	GRM	35.0	93.62

Identifier	Distance (ft)	Elevation (ft)
TRMON	35.0	93.65



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 3-2
March 2006

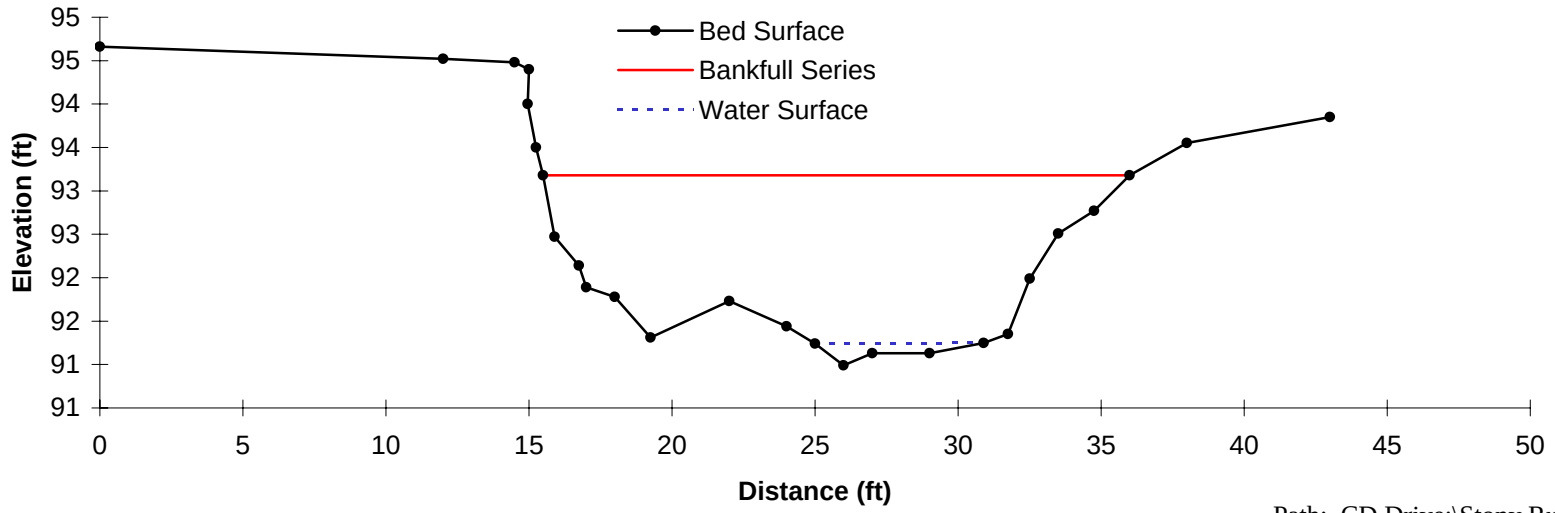
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 4 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
20.51	30.82	1.50	2.19	23.51	1.31	Bankfull
5.90	0.65	0.11	0.25	5.94	0.11	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 4 XS USFWS 1 (Riffle)
DATE: 03/16/06
CREW: CE, KMF
DATA: KMF
QA/QC: CE

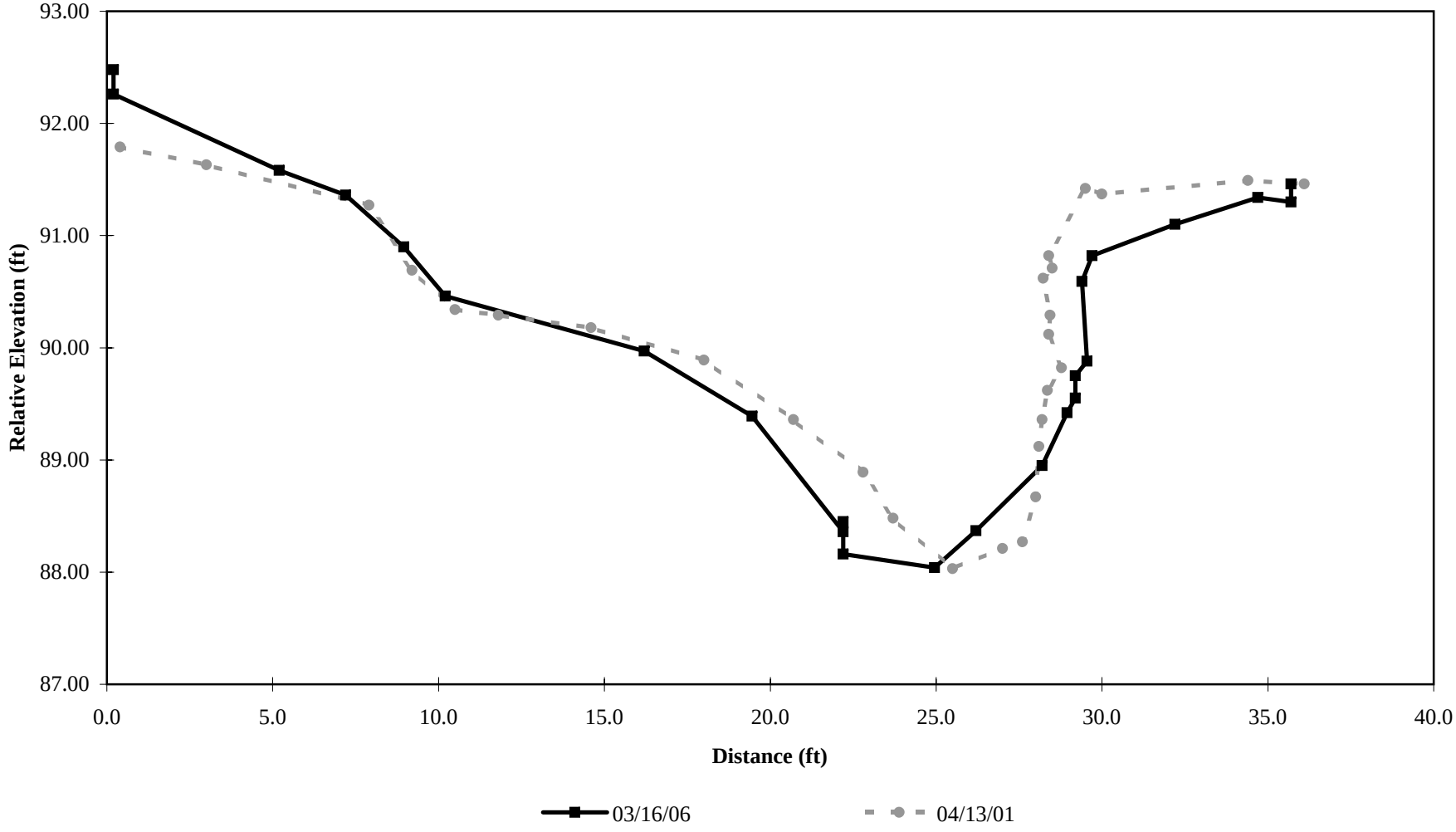
Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
GS	-50.0	94.80	CS	26.0	90.99
GS	0.0	94.66	CS	27.0	91.13
GS	12.0	94.52	CS	29.0	91.13
LTOB	14.5	94.48	REW	30.9	91.25
SLP BRK	15.0	94.40	TOE	31.8	91.35
UNDERCUT	15.0	94.00	SLP BRK	32.5	91.99
SLP BRK	15.3	93.50	SLP BRK	33.5	92.51
LBF	15.5				
SLP BRK	15.9	92.47	SLP BRK	34.8	92.77
SLP BRK	16.8	92.14	RBF	36.0	93.18
BAR	17.0	91.89	RTOB	38.0	93.55
BAR	18.0	91.78	GS	43.0	93.85
BAR	19.3	91.31			93.85
BAR	22.0	91.73			
BAR	24.0	91.44			
LEW	25.0	91.24			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 4-1 (USFWS)
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 4
Cross Section 2 Overlay
(Pool)



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 4-2
March 2006

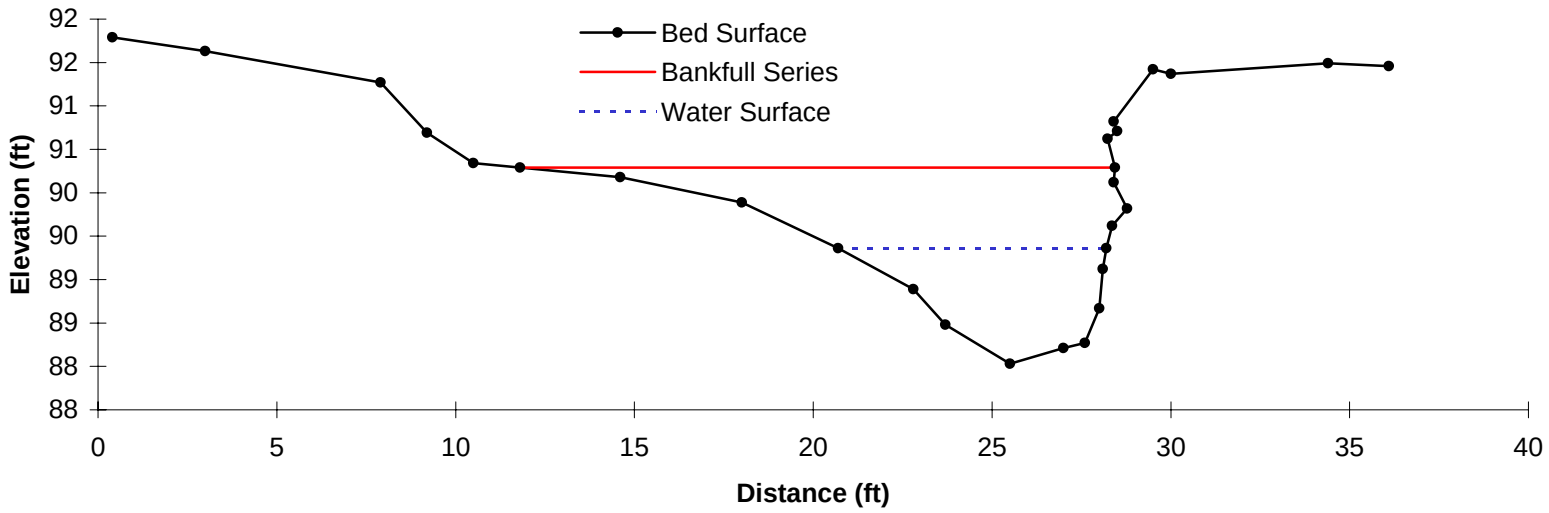
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 4 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
16.64	16.14	0.97	2.26	18.79	0.86	Bankfull
7.50	6.04	0.80	1.33	8.40	0.72	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 4 - XS 2 (Pool)
DATE: 04/13/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
	0.4	91.79		28.1	89.12
	3.0	91.63	REW	28.2	89.36
	7.9	91.27		28.4	89.62
	9.2	90.69		28.8	89.82
	10.5	90.34		28.4	90.12
LBF	11.8	90.29	RBF	28.4	90.29
	14.6	90.18		28.2	90.62
	18.0	89.89		28.5	90.71
LEW	20.7	89.36		28.4	90.82
	22.8	88.89		29.5	91.42
	23.7	88.48		30.0	91.37
	25.5	88.03		34.4	91.49
	27.0	88.21		36.1	91.46
	27.6	88.27			
	28.0	88.67			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 4-2
March 2006

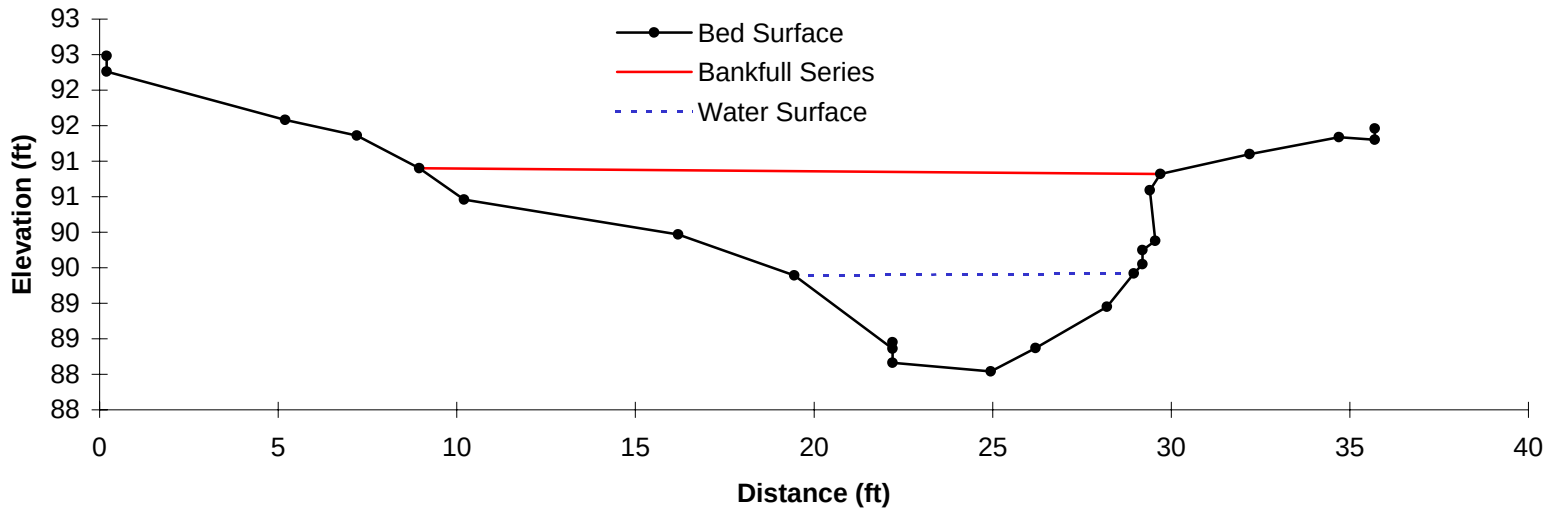
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 4 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
20.75	30.62	1.48	2.80	22.93	1.33	Bankfull
9.50	8.20	0.86	1.37	10.33	0.79	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 4 - XS 2 (Pool)
DATE: 03/16/06
CREW: CE KMF
DATA: KMF
QA/QC: CE

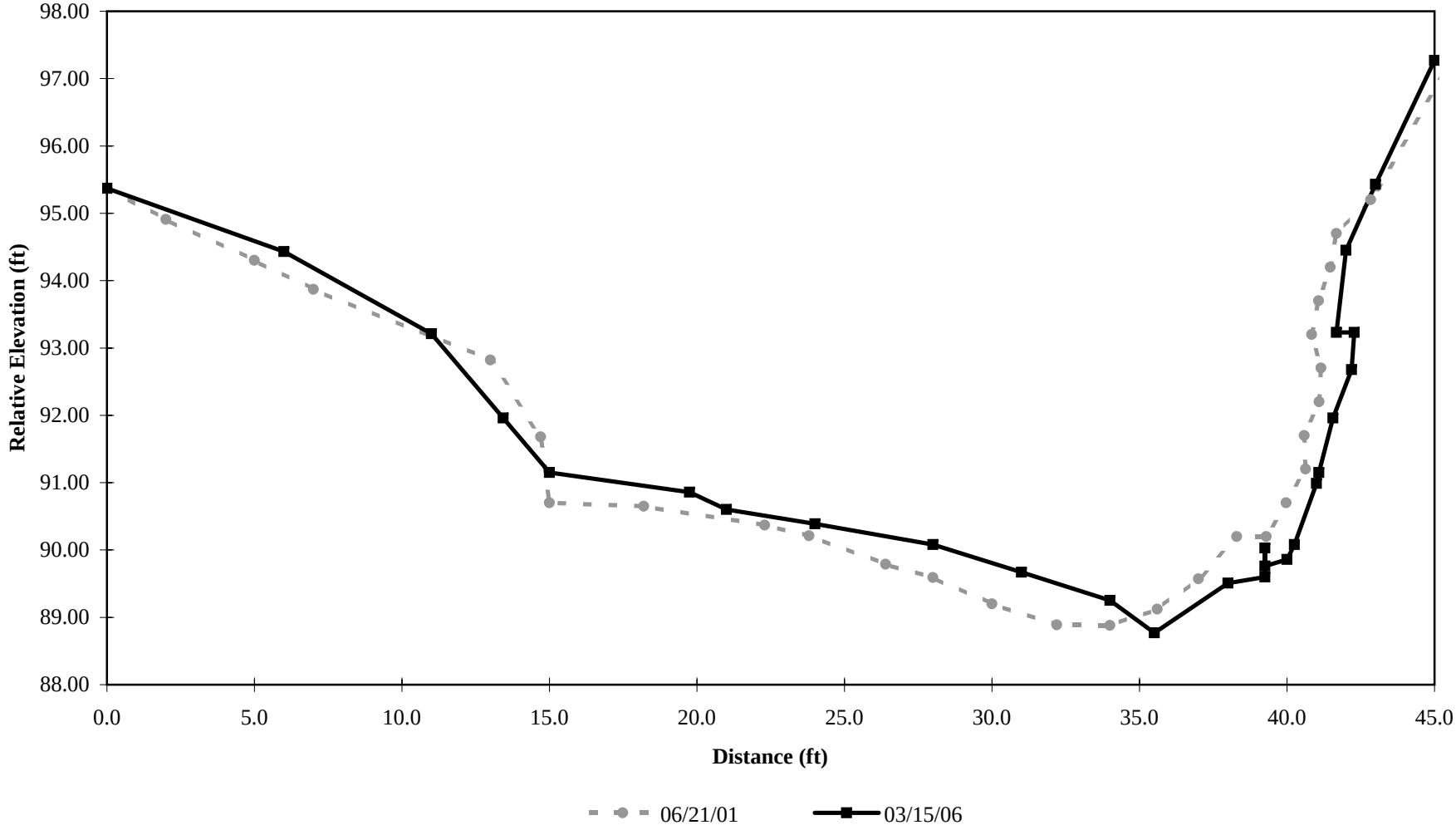
Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.2	92.48	TOE	29.2	89.55
GLMON	0.2	92.26	BK PIN - 0.9	29.2	89.75
GS	5.2	91.58	SLP BRK	29.6	89.88
SLP BRK	7.2	91.36	SLP BRK	29.4	90.59
LBF	9.0	90.90	RBF	29.7	90.82
BAR	10.2	90.46	SLP BRK	32.2	91.10
BAR	16.2	89.97	SLP BRK	34.7	91.34
LEW	19.5	89.39	GRMON	35.7	91.30
GTP	22.2	88.36	TRMON	35.7	91.46
TTP	22.2	88.45			
GTP	22.2	88.16			
CS	25.0	88.04			
CS	26.2	88.37			
CS	28.2	88.95			
REW	29.0	89.42			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 4-2
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 5
Cross Section 1 Overlay
(Bank Study)



Path: CD Drive:\Stony Run\Data\Cross Sections

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

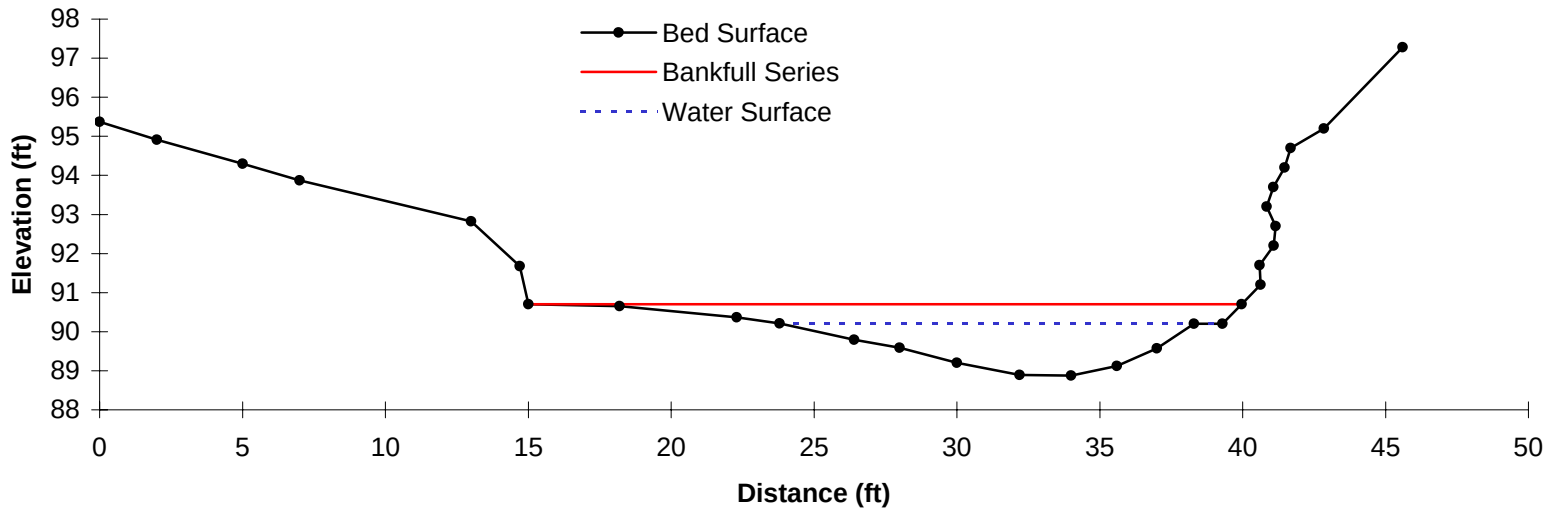
File: Cross Section 5-1
March 2006

STONY RUN - REACH 5 - 2001 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
24.97	20.77	0.83	1.82	25.49	0.81	Bankfull
15.50	11.46	0.74	1.32	15.84	0.72	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 5 - XS 1 (Bank Study)
DATE: 06/21/01
CREW: STV, Inc.
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	95.37		35.6	89.12
	2.0	94.91		37.0	89.57
	5.0	94.30		38.3	90.20
	7.0	93.87	REW	39.3	90.20
	13.0	92.82	RBF	40.0	90.70
	14.7	91.68		40.6	91.20
LBF	15.0	90.70		40.6	91.70
	18.2	90.65		41.1	92.20
	22.3	90.37		41.2	92.70
LEW	23.8	90.21		40.8	93.20
	26.4	89.79		41.1	93.70
	28.0	89.59		41.5	94.20
	30.0	89.20		41.7	94.70
	32.2	88.89		42.8	95.20
	34.0	88.88	TRMON	45.6	97.28



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 5-1
March 2006

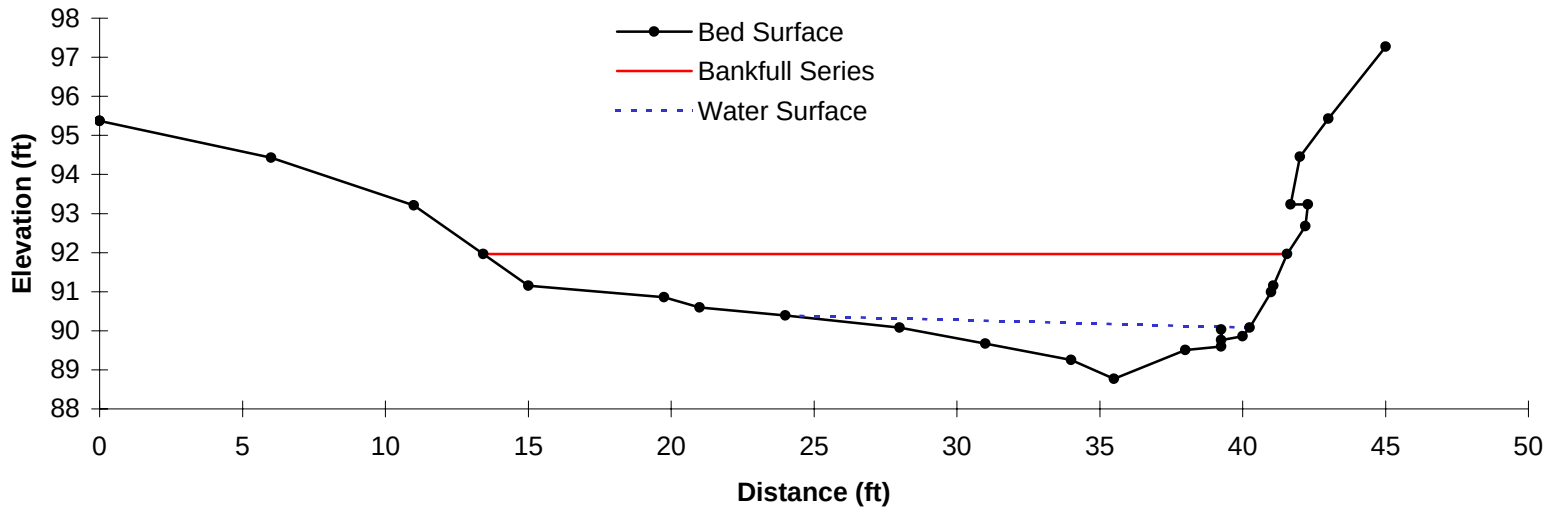
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 5 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
28.13	49.69	1.77	3.19	30.40	1.63	Bankfull
16.25	9.21	0.57	1.40	17.29	0.53	Water Surface

STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 5 - XS 1 (Bank Study)
DATE: 03/15/06
CREW: CE, KMF
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
TLMON	0.0	95.37	TTP	39.3	90.03
GLMON	0.0	95.37	GTP	39.3	89.76
TOE	6.0	94.43	CS	40.0	89.86
SLP BRK	11.0	93.21	REW	40.3	90.08
LBF	13.4	91.96	SLP BRK	41.0	90.99
SLP BRK	15.0	91.15	SLP BRK	41.1	91.15
SLP BRK	19.8	90.86	RBF	41.6	91.96
BAR	21.0	90.60	SLP BRK	42.2	92.68
LEW	24.0	90.39	SLP BRK	42.3	93.23
CS	28.0	90.08	SLP BRK	41.7	93.23
CS	31.0	89.67	SLP BRK	42.0	94.45
CS	34.0	89.25	SLP BRK	43.0	95.43
TW	35.5	88.77	TRMON (Fl	45.0	97.27
CS	38.0	89.51			
GTP	39.3	89.60			



Path: CD Drive:\Stony Run\Data\Cross Sections
File: Cross Section 5-1
March 2006

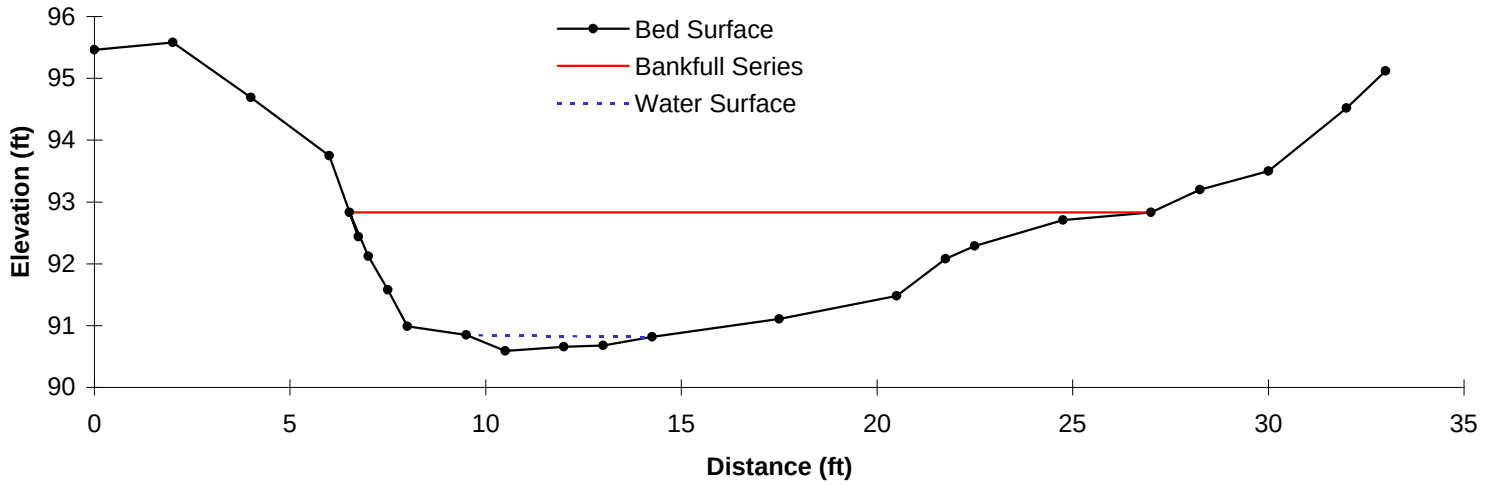
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN - REACH 5 - 2006 SURVEY

Width (ft)	Cross-Sectional Area (Sq.ft)	Mean Depth (ft)	Maximum Depth (ft)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	
20.48	27.82	1.36	2.24	21.66	1.28	Bankfull
4.75	0.70	0.15	0.25	4.79	0.15	Water Surface

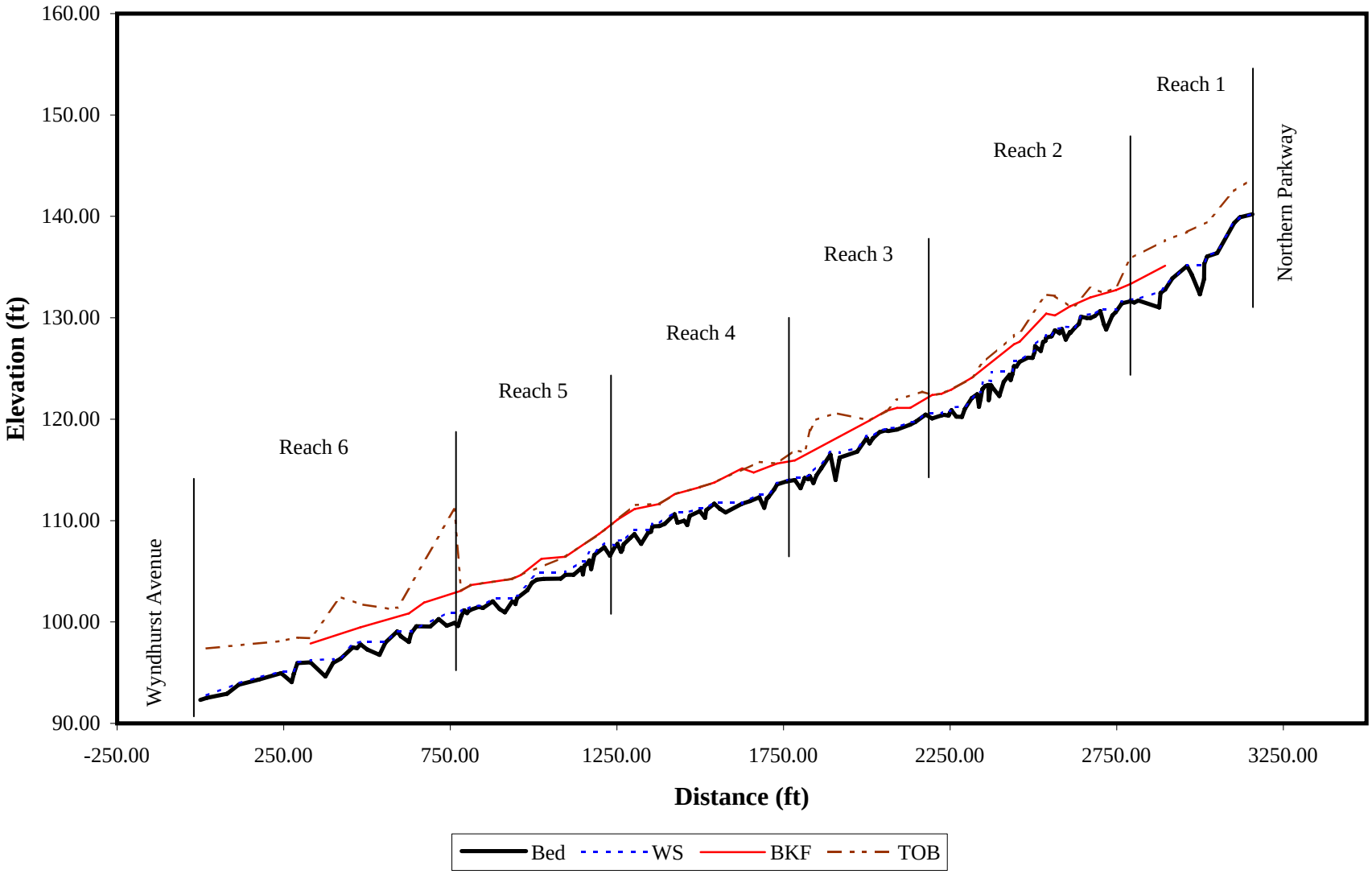
STREAM: Stony Run, Baltimore City, Maryland
REACH & XS: Reach 5 - XS USFWS 2 (Riffle)
DATE: 03/15/06
CREW: CE, KMF
DATA: KMF
QA/QC: CE

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
GS	0.0	95.46	SLP BRK	21.8	92.08
	2.0	95.58		22.5	92.29
	4.0	94.69		24.8	92.71
IP	6.0	93.75	RBF	27.0	92.83
SLP BRK	6.8	92.44		28.3	93.20
LBF	6.5				
	7.0	92.12	TOE SLP	30.0	93.50
	7.5	91.58		32.0	94.52
TOE	8.0	90.99		33.0	95.12
LEW	9.5	90.85			
CS	10.5	90.59			
	12.0	90.66			
	13.0	90.68			
REW	14.3	90.82			
CS	17.5	91.11			
BAR	20.5	91.48			



Appendix D – Longitudinal Profile

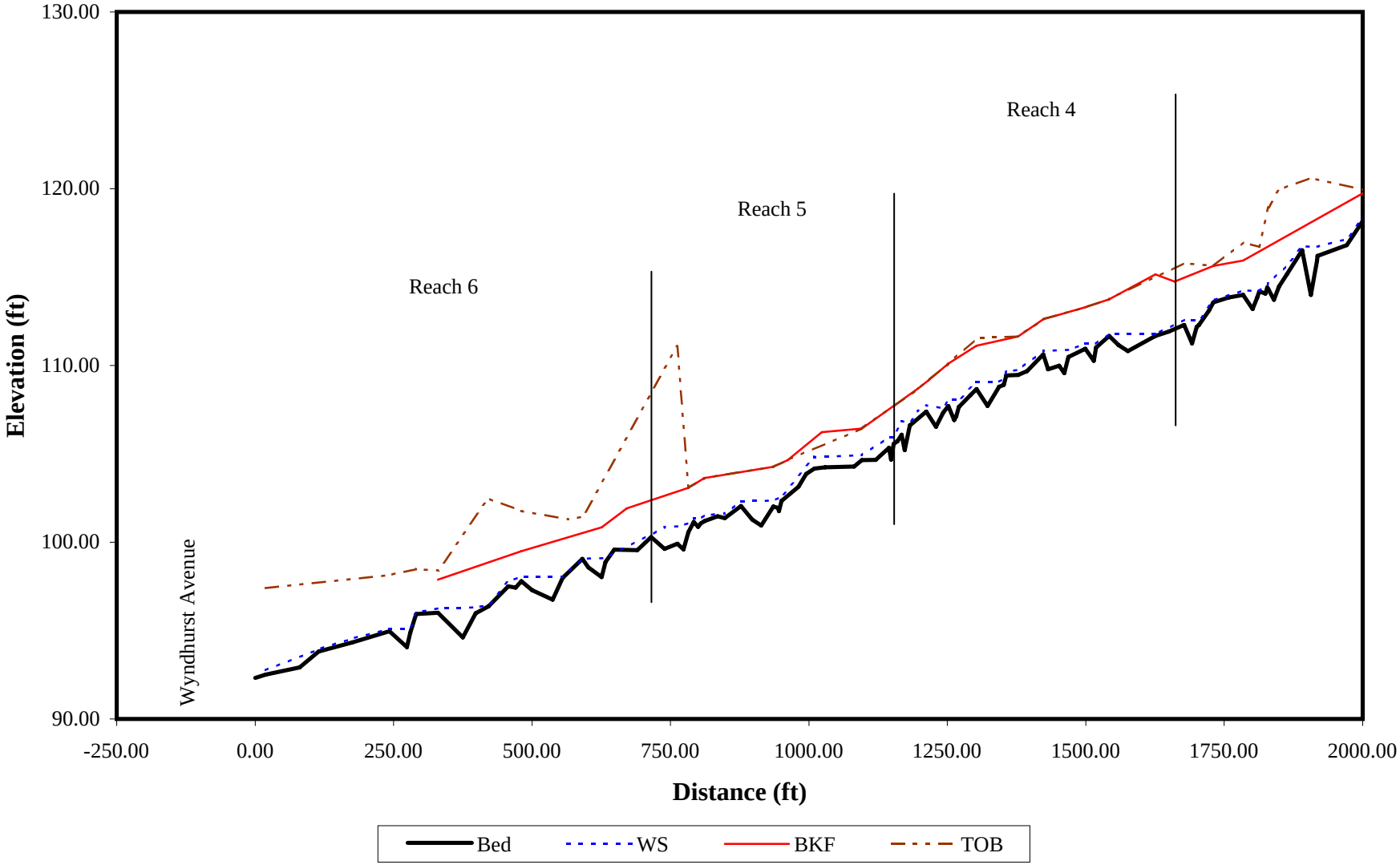
STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE



Path: CD Drive:\Stony Run\Data\Longitudinal Profile
File: Stony Run - Longitudinal Profile
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

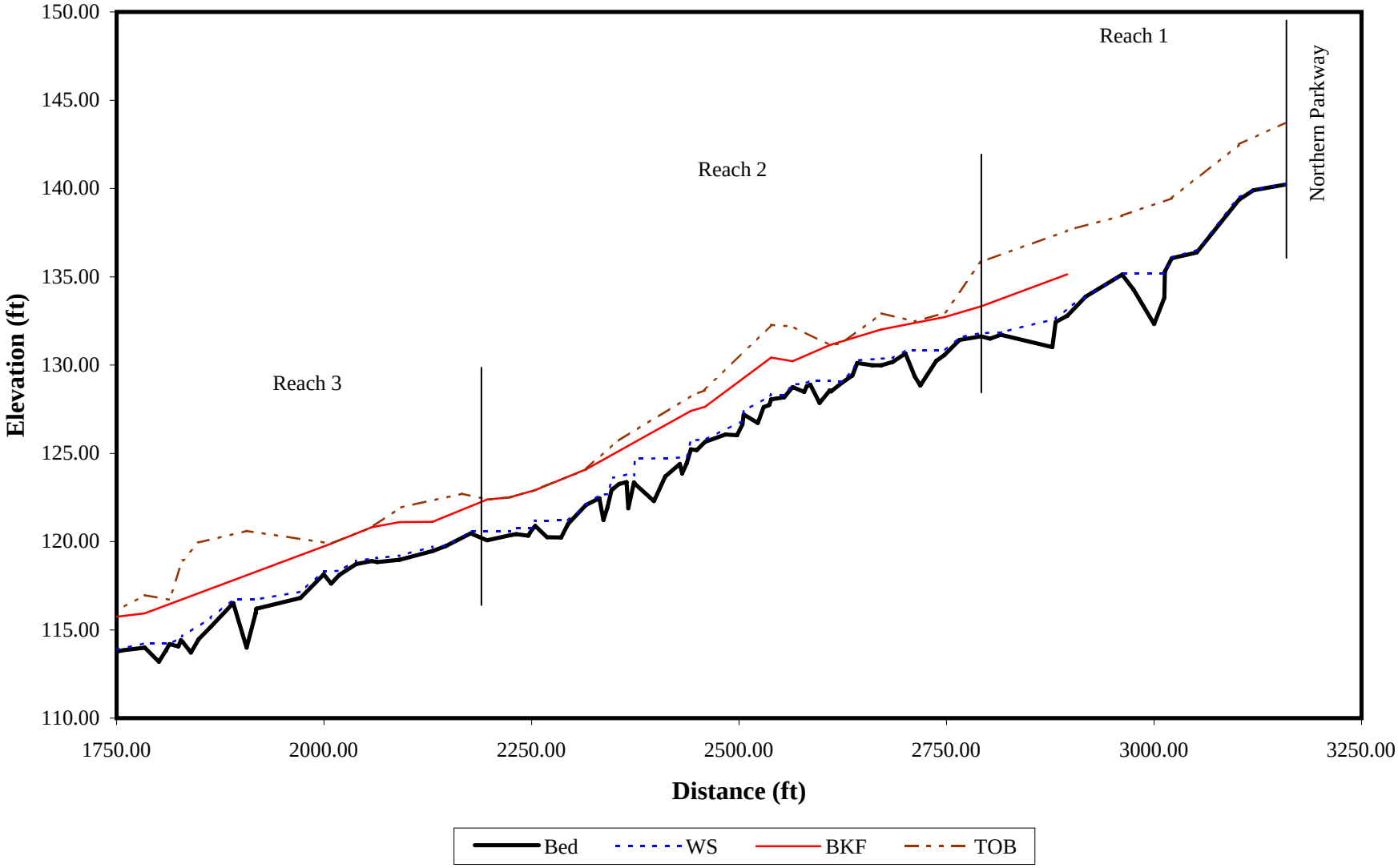
STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE - ENLARGEMENT



Path: CD Drive:\Stony Run\Data\Longitudinal Profile
File: Stony Run - Longitudinal Profile
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE - ENLARGEMENT



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File: Stony Run - Longitudinal Profile
March 2006

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE

STREAM	Stony Run, Baltimore City, Maryland
USGS #	
FWS #	

DATA	KMF
QA/QC	CE

DATE	March 2006
CREW	SD CE
REFERENCE POINT	
REFERENCE ELEVATION	

						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
USFWS BM 1	2.94		102.94																100.00							
Culvert Invert.				-19.20	0.00	10.62	92.32																			
CS (U/S LIMIT OF APRON)				0.00	19.20	10.43	92.51	10.18	92.76				5.54	97.40												
LB 6" Terracotta pipe				40.50	59.70																					
CS				61.00	80.20	10.02	92.92																			
END OF CONCRETE BLOCK WALL				89.60	108.80																					
CS				95.50	114.70	9.12	93.82	8.99	93.95																	
CS				155.50	174.70	8.62	94.32	8.40	94.54																	
RB 14" Terracotta pipe				170.00	189.20																					
Gabion baskets drop down to lower TOB				172.50	191.70																					
USFWS BM 1				212.00	231.20													2.94	100.00							
TRUN				223.50	242.70	7.98	94.96	7.84	95.10				4.80	98.14												
CS				255.00	274.20	8.88	94.06																			
TPOOL				261.00	280.20	8.07	94.87	7.81	95.13																	
TRIFF				271.50	290.70	7.00	95.94	6.92	96.02				4.47	98.47												
TRUN (POOR BF indicator)				311.00	330.20	6.93	96.01	6.68	96.26	5.06	97.88	1.62	4.54	98.40												
LB Start of concrete wall				342.00	361.20																					
RB end Gabions location of concrete wall				353.00	372.20																					
End RB concrete wall				356.00	375.20	8.32	94.62																			
TP1	7.41	3.73	106.63																							
TPOOL				379.00	398.20	10.65	95.98	10.31	96.32																	
D/S end concrete wall				392.50	411.70																					
TRUN				402.00	421.20	10.25	96.38	10.18	96.45				4.16	102.47												
Location of twin 36" culverts				402.00	421.20																					
U/S end RB concrete wall (4' high)				412.00	431.20																					
CS				438.00	457.20	9.12	97.51	8.84	97.79																	
CS				451.20	470.40	9.20	97.43																			
TRIFF				461.50	480.70	8.83	97.80	8.57	98.06	7.14	99.49	1.43	4.86	101.77												
CS/pool				481.00	500.20	9.34	97.29																			

STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE

						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
LB location of 18" outfall				487.70	506.90																					
CS				518.00	537.20	9.87	96.76																			
TPOOL				536.30	555.50	8.64	97.99	8.57	98.06																	
CS				546.50	565.70								5.33	101.30												
RB 10" outfall				555.00	574.20																					
TP 2	4.98	3.62	107.99																							
CS				572.00	591.20	8.93	99.06	8.92	99.07				6.55	101.44												
DMAX				582.50	601.70	9.41	98.58																			
CS				606.50	625.70	9.97	98.02			7.15	100.84															
TPOOL				613.70	632.90	9.11	98.88	8.89	99.10				4.54													
CS				629.00	648.20	8.41	99.58																			
Location of Brick Culvert RB				641.50	660.70																					
				652.00	671.20					6.07	101.92															
CS				671.00	690.20	8.44	99.55																			
LB 36" culvert				675.00	694.20																					
CS				696.00	715.20	7.70	100.29																			
CS				720.00	739.20	8.37	99.62	7.13	100.86																	
TP3	12.37	4.09	116.27																							
U/S of fallen tree				743.30	762.50																					
CS/POOL				743.30	762.50	16.36	99.91	15.37	100.90				5.20	111.07												
CS				754.30	773.50	16.67	99.60																			
TPOOL				763.30	782.50	15.70	100.57	15.19	101.08	13.19	103.08	2.00	13.19	103.08												
CS				772.80	792.00	15.12	101.15	14.92	101.35																	
CS				780.90	800.10	15.40	100.87																			
CS				785.30	804.50	15.21	101.06	14.93	101.34																	
TRUN				791.80	811.00	15.08	101.19	14.74	101.53	12.64	103.63		12.64	103.63												
CS				815.80	835.00	14.80	101.47																			
TRUN				828.80	848.00	14.90	101.37	14.64	101.63																	
TP4	5.12	0.70	120.69																							
CS				858.30	877.50	18.65	102.04	18.37	102.32																	
CS				878.30	897.50	19.41	101.28																			
CS				894.80	914.00	19.74	100.95																			
CS				916.30	935.50	18.67	102.02	18.34	102.35	16.43	104.26		16.43	104.26												
TRUN				924.80	944.00	18.75	101.94	18.20	102.49																	
CS/POOL				926.80	946.00	18.93	101.76																			
TPOOL				931.30	950.50	18.35	102.34	18.07	102.62																	
Approx end US end R5 Start DS R4				940.30	959.50																					

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						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
CS				942.30	961.50					16.05	104.64		16.05	104.64												
CS				961.80	981.00	17.56	103.13																			
CS				975.80	995.00	16.83	103.86																			
TRIFF				990.80	1010.00	16.52	104.17	15.87	104.82																	
CS (Bank height rises here, well established bench				1004.30	1023.50					14.46	106.23															
CS				1010.30	1029.50	16.45	104.24																			
Location of Reach 4 XS 4-2 LTMON																		12.91	107.78							
TP 5 XS 4-2 LTMON	6.18	12.90	113.97	1029.80	1049.00																					
RTMON XS 4-2				1030.30	1049.50													7.18	106.79							
CS				1062.30	1081.50	9.69	104.28																			
TPOOL (water levels went up due to rain)				1076.30	1095.50	9.32	104.65	9.04	104.93	7.53	106.44		7.53	106.44												
CS				1101.30	1120.50	9.31	104.66																			
TRIFF				1125.30	1144.50	8.62	105.35	8.01	105.96																	
POOL				1129.30	1148.50	9.29	104.68																			
TPOOL				1133.80	1153.00	8.40	105.57	8.01	105.96																	
RB 24" outfall				1136.30	1155.50																					
CS				1140.80	1160.00	8.25	105.72																			
TRIFF				1148.30	1167.50	7.89	106.08	7.12	106.85																	
CS				1153.80	1173.00	8.76	105.21																			
TPOOL				1162.80	1182.00	7.36	106.61	7.17	106.80																	
CS				1177.90	1197.10			6.57	107.40	5.27	108.70		5.27	108.70												
TRIFF				1192.80	1212.00	6.58	107.39	6.21	107.76																	
CS				1197.30	1216.50					4.79	109.18		4.79	109.18												
CS				1210.30	1229.50	7.43	106.54																			
TPOOL				1223.30	1242.50	6.64	107.33	6.39	107.58																	
TRIFF				1232.30	1251.50	6.26	107.71	5.92	108.05	3.87	110.10		3.87	110.10												
DMAX				1243.30	1262.50	7.06	106.91																			
BTM step created by log across channel				1246.80	1266.00	6.84	107.13	5.91	108.06																	
Front of log jam				1251.30	1270.50	6.32	107.65	5.91	108.06																	
TP 6	6.09	3.69	116.37																							
CS				1272.30	1291.50	8.05	108.32																			
CS				1283.30	1302.50	7.71	108.66	7.29	109.08	5.25	111.12	2.04	4.83	111.54												
CS				1303.30	1322.50	8.66	107.71																			
TPOOL				1324.30	1343.50	7.58	108.79	7.28	109.09																	
24" HDPE				1332.80	1352.00	7.48	108.89	7.14	109.23																	
CS				1337.30	1356.50	6.93	109.44	6.70	109.67																	
TRIFF				1358.30	1377.50	6.91	109.46	6.61	109.76	4.73	111.64	1.88	4.73	111.64												
CS				1374.80	1394.00	6.69	109.68																			
TRIFF				1403.80	1423.00	5.74	110.63	5.55	110.82	3.76	112.61	1.79	3.76	112.61												
CS				1412.80	1432.00	6.59	109.78																			
CS				1432.80	1452.00	6.39	109.98																			
CS				1441.80	1461.00	6.80	109.57																			
TPOOL				1449.30	1468.50	5.89	110.48	5.48	110.89																	
TRUN				1479.80	1499.00	5.43	110.94	5.15	111.22	3.07	113.30	2.08	3.07	113.30												

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						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
CS				1495.30	1514.50	6.11	110.26																			
TPOOL				1499.30	1518.50	5.35	111.02	5.14	111.23																	
TRIFF (Small man-made crossing causing the riffle				1522.80	1542.00	4.70	111.67	4.59	111.78	2.62	113.75	1.97	2.62	113.75												
POOL				1540.30	1559.50	5.22	111.15																			
POOL				1556.80	1576.00	5.56	110.81																			
TPOOL				1606.30	1625.50	4.70	111.67	4.58	111.79	1.22	115.15															
TP 7	6.84		120.65				113.81																			
TPOOL (same pool a check)				1606.30	1625.50			8.90	111.75																	
CS				1630.30	1649.50	8.73	111.92																			
CS				1641.30	1660.50					5.90	114.75															
TRIFF				1658.30	1677.50	8.35	112.30	8.06	112.59				4.86	115.79												
POOL				1672.80	1692.00	9.40	111.25																			
CS				1680.80	1700.00	8.47	112.18																			
TPOOL				1685.30	1704.50	8.36	112.29	8.10	112.55																	
Location of 18" ROP on RB. End of Reach 4 st 3				1699.30	1718.50																					
CS				1703.30	1722.50	7.55	113.10																			
TRIFF/BRUN				1711.30	1730.50	7.08	113.57	6.97	113.68	5.02	115.63	1.95	5.02	115.63												
TRUN				1738.80	1758.00	6.81	113.84																			
CS (location of Reach 3 XS 3-2)				1764.80	1784.00	6.66	113.99	6.41	114.24	4.71	115.94	1.70	3.68	116.97												
CS				1781.80	1801.00	7.45	113.20																			
CS				1790.30	1809.50	6.81	113.84																			
TPOOL				1794.30	1813.50	6.45	114.20	6.43	114.22				3.95	116.70												
CS				1805.30	1824.50	6.58	114.07																			
CS				1808.30	1827.50	6.24	114.41	6.14	114.51																	
TRUN				1810.30	1829.50	6.32	114.33	6.00	114.65				1.71	118.94												
CS				1820.30	1839.50	6.94	113.71																			
TP8	16.67	5.17	132.15																							
RTMON CX 3-2																		13.41	118.74							
LTMON CX 3-2																		14.06	118.09							
RTMON CX 3-1																		11.75	120.40							
LTMON CX 3-1																		11.78	120.37							
53' culvert and road																										
TPOOL				1829.80	1849.00	17.68	114.47						12.21	119.94												
Location of CX 3-1				1831.80	1851.00																					
CS				1844.30	1863.50	16.99	115.16	16.47	115.68																	
TRIFF				1871.30	1890.50	15.63	116.52	15.41	116.74																	
POOL				1887.30	1906.50	18.16	113.99						11.54	120.61												
CS (Also location of twin 36" culverts				1898.30	1917.50	16.23	115.92																			
Invert of culvert				1899.30	1918.50	15.95	116.20	15.43	116.72																	

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						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
BM2 USFWS	2.84	6.64	128.35	1952.30	1971.50														125.51							
Invert of 54" twin culverts, start reach 2				1952.30	1971.50	11.55	116.80	11.20	117.15																	
TRIFF				1980.30	1999.50	10.21	118.14	10.04	118.31																	
CS				1989.30	2008.50	10.73	117.62			8.47	119.88		8.47	119.88												
TPOOL				1999.30	2018.50	10.23	118.12	10.01	118.34																	
Location of RB outfall				2007.30	2026.50																					
CS				2019.30	2038.50	9.62	118.73	9.44	118.91																	
CS				2038.30	2057.50	9.45	118.90	9.32	119.03	7.53	120.82	1.79	7.53	120.82												
CS				2044.80	2064.00	9.51	118.84	9.28	119.07																	
CS				2071.80	2091.00	9.38	118.97	9.15	119.20	7.24	121.11	1.91	6.44	121.91												
RB 24" outfall				2102.30	2121.50																					
CS				2111.30	2130.50	8.89	119.46	8.65	119.70	7.23	121.12															
TRUN				2127.80	2147.00	8.60	119.75	8.58	119.77																	
				2147.30	2166.50								5.63	122.72												
TRUN				2157.30	2176.50	7.89	120.46	7.79	120.56																	
24" outfall RB				2164.30	2183.50																					
CS				2177.30	2196.50	8.28	120.07			5.97	122.38		5.97	122.38												
CS				2205.30	2224.50	7.98	120.37	7.76	120.59	5.84	122.51	1.92	5.84	122.51												
CS				2212.30	2231.50	7.93	120.42	7.57	120.78	5.74	122.61	1.83	5.74	122.61												
CS				2226.80	2246.00	8.01	120.34																			
TPOOL				2231.30	2250.50	7.67	120.68	7.56	120.79																	
TRIFF				2235.30	2254.50	7.46	120.89	7.16	121.19	5.43	122.92	1.73	5.43	122.92												
CS				2249.30	2268.50	8.11	120.24						4.96													
CS				2266.30	2285.50	8.12	120.23																			
TPOOL				2274.80	2294.00	7.35	121.00	7.14	121.21																	
CS				2296.30	2315.50	6.28	122.07	6.27	122.08	4.26	124.09	2.01	4.26	124.09												
Location of 24" outfall RB				2309.80	2329.00																					
CS				2312.30	2331.50	5.90	122.45	5.70	122.65																	
CS				2317.30	2336.50	7.13	121.22																			
BSTEP				2322.30	2341.50	6.39	121.96	5.67	122.68																	
CS				2327.30	2346.50	5.41	122.94	4.95	123.40																	
TSTEP				2329.30	2348.50	5.34	123.01	4.74	123.61				2.80	125.55												
Channel is wider with more boulders																										
CS				2336.30	2355.50	5.08	123.27																			
BPOOL (caused by log jam)				2345.30	2364.50	4.98	123.37	4.55	123.80																	
POOL				2347.30	2366.50	6.47	121.88																			
TPOOL (also debris jam)				2354.30	2373.50	5.00	123.35	4.58	123.77																	
T Log jam				2355.30	2374.50	5.09	123.26	3.67	124.68																	
TP 9	5.96	0.88	133.43																							
18" RB outfall and US end R-2 DS end R-1				2359.30	2378.50																					

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Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
CS				2378.30	2397.50	11.14	122.29																			
42" RCP on LB				2391.80	2411.00																					
CS				2391.80	2411.00	9.74	123.69																			
CS				2409.30	2428.50	9.03	124.40																			
CS				2412.30	2431.50	9.57	123.86																			
CS				2417.80	2437.00	8.99	124.44	8.65	124.78																	
CS				2422.80	2442.00	8.21	125.22	7.68	125.75	6.03	127.40	1.65	5.17	128.26												
CS				2429.80	2449.00	8.25	125.18																			
TPOOL				2439.80	2459.00	7.78	125.65	7.67	125.76	5.80	127.63	1.87	4.85	128.58												
CS				2464.30	2483.50	7.36	126.07																			
CS				2478.30	2497.50	7.40	126.03																			
TRUN				2484.80	2504.00	6.80	126.63	6.59	126.84																	
TSTEP				2486.30	2505.50	6.23	127.20	6.04	127.39																	
CS				2503.30	2522.50	6.71	126.72																			
CS				2510.30	2529.50	5.81	127.62																			
TRUN				2517.30	2536.50	5.70	127.73	5.20	128.23																	
TSTEP/BPOOL				2519.30	2538.50	5.37	128.06	5.12	128.31	3.01	130.42	2.11	1.15	132.28												
TPOOL				2535.30	2554.50	5.26	128.17	5.13	128.30																	
CS				2545.30	2564.50	4.68	128.75	4.55	128.88	3.21	130.22	1.34	1.26	132.17												
TP 10	7.09	0.99	139.53																							
CS				2559.30	2578.50	11.06	128.47																			
CS				2562.30	2581.50	10.74	128.79	10.55	128.98																	
TRUN				2566.80	2586.00	10.65	128.88	10.42	129.11																	
POOL				2577.80	2597.00	11.68	127.85																			
CS				2590.30	2609.50	10.96	128.57	10.43	129.10	8.40	131.13		8.40	131.13												
CS				2591.80	2611.00	11.03	128.50																			
Location of Reach 1A XS 1-2				2594.80	2614.00																					
TPOOL				2605.30	2624.50	10.52	129.01	10.45	129.08				8.28	131.25												
CS				2617.30	2636.50	10.13	129.40	9.86	129.67																	
CS				2623.30	2642.50	9.42	130.11	9.26	130.27																	
CS				2641.30	2660.50	9.54	129.99																			
CS				2652.30	2671.50	9.54	129.99	9.17	130.36	7.51	132.02	1.66	6.60	132.93												
CS				2665.80	2685.00	9.36	130.17	9.14	130.39																	
TRUN				2681.30	2700.50	8.87	130.66	8.70	130.83																	
POOL				2692.30	2711.50	10.17	129.36	8.71	130.82				7.06	132.47												
POOL				2699.30	2718.50	10.69	128.84																			
CS				2718.30	2737.50	9.30	130.23																			
TPOOL				2728.30	2747.50	8.97	130.56	8.71	130.82	6.81	132.72	1.90	6.58	132.95												
CS				2746.30	2765.50	8.11	131.42	7.96	131.57																	
CS				2772.30	2791.50	7.90	131.63	7.72	131.81	6.20	133.33	1.52	3.69	135.84												
CS				2783.30	2802.50	8.03	131.50																			
CS				2796.30	2815.50	7.82	131.71	7.68	131.85																	
6" Terra cotta pipe on LB				2814.30	2833.50																					
TRUN				2810.30	2829.50	7.21																				
POOL				2827.80	2847.00	8.04																				
CS				2838.30	2857.50	7.68																				

STONY RUN, BALTIMORE CITY, MARYLAND
2006 LONGITUDINAL PROFILE

						Bed		WS		BKF			TOB		IP			MON			Other3			Other[4]		
Comment	BS	FS	HI	Sta	Adj. Sta	Rod	Elev	Rod	Elev	Rod	Elev	BKF-WS	Rod	Elev	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF	Rod	Elev	WS DIFF
TP 11	9.79	3.86	145.46																							
BM-3																		3.83	141.63							
DS end Ped bridge				2843.80	2863.00																					
US end Ped bridge				2850.30	2869.50																					
CS				2858.30	2877.50	14.45	131.01																			
TPOOL				2862.30	2881.50	13.02	132.44	12.84	132.62																	
CS				2876.30	2895.50	12.67	132.79	12.27	133.19	10.32	135.14	1.95	7.84	137.62												
TRMON Reach 1 CX-1				2885.30	2904.50													7.54	137.92							
TLMON Reach 1 CX-1				2885.30	2904.50													8.81	136.65							
CS				2898.30	2917.50	11.58	133.88																			
24" plastic culvert RB				2898.30	2917.50																					
TRIFF				2942.30	2961.50	10.34	135.12	10.28	135.18				7.00	138.46												
POOL				2956.30	2975.50	11.19	134.27																			
POOL				2980.80	3000.00	13.14	132.32																			
Bottom boulder and DS end of concrete block secti				2993.30	3012.50	11.65	133.81	10.28	135.18																	
Top concrete block				2993.80	3013.00	10.16	135.30																			
CS				3002.30	3021.50	9.41	136.05	9.37	136.09				6.01	139.45												
BM 3 RB				3012.30	3031.50																					
CS				3032.30	3051.50	9.09	136.37	8.94	136.52																	
CS				3083.30	3102.50	6.10	139.36	5.97	139.49				2.97	142.49												
Start solid concrete channel				3100.30	3119.50	5.56	139.90	5.55	139.91																	
Concrete flume enters LB				3106.30	3125.50																					
DS culvert under Northern PKWY				3138.30	3157.50	5.24	140.22	5.22	140.24				1.75	143.71												

Appendix E – Substrate Characterization

Photo 1. Reach 01 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Photo 2. Reach 02 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Photo 3. Reach 03 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Photo 4. Reach 04 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Photo 5. Reach 05 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Photo 6. Reach 06 – Bed Substrate Characterization (with a 12-inch ruler as reference).

Appendix F – BEHI and NBS

STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF	Data:	KMF	QA/QC:	KF
Reach:	1	Comments:	NBS estimated Low. Granite block lined channel				
Location:	BK 35 & 36 Left and Right Banks						
Date:	3/7/2006						

Total Score:	#DIV/0!
	Very Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials			
	Adjustment		Notes
Bank Stratification			
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

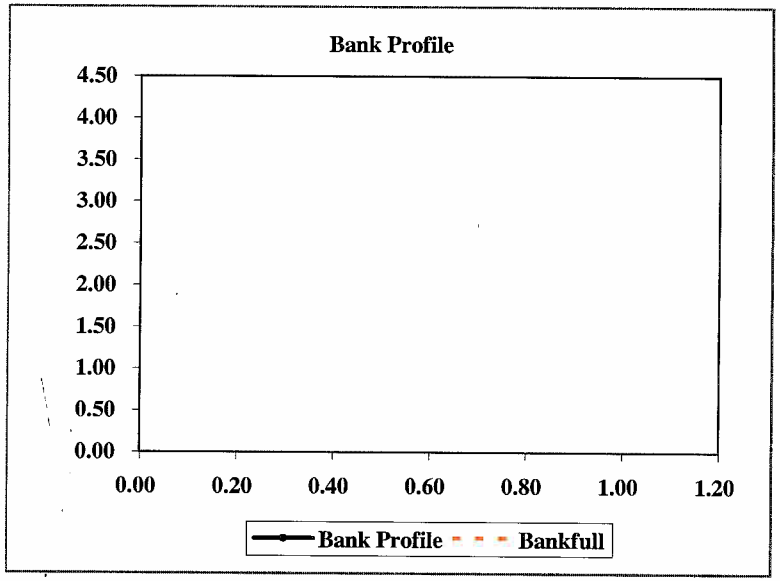
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF	[redacted]	KMF	[redacted]	KF
Reach:	1	Comments:	NBS estimated low				
Location:	BK 34 Left Bank						
Date:	3/7/2006						

Total Score:	42.95					
	Very High					
Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables					
Bank Height / Bankfull Height Ratio					
Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.40	1.80	1.89	7.37	High	
Root Depth / Bank Height Ratio					
Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.50	3.40	0.15	7.94	High	
Weighted Root Density					
Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
50.00	0.15	7.35	8.74	Very High	
Bank Angle					
Bank Angle (°)			Index	Bank Erosion Potential	Notes
80.00			5.90	Moderate	
Surface Protection					
Surface Protection (%)			Index	Bank Erosion Potential	Notes
15.00			8.00	Very High	
			Adjustment		Notes
Bank Materials			5.00		
			Adjustment		Notes
Bank Stratification			0.00		
		TOTAL SCORE	42.95		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

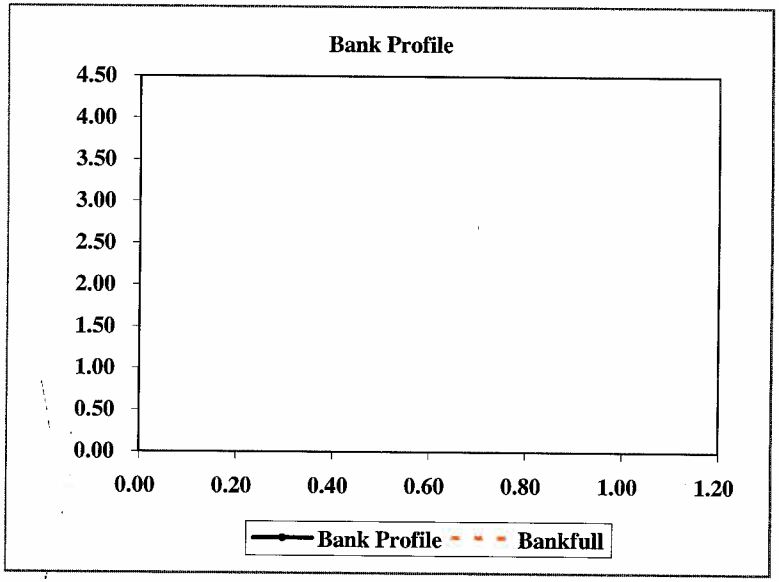
Bank Material

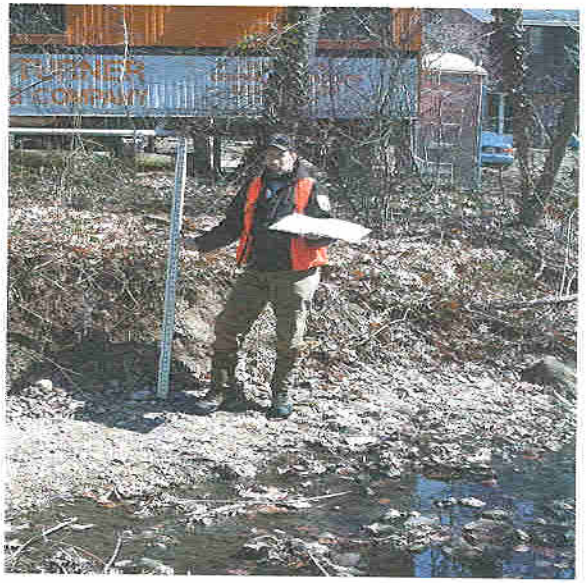
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile		
Horizontal Distance	Vertical Height	Notes
Bankfull		
Horizontal Distance	Vertical Height	Notes





STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF [redacted] KMF [redacted] KF	Total Score:	47.63
Reach:	1	Comments:	NBS estimated very high, outside meander with concreted lined channel upstream.		Extreme
Location:	BK 33 Right Bank				
Date:	3/7/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height/ Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
5.20	1.80	2.89	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.75	5.20	0.14	7.98	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
50.00	0.14	7.21	8.75	Very High	

Bank Angle

Bank Angle (°)			Index	Bank Erosion Potential	Notes
90.00			7.90	High	

Surface Protection

Surface Protection (%)			Index	Bank Erosion Potential	Notes
15.00			8.00	Very High	

	Adjustment		Notes
Bank Materials	5.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	47.63		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

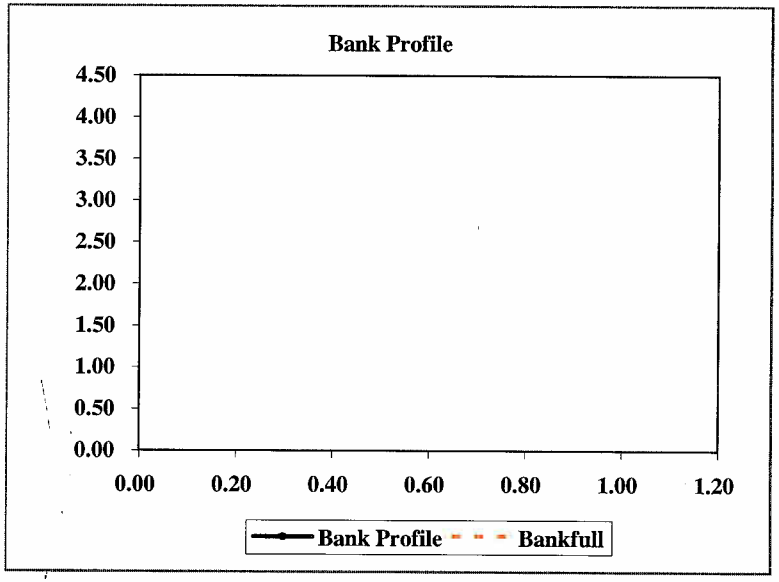
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Mayland	Observer(s):	RRS KMF [redacted] KMF [redacted] KF	Total Score:	40.19	
Reach:	1	Comments:	NBS low		Very High	
Location:	BK 32a Left Bank			Total Score Values:	Very Low: 5-10	Low: 10-20
Date:	3/7/2006				Moderate: 20-30	High: 30-40
					Very High: 40-45	Extreme: 45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
6.00	1.80	3.33	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.50	6.00	0.25	6.54	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
60.00	0.25	15.00	7.90	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
85.00		6.84	High	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
55.00		3.90	Low	

	Adjustment	Notes
Bank Materials	5.00	
	Adjustment	Notes
Bank Stratification	0.00	
TOTAL SCORE	40.19	

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

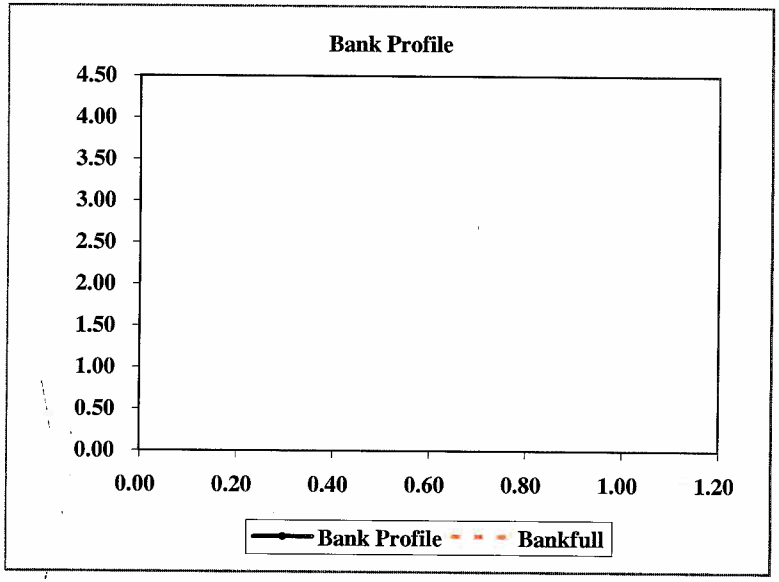
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF [illegible] KMF [illegible] KF	Total Score:	28.56
Reach:	1	Comments:	NBS1 low, NBS2 high because on the outside of a meander.		Moderate
Location:	BK 32 Left Bank				
Date:	3/7/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
4.00	1.80	2.22	8.17	Very High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.50	4.00	0.38	5.15	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
75.00	0.38	28.13	6.12	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
65.00		4.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
70.00		2.71	Low	

	Adjustment		Notes
Bank Materials	2.00		
Bank Stratification	0.00		
TOTAL SCORE	28.56		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

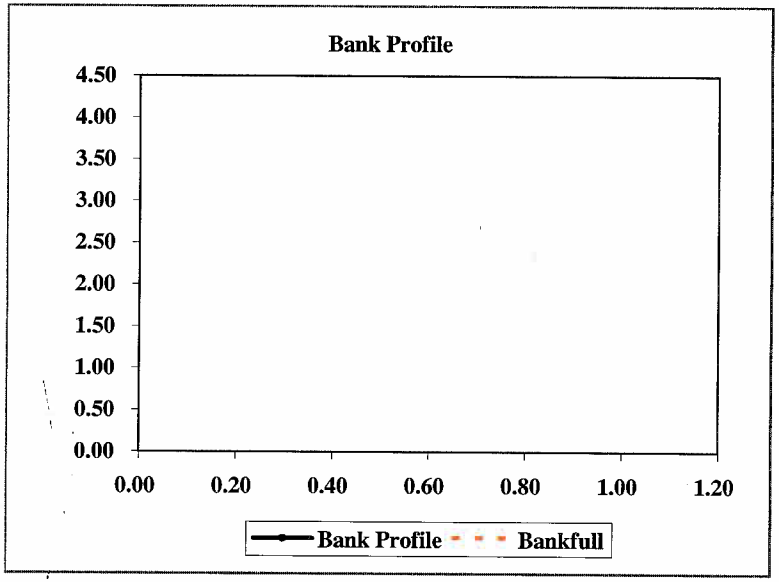
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF [redacted] KMF QA/QC: KF	Total Score:	18.38
Reach:	1	Comments:	NBS estimated low		Low
Location:	BK 31 Left Bank				
Date:	3/7/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.20	1.80	1.22	4.14	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	2.20	0.45	4.35	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
70.00	0.45	31.82	5.76	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
35.00		2.68	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	18.38		

Bank Erosion Potential

Erodibility Variables

		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

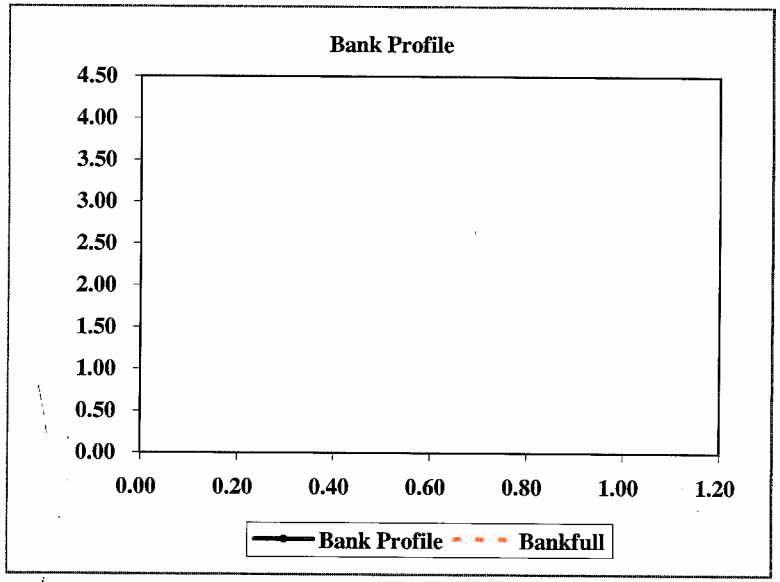
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF	DRS	KMF	DAVOC	KF
Reach:	1	Comments:	NBS estimated low				
Location:	BK 30 Right Bank						
Date:	3/7/2006						

Total Score:	27.81
	Moderate

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.30	1.80	1.83	7.11	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.75	3.30	0.23	6.85	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
70.00	0.23	15.91	7.78	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
65.00		4.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
85.00		1.68	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	27.81		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	≤0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

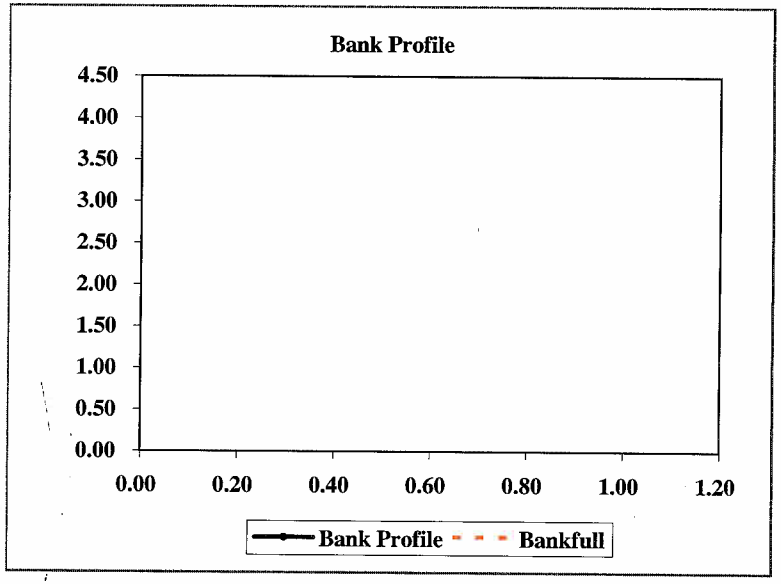
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF DATE KMF QA/QC KF
Reach:	1	Comments:	NBS estimated as high because it is on the outside of a meander. Use cross section CX 1-2 to calculate NBS
Location:	BK 29 Left Bank		
Date:	3/7/2006		

Total Score:	41.48					
	Very High					
Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
4.80	1.80	2.67	8.81	Very High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	4.80	0.21	7.11	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
75.00	0.21	15.63	7.82	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
85.00		6.84	High	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
30.00		5.90	Moderate	

	Adjustment		Notes
Bank Materials	5.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	41.48		

Bank Erosion Potential

		Very Low	Low	Moderate	High	Very High	Extreme
Erodibility Variables							
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

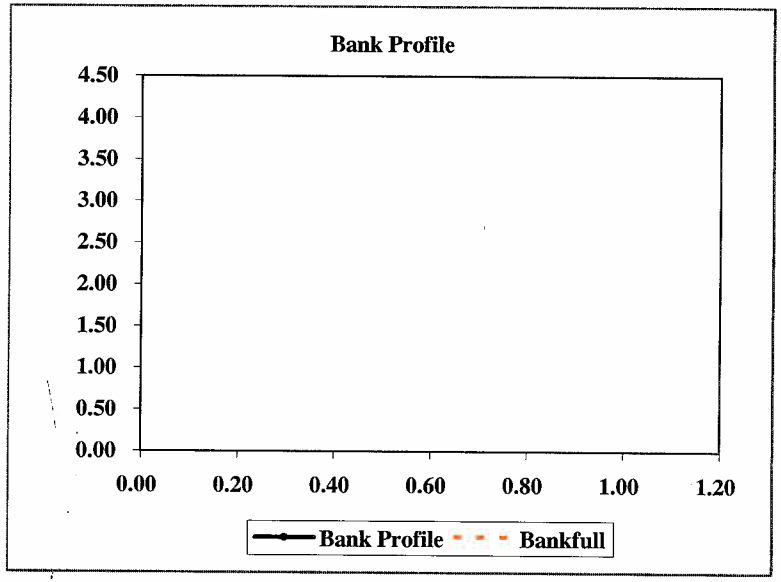
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS KMF [redacted] KMF [redacted] KF
Reach:	1	Comments:	BEHI rated as very low because of bedrock. NBS as Low because it is straight .
Location:	BK 29a Left Bank		
Date:	3/7/2006		

Total Score:	#DIV/0!
	Very Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	
		Adjustment		Notes
Bank Materials		5.00		
		Adjustment		Notes
Bank Stratification		0.00		
	TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

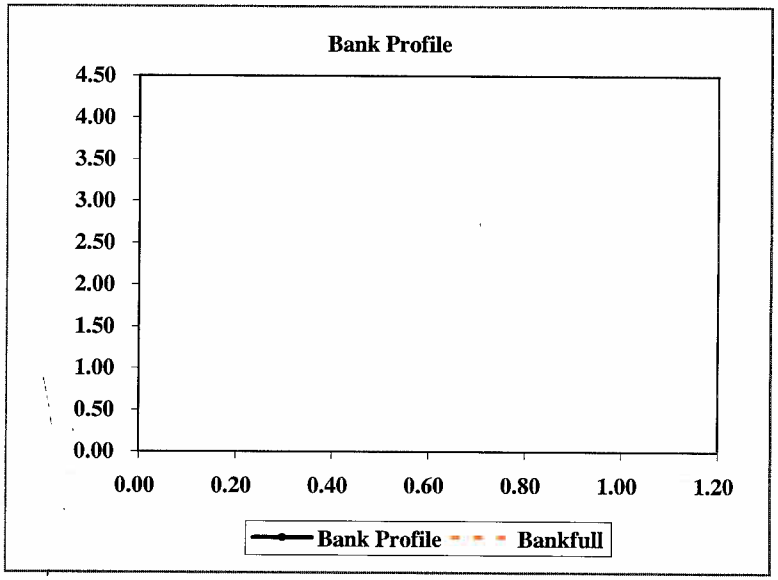
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS [redacted] KMF [redacted] KF	Total Score:	32.12
Reach:	1	Comments:	NBS2 estimated as low NBS1 estimated as high on the outside meander.		High
Location:	BK 28 Right Bank				
Date:	3/1/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potental	Notes
3.40	1.90	1.79	6.90	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potental	Notes
1.00	3.40	0.29	5.96	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potental	Notes
80.00	0.29	23.53	6.74	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potental	Notes
50.00		3.41	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potental	Notes
65.00		3.11	Low	

	Adjustment		Notes
Bank Materials	3.00		
	Adjustment		Notes
Bank Stratification	3.00		
TOTAL SCORE	32.12		

Bank Erosion Potential

		Very Low	Low	Moderate	High	Very High	Extreme
Erodibility Variables							
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

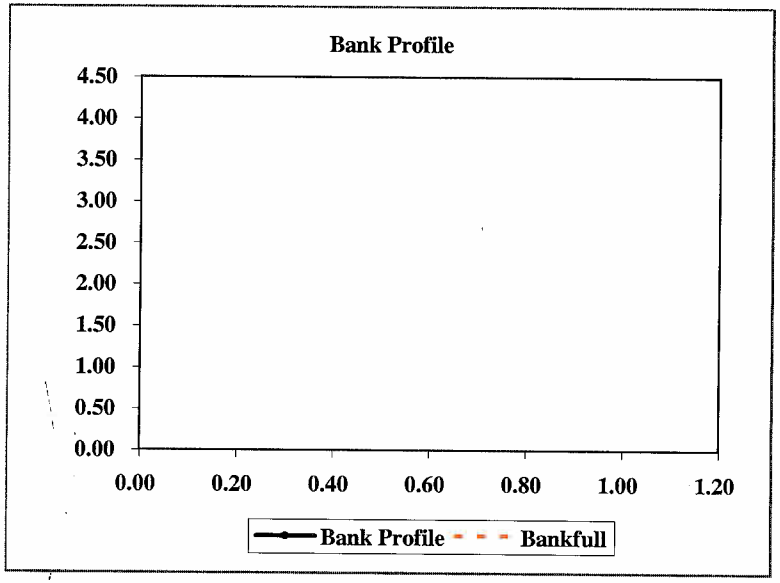
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Date:	KMF	QA/QC:	KF
Reach:	1	Comments:	NBS estimated as low.				
Location:	BK 27 Left Bank						
Date:	3/1/2006						

Total Score:	32.12
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potental	Notes
3.40	1.90	1.79	6.90	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potental	Notes
1.00	3.40	0.29	5.96	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potental	Notes
80.00	0.29	23.53	6.74	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potental	Notes
50.00		3.41	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potental	Notes
65.00		3.11	Low	

	Adjustment		Notes
Bank Materials	3.00		
	Adjustment		Notes
Bank Stratification	3.00		
TOTAL SCORE	32.12		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

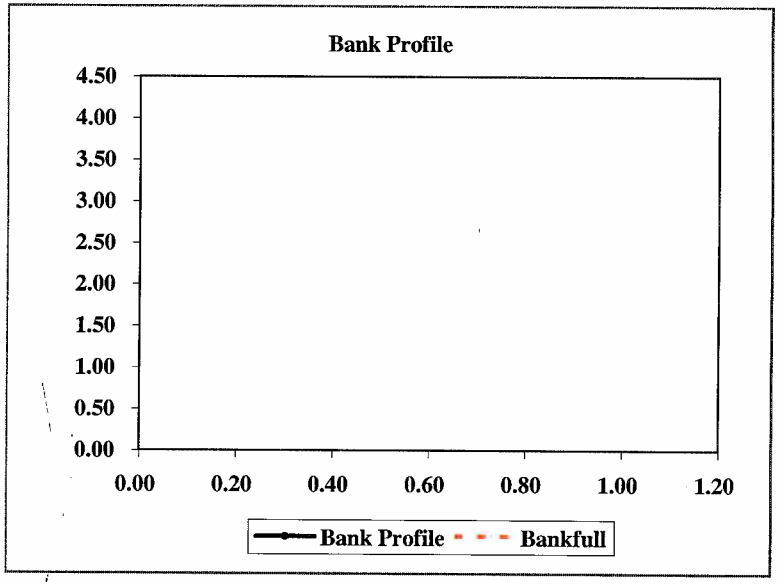
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	KMF	KF
Reach:	1	Comments:	NBS estimated low and the BEHI is also estimated as low because both banks are protected by boulders		
Location:	BK 26 Right bank				
Date:	3/1/2006				

Total Score:	#DIV/0!
	Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials			
	Adjustment		Notes
Bank Stratification			
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

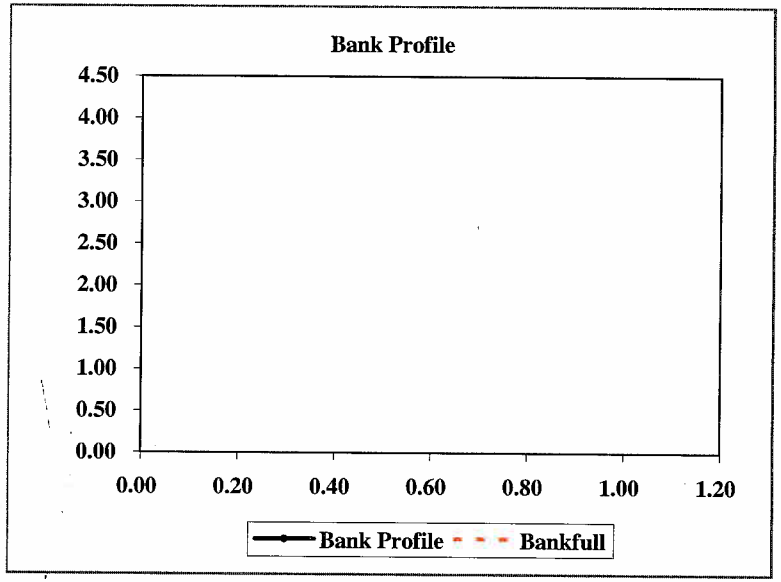
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS [redacted] KMF [redacted] KF	Total Score:	#DIV/0!
Reach:	1	Comments:	NBS estimated low and the BEHI is also estimated as low because both banks are protected by boulders		Low
Location:	BK 25 Left Bank				
Date:	3/1/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials			
	Adjustment		Notes
Bank Stratification			
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

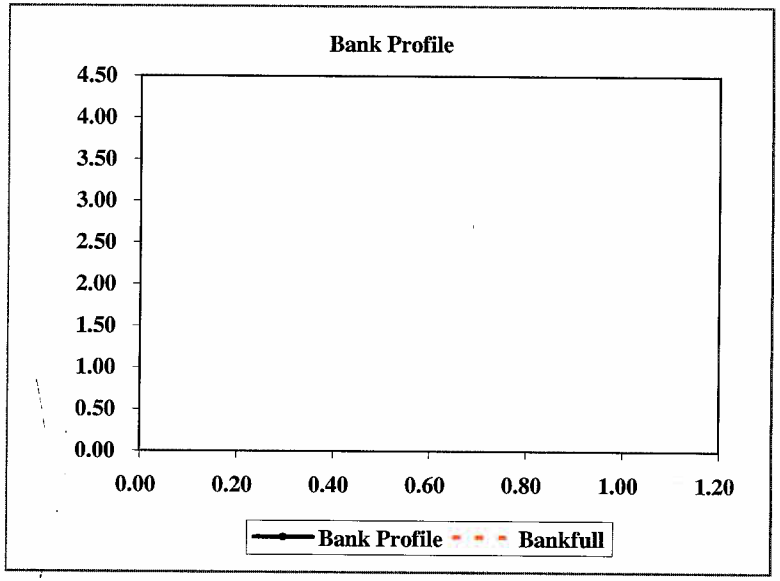
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Drive	KMF	QA/QC:	KF
Reach:	2	Comments:	NBS estimated as low. Dmean 1.9 Dmax 2.2				
Location:	BK 24 Right Bank						
Date:	3/1/2006						

Total Score:	17.15
	Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.30	1.70	1.35	4.97	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.90	2.30	0.83	2.31	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.83	66.09	3.02	Low	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
75.00		5.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	17.15		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

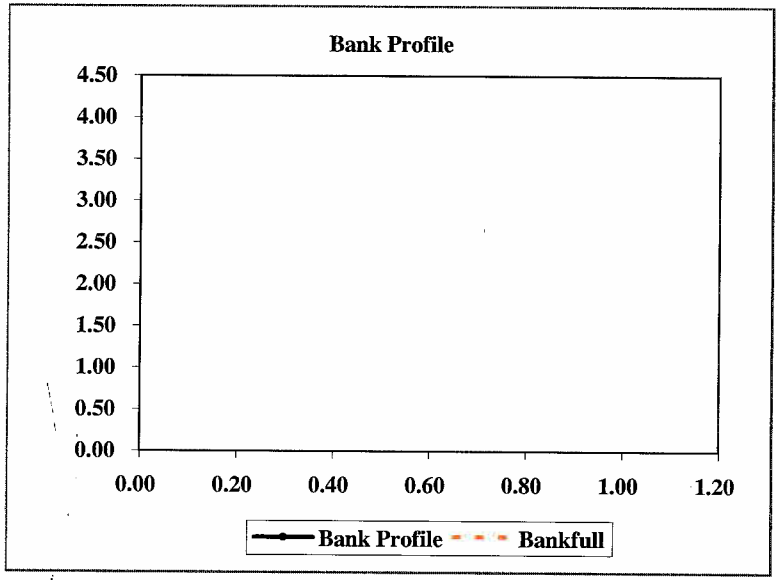
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	KMF	KF
Reach:	2	Comments:	NBS estimated as low. Dmean 1.9 Dmax 2.2		
Location:	BK 23 Left Bank				
Date:	3/1/2006				

Total Score:	17.15
	Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.30	1.70	1.35	4.97	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.90	2.30	0.83	2.31	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.83	66.09	3.02	Low	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
75.00		5.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	17.15		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

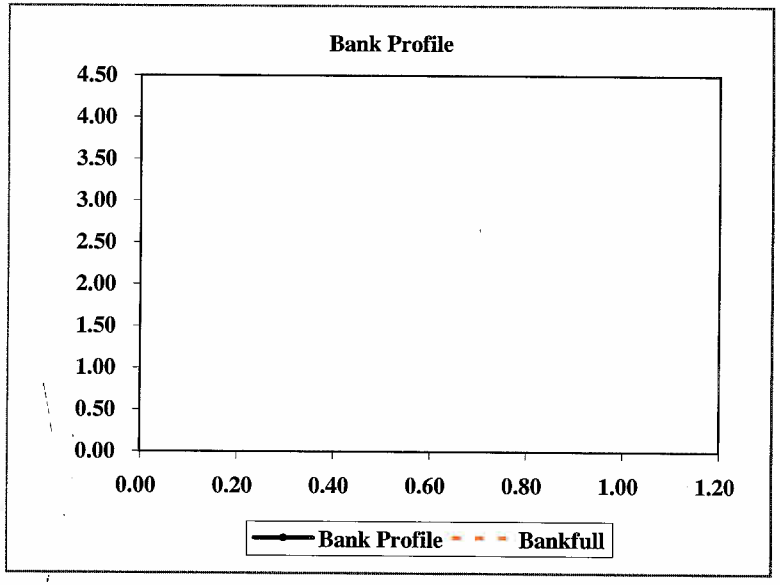
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Drive:	KMF	CAVOC:	KF
Reach:	3	Comments:	NBS estimated low Dmean 1.8 Dmax 2.0				
Location:	BK 22 Left Bank						
Date:	3/1/2006						

Total Score:	19.50
	Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.00	1.70	1.76	6.78	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
2.00	3.00	0.67	3.09	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.67	53.33	4.05	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
60.00		3.90	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
85.00		1.68	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	19.50		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustment

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

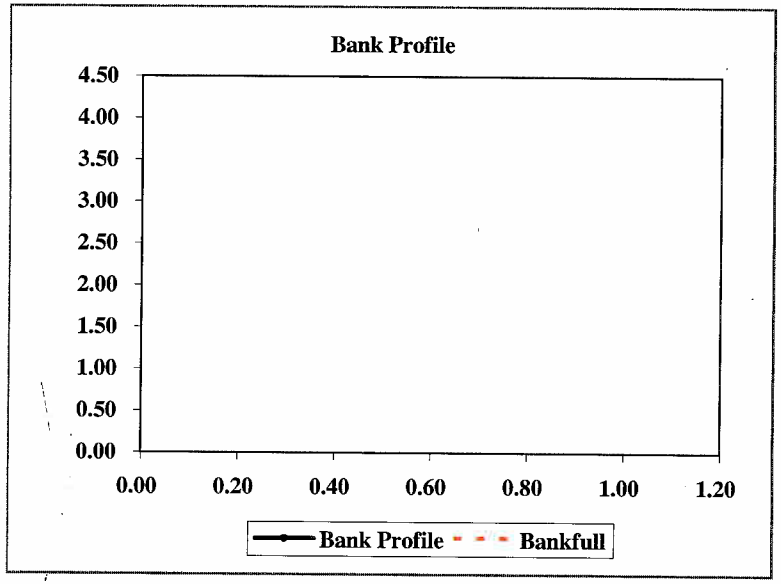
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF	Total Score:	26.81		
Reach:	3	Comments:	NBS estimated low. Dmean 1.6 Dmax 1.8						Moderate		
Location:	BK 21 Right Bank							Total Score Values:	Very Low	Low	Moderate
Date:	3/1/2006								5-10	10-20	20-30

High	Very High	Extreme	
30-40	40-45	45-50	

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.00	1.70	1.76	6.78	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.50	3.00	0.50	3.90	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
85.00	0.50	42.50	4.91	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
60.00		3.90	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
50.00		4.32	Moderate	

	Adjustment		Notes
Bank Materials	3.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	26.81		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

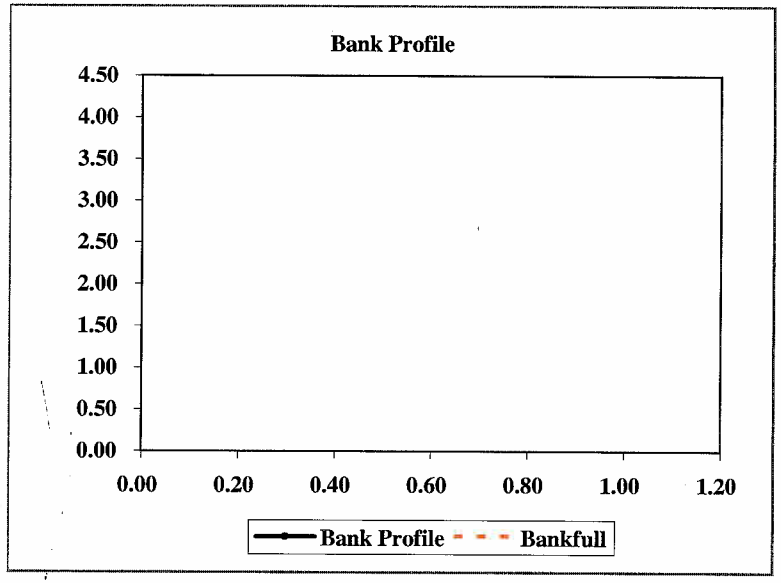
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	[illegible]	KMF	QA/QC:	KF
Reach:	3	Comments:	NBS estimated low. Dmean 1.6 Dmax 1.8				
Location:	BK 20 Left Bank						
Date:	3/1/2006						

Total Score:	36.59
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.50	1.70	2.06	8.18	Very High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.50	3.50	0.14	8.00	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
50.00	0.14	7.14	8.76	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
55.00		3.66	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
15.00		8.00	Very High	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	36.59		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

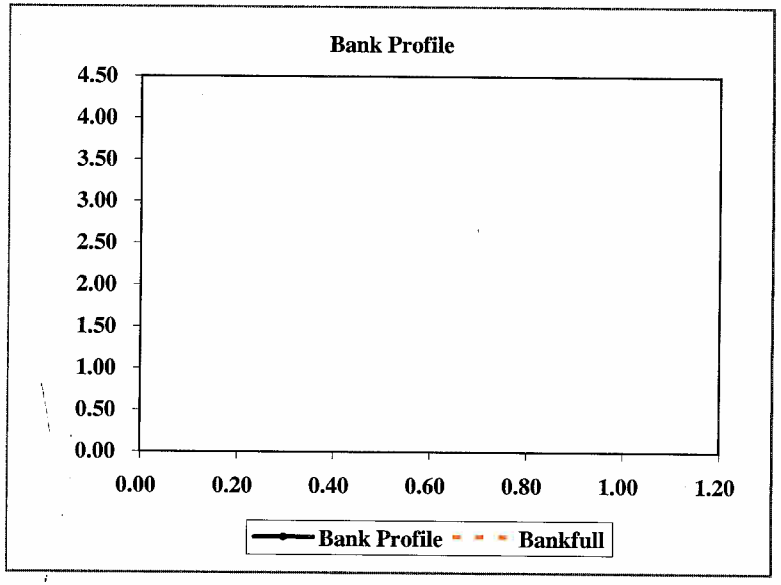
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	3	Comments:	NBS estimated low. Dmean 1.5 Dmax 1.7				
Location:	BK 19 Right Bank						
Date:	3/1/2006						

Total Score:	12.15
	Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.20	1.70	1.29	4.60	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
2.20	2.20	1.00	1.00	Very Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
90.00	1.00	90.00	1.45	Very Low	

Bank Angle

Bank Angle (^)		Index	Bank Erosion Potential	Notes
55.00		3.66	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	12.15		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

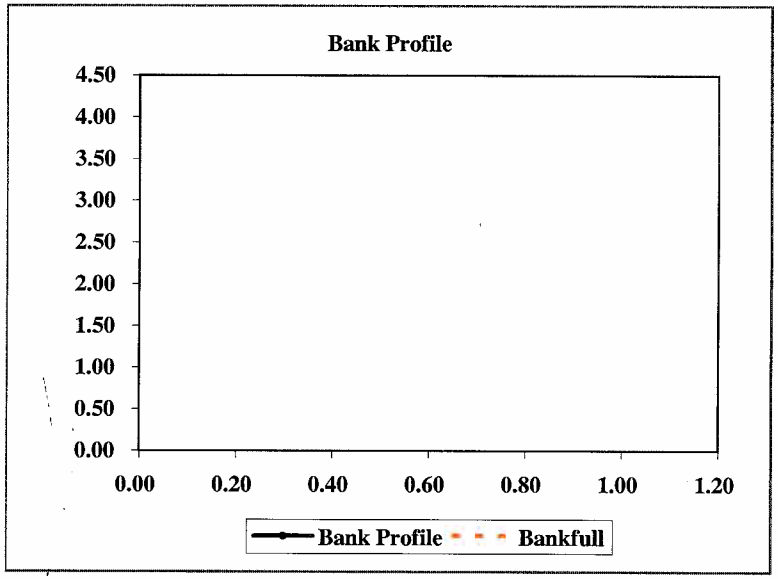
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stony Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	4	Comments:	NBS estimated as high on outside of meander. Dmean 2 Dmax 2.3				
Location:	BK 18 Left Bank						
Date:	3/1/2006						

Total Score:	30.84
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.50	1.90	1.84	7.15	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	3.50	0.29	6.06	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
65.00	0.29	18.57	7.42	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
80.00		5.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
50.00		4.32	Moderate	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	30.84		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material Adjustments	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

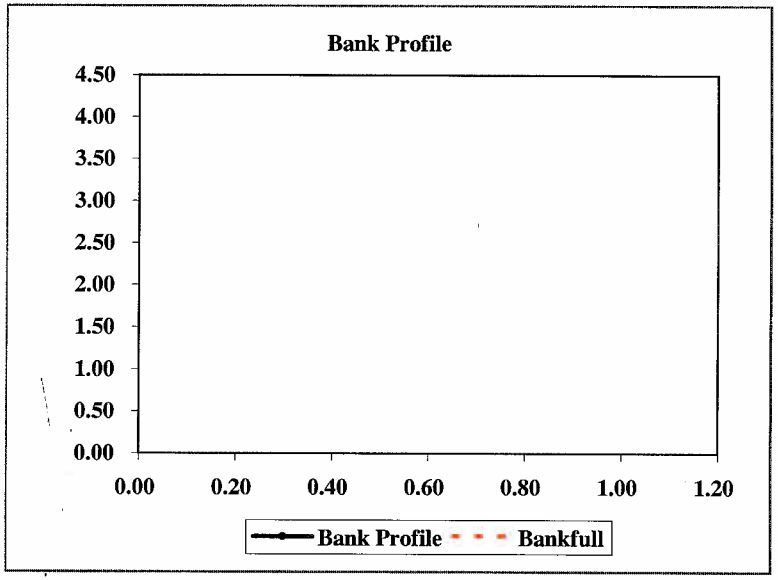
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stony Run, Baltimore City, Maryland	Observer(s):	RRS	Data: KMF	QA/QC: KF	Total score: 23.45
Reach:	4	Comments:	NBS estimated low Dmean 2' Dmax 2.2'. This area recieves a lot of over bank flow. General overflow channels present in floodplain which are connected to the channel below BF elevation.			Moderate
Location:	BK 17 Right Bank					
Date:	3/1/2006					

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.50	1.80	1.39	5.20	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	2.50	0.40	4.90	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.40	32.00	5.74	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
70.00		4.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
70.00		2.71	Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	23.45		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

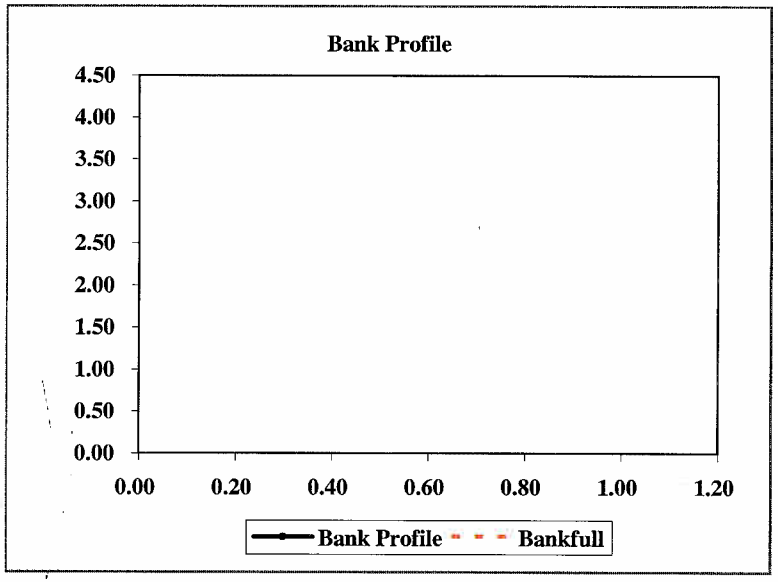
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stony Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	4	Comments:	NBS estimated as low Dmean 2.0 Dmax 2.2				
Location:	BK 16 Left Bank						
Date:	3/1/2006						

Total Score:	24.13
	Moderate

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.50	1.80	1.39	5.20	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	2.50	0.40	4.90	Moderate	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.40	32.00	5.74	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
85.00		6.84	High	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	24.13		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

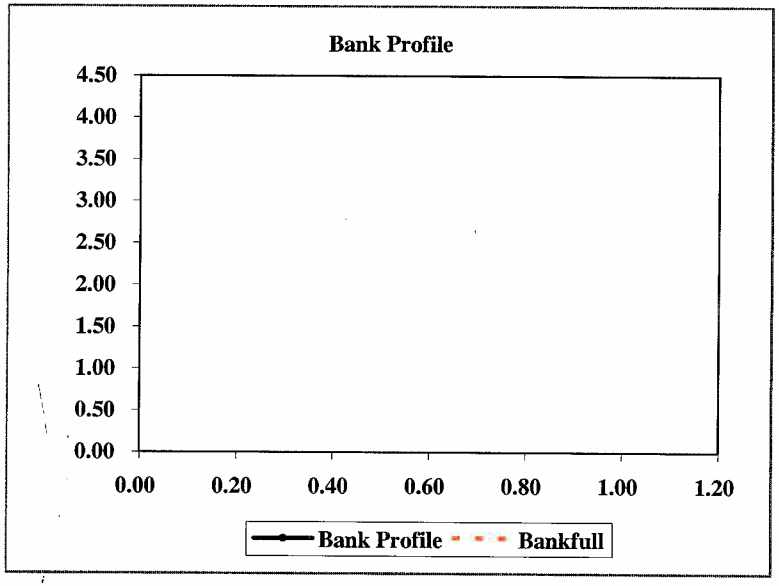
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stony Run, Baltimore City, Maryland	Observer(s):	RRS	[illegible]	KMF	[illegible]	KF	Total Score:	33.29		
Reach:	4	Comments:	NBS estimated low on the straight stretch and high on the meander. See map for these areas.						High		
Location:	BK 15 Left Bank							Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
Date:	3/1/2006								5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
6.00	1.60	3.75	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.80	6.00	0.13	8.07	Very High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.13	10.67	8.37	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
75.00		5.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	33.29		

Bank Erosion Potential

		Very Low	Low	Moderate	High	Very High	Extreme
Erodibility Variables							
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	≤0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

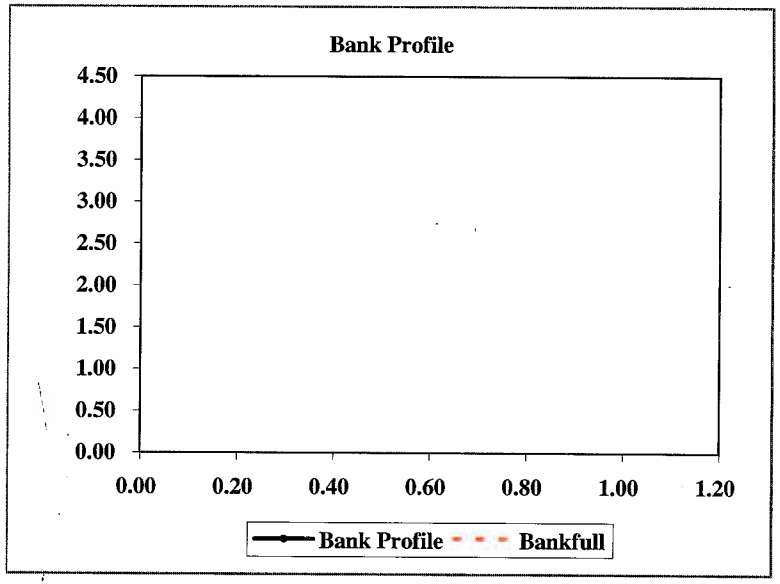
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stony Run, Baltimore City, Maryland	Observer(s):	RRS [redacted] KMF [redacted] KF	Total Score:	18.80
Reach:	4	Comments:	NBS for the lower section was estimated as low and high for the upper section because it is on the outside of a meander bend. Refer to map for demarkation between uppper and lower. Check NBS with CX 4		Low
Location:	BK 14 Right Bank				
Date:	3/1/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.00	1.60	1.25	4.32	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.50	2.00	0.75	2.68	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
80.00	0.75	60.00	3.50	Low	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
85.00		6.84	High	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	18.80		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

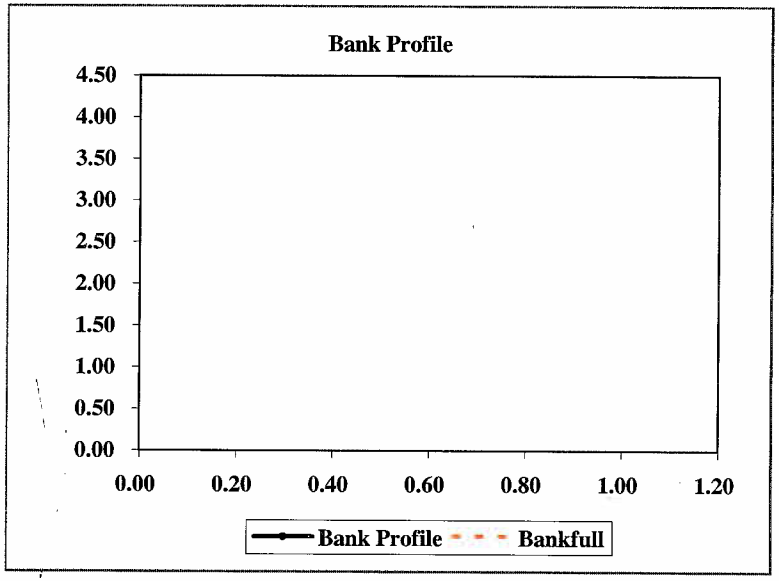
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 1.5' Dmax 2.5 = 1.7 or moderate				
Location:	BK 13 Right Bank						
Date:	3/1/2006						

Total Score:	21.02
	Moderate

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
2.60	1.85	1.41	5.30	Moderate	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.50	2.60	0.58	3.53	Low	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
85.00	0.58	49.04	4.39	Moderate	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
80.00		5.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
80.00		1.90	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	21.02		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

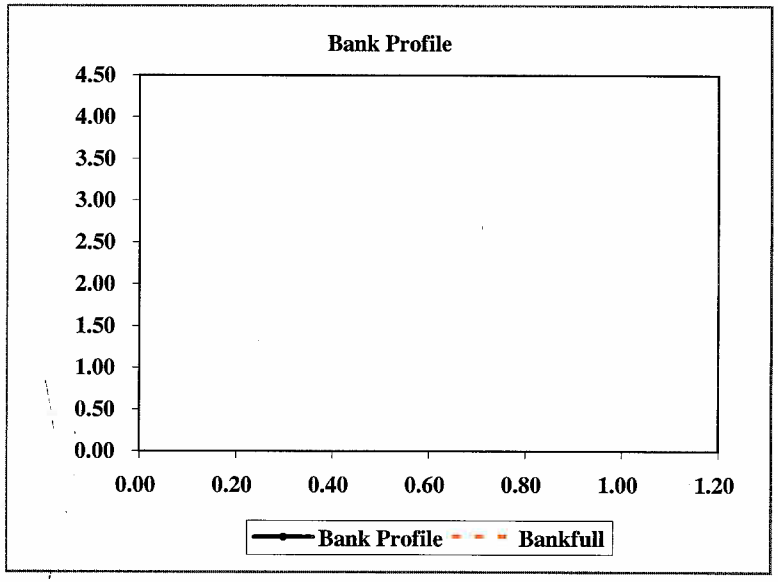
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	KMF	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 2' Dmax 2'		
Location:	BK 12 Left Bank				
Date:	3/1/2006				

Total Score:	38.47
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
10.00	1.85	5.41	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	10.00	0.10	8.44	Very High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
75.00	0.10	7.50	8.72	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
75.00		5.40	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
30.00		5.90	Moderate	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	38.47		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

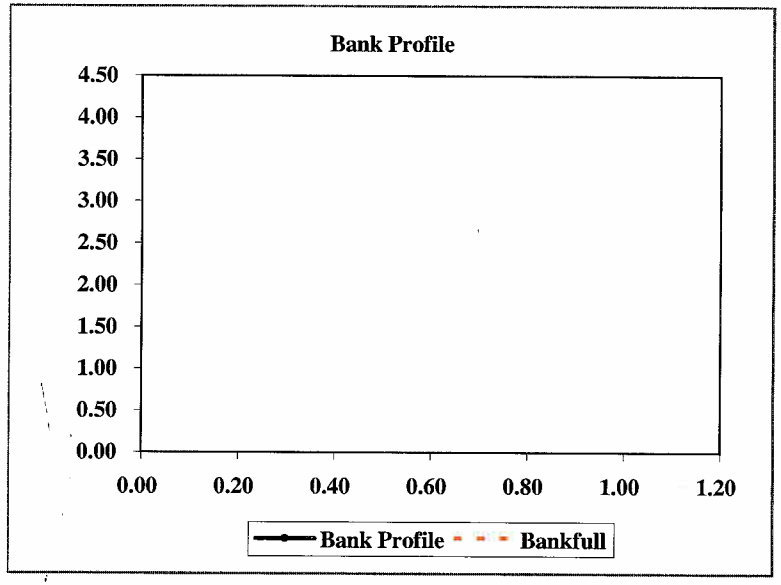
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	DMF	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 1.8' Dmax 2				
Location:	BK 11 Right Bank						
Date:	3/1/2006						

Total Score:	33.66					
	High					
Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
11.00	2.00	5.50	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	11.00	0.09	8.55	Very High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
65.00	0.09	5.91	8.90	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
60.00		3.90	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
75.00		2.32	Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	33.66		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

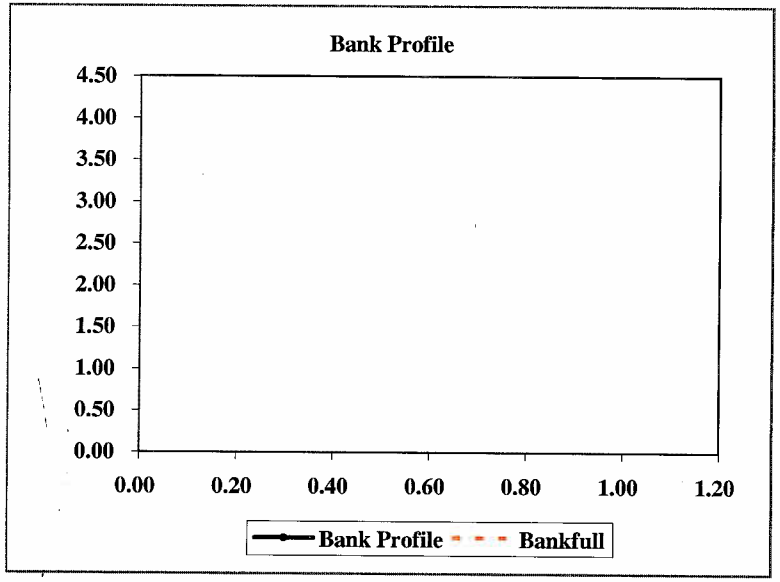
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 1.5' Dmax 1.7				
Location:	BK 10 Left Bank						
Date:	3/1/2006						

Total Score:	32.95
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
4.80	1.70	2.82	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.70	4.80	0.15	7.96	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
70.00	0.15	10.21	8.42	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
70.00		4.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
85.00		1.68	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	32.95		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

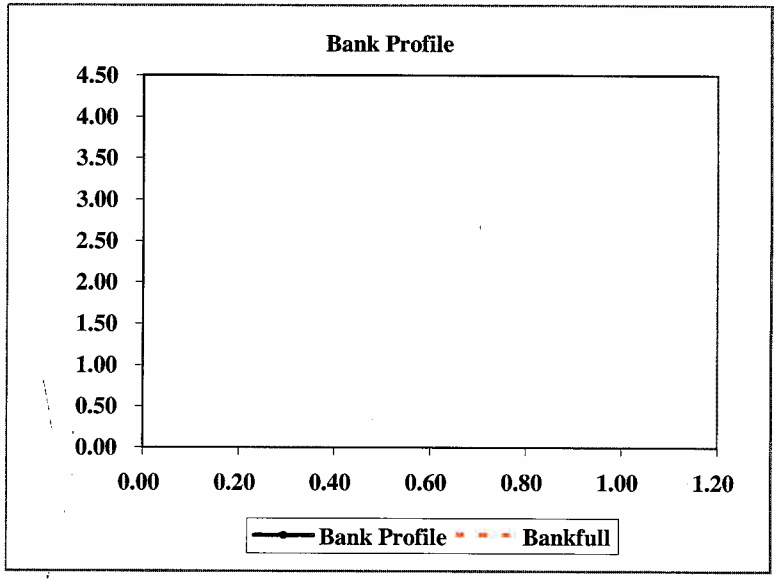
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	[redacted]	KMF	[redacted]	KF	Total Score:	#DIV/0!		
Reach:	5	Comments:	NBS estimated rating was low. Dmean 2' Dmax 2.5 = 1.25. The bank was concrete blocks with concrete groute covering it. There was some slight toe erosion, but the bank was stable.						Very Low		
Location:	BK 9 Left Bank							Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
Date:	3/1/2006								5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables					
Bank Height / Bankfull Height Ratio					
Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
		#DIV/0!	#DIV/0!	#DIV/0!	
Root Depth / Bank Height Ratio					
Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	
Weighted Root Density					
Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potental	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Bank Angle					
Bank Angle (°)			Index	Bank Erosion Potental	Notes
			1.00	Very Low	
Surface Protection					
Surface Protection (%)			Index	Bank Erosion Potental	Notes
			10.00	Extreme	
			Adjustment		Notes
Bank Materials			0.00		
			Adjustment		Notes
Bank Stratification			0.00		
		TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

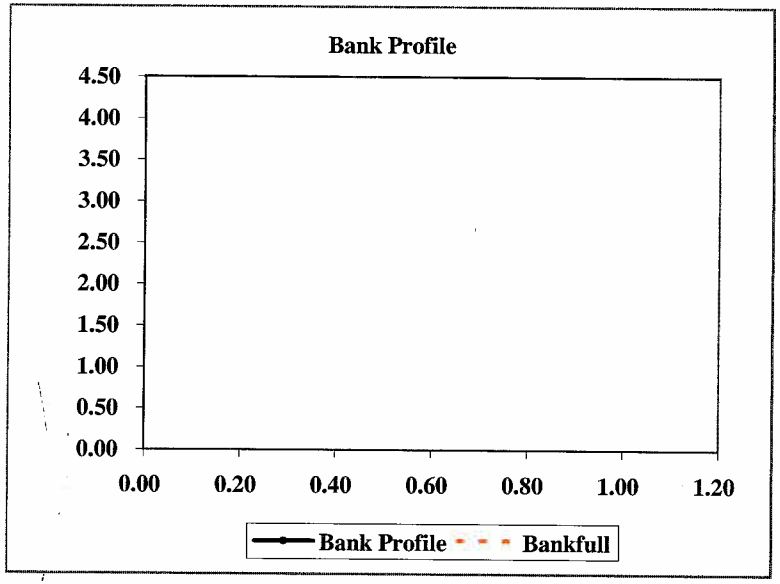
Bank Material Adjustment

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile		
Horizontal Distance	Vertical Height	Notes
Bankfull		
Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Date:	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 2' dmax 2'				
Location:	BK 8 Right Bank						
Date:	3/1/2006						

Total Score:	26.30
	Moderate

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
3.50	2.20	1.59	6.48	High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
1.00	3.50	0.29	6.06	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
85.00	0.29	24.29	6.64	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
80.00		5.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
95.00		1.23	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	26.30		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

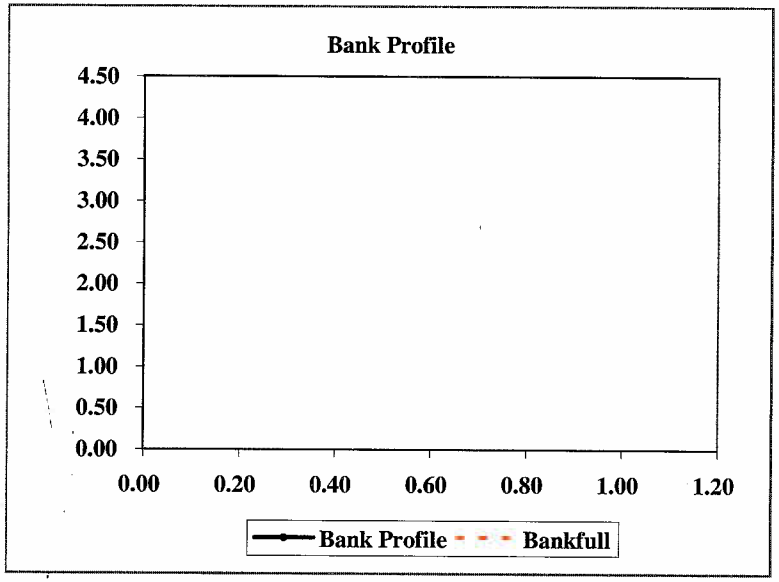
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observers:	RRS	Data:	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 2' Dmax 2'				
Location:	BK 7 Left Bank						
Date:	3/1/2006						

Total Score:	37.10
	High

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
4.70	2.00	2.35	8.36	Very High	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
0.50	4.70	0.11	8.37	Very High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
50.00	0.11	5.32	8.96	Very High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
80.00		5.90	Moderate	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
35.00		5.50	Moderate	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	37.10		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

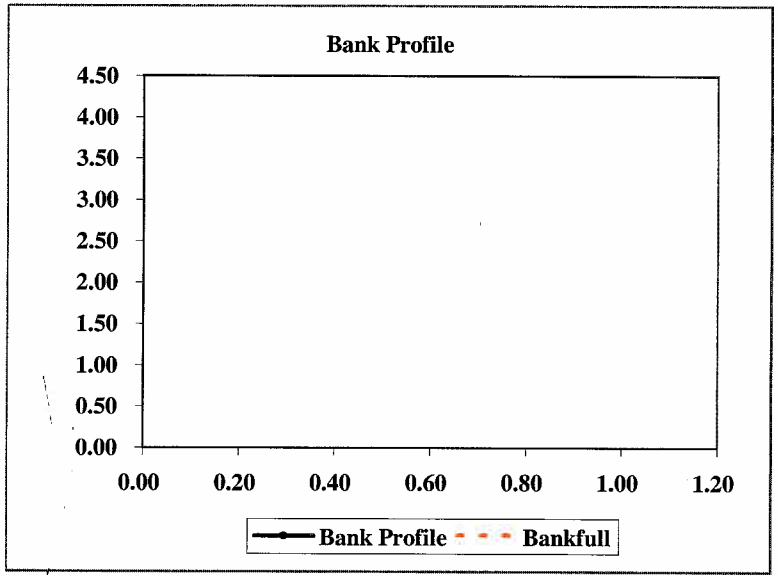
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	Data:	KMF	QA/QC:	KF
Reach:	5	Comments:	NBS estimated rating was low. Dmean 2' Dmax 2'.				
Location:	BK 6 Right Bank						
Date:	3/1/2006						

Total Score:	29.03
	Moderate

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
13.00	2.00	6.50	10.00	Extreme	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
3.00	13.00	0.23	6.80	High	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
90.00	0.23	20.77	7.12	High	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
55.00		3.66	Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
90.00		1.45	Very Low	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	29.03		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

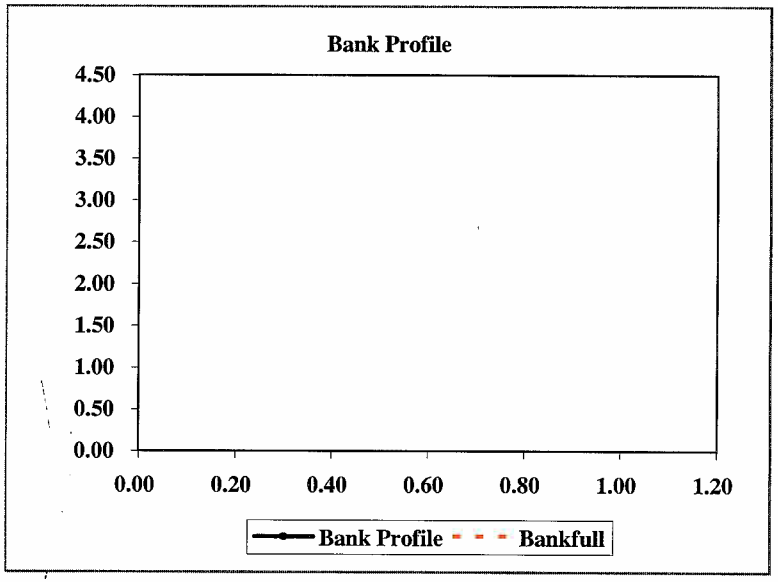
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	[redacted]	KMF	[redacted]	KF
Reach:	6	Comments:	Banks 1 -5 are hardened banks. Bank 5 is a gabbion bank. NBS is low.				
Location:	BK 5 Left Bank						
Date:	3/1/2006						

Total Score:	#DIV/0!
	Very Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
	2.00	0.00	0.00	Very Low	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

		Very Low	Low	Moderate	High	Very High	Extreme
Erodibility Variables: Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material Adjustments	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

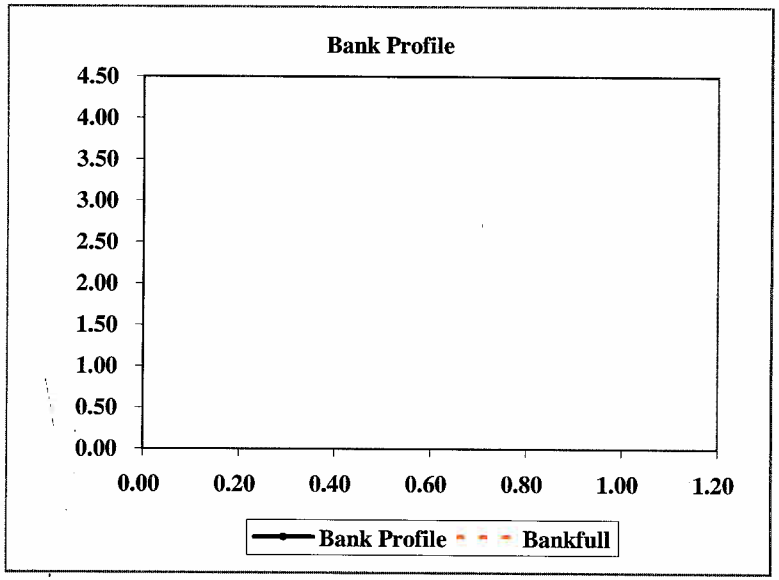
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS [illegible] KMF [illegible] KF	Total Score:	#DIV/0!
Reach:	6	Comments:	Banks 1 -5 are hardened banks. Bank 4 is a gabbion bank. NBS is very high because of severe incision and low W/D ratio.		Very Low
Location:	BK 4 Left Bank				
Date:	3/1/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
	2.00	0.00	0.00	Very Low	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	
		Adjustment		Notes
Bank Materials		0.00		
		Adjustment		Notes
Bank Stratification		0.00		
	TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

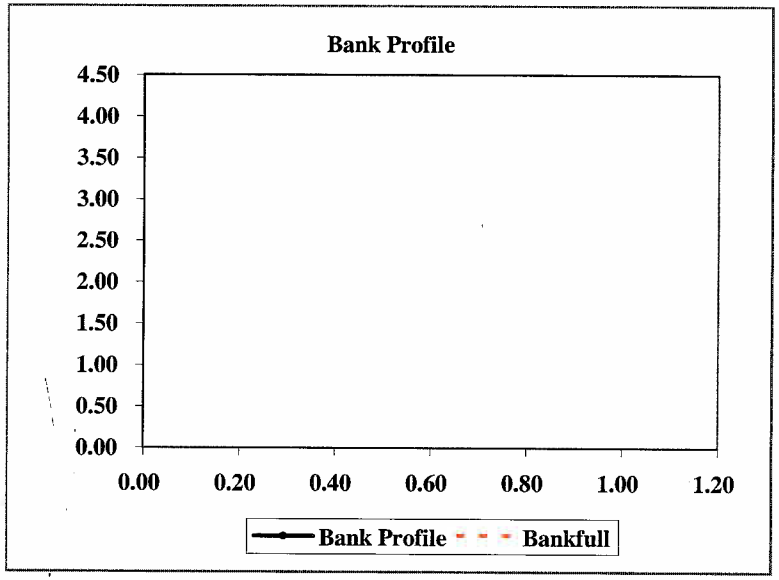
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	KMF	KF
Reach:	6	Comments:	Banks 1 -5 are hardened banks. Bank 3 is a gabbion bank. NBS is low.		
Location:	BK 3 Right Bank				
Date:	3/1/2006				

Total Score:	#DIV/0!
	Very Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
	2.00	0.00	0.00	Very Low	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

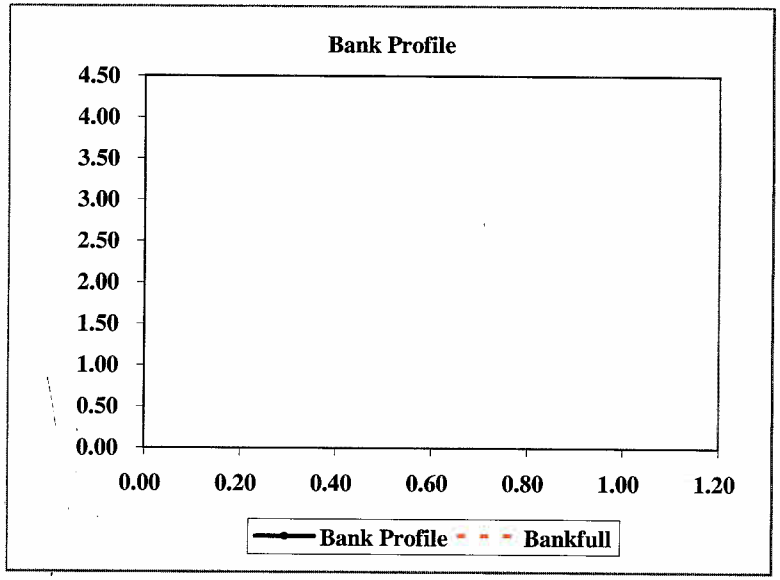
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS [illegible] KMF [illegible] KF	Total Score:	#DIV/0!
Reach:	6	Comments:	Banks 1 -5 are hardened banks. Bank 2 is a gabbion bank. NBS is low.		Very Low
Location:	BK 2 Right Bank				
Date:	3/1/2006				

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
	2.00	0.00	0.00	Very Low	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Adjustments

Bank Material	
Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

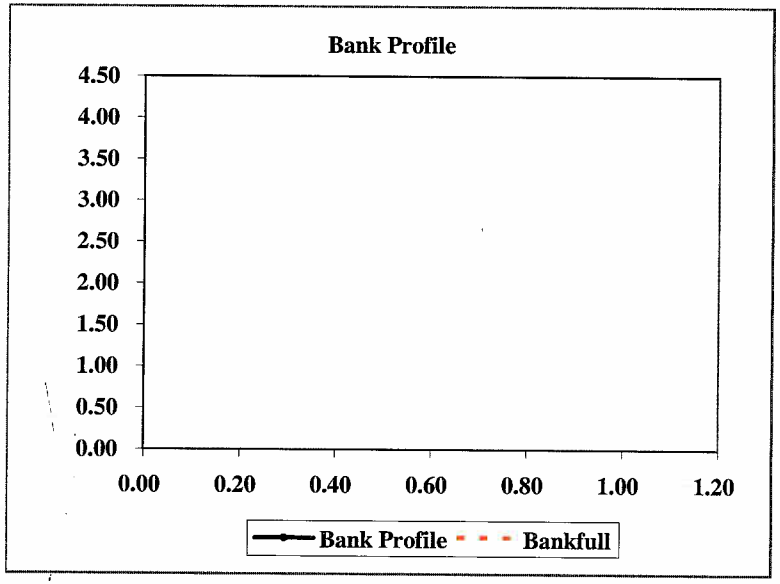
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

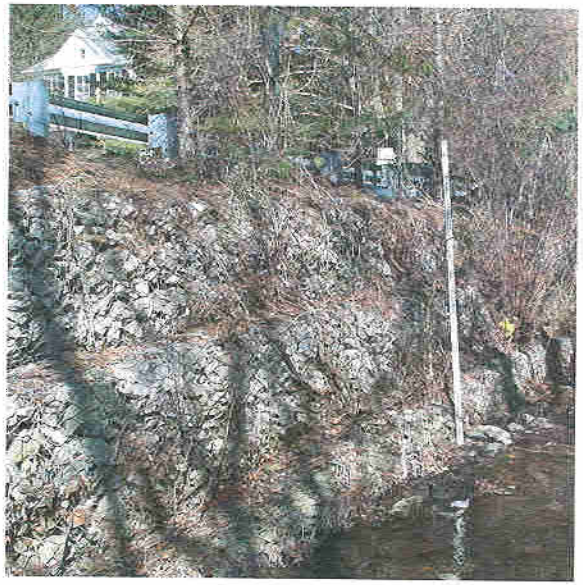
Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes





STONY RUN, BALTIMORE CITY, MARYLAND

BANK EROSION HAZARD INDEX

Stream:	Stoney Run, Baltimore City, Maryland	Observer(s):	RRS	KMF	KF
Reach:	6	Comments:	Banks 1 -5 are hardened banks. Bank 1 is concrete cribbing. NBS is very high because of severe incision and a low W/D ratio.		
Location:	BK 1 Right Bank				
Date:	3/1/2006				

Total Score:	#DIV/0!
	Very Low

Total Score Values:	Very Low	Low	Moderate	High	Very High	Extreme
	5-10	10-20	20-30	30-40	40-45	45-50

Erodibility Variables

Bank Height / Bankfull Height Ratio

Bank Height	Bankfull Height	Value	Index	Bank Erosion Potential	Notes
	2.00	0.00	0.00	Very Low	

Root Depth / Bank Height Ratio

Root Depth	Bank Height	Value	Index	Bank Erosion Potential	Notes
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	

Weighted Root Density

Root Density (%)	Root Depth / Bank Height	Value	Index	Bank Erosion Potential	Notes
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Bank Angle

Bank Angle (°)		Index	Bank Erosion Potential	Notes
		1.00	Very Low	

Surface Protection

Surface Protection (%)		Index	Bank Erosion Potential	Notes
		10.00	Extreme	

	Adjustment		Notes
Bank Materials	0.00		
	Adjustment		Notes
Bank Stratification	0.00		
TOTAL SCORE	#DIV/0!		

Bank Erosion Potential

Erodibility Variables		Very Low	Low	Moderate	High	Very High	Extreme
Bank Height / Bankfull Height	Value	1.00-1.10	1.11-1.19	1.20-1.50	1.60-2.00	2.10-2.80	>2.80
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Root Depth / Bank Height	Value	1.00-0.90	0.89-0.50	0.49-0.30	0.29-0.15	0.14-0.05	<0.05
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Weighted Root Density	Value	100-80	79-55	54-30	29-15	14-5	<5
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Bank Angle	Value	0-20	21-60	61-80	81-90	91-119	>119
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10
Surface Protection	Value	100-80	79-55	54-30	29-15	14-10	<10
	Index	1.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.0	10

Bank Material Adjustments

Bedrock	Bedrock banks have a very low erosion potential.
Boulders	Boulder banks have a low erosion potential.
Cobble	Substract 10 points. No adjustment if sand/gravel compose greater than 50% of bank.
Clay/Silt Loam	Add 5 points.
Gravel	Add 5-10 points depending on percentage of bank material composed of sand.
Sand	Add 10 points.
Silt / Clay	No adjustment.

Stratification

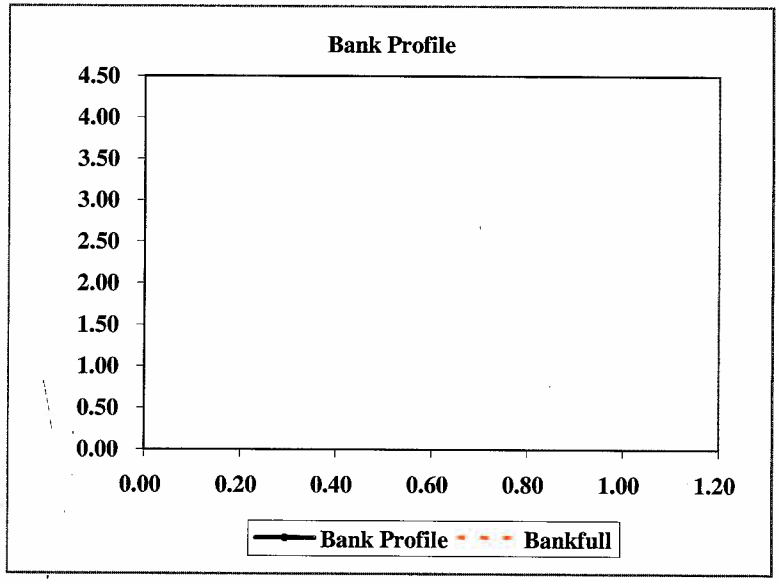
Add 5-10 points depending on position of unstable layers in relation to bankfull stage.

Bank Profile

Horizontal Distance	Vertical Height	Notes

Bankfull

Horizontal Distance	Vertical Height	Notes



Appendix G – Bank Erosion Predictions

STONY RUN
GENERAL EROSION PREDICTION

BANK EROSION PREDICTION SUMMARY 2006														
Reach		Reach Length	Cross Section	BEHI	Near Bank Stress Rating	Bank Erosion Prediction (ft/yr)	Length of Bank (ft)	Height of Bank (ft)	Bank Area (ft)	Erosion Total (ft^3/yr)	Erosion Total (ton/yr)	Reach Total (ton/yr)	Reach Total (ton/yr/ft)	Comments
1	36	778		Very Low	Low	0.0000	190	3.0	570.0	0.00	0.00			
	35			Very Low	Low	0.0000	190	3.0	570.0	0.00	0.00			
	34			Very High	Low	0.4000	152	3.4	516.8	206.72	9.95			
	33			Extreme	Very High	3.3000	192	5.2	998.4	3294.72	158.63			
	32a			Very High	Low	0.4000	51	6.0	306.0	122.40	5.89			
	32			Moderate	Low	0.1100	52	4.0	208.0	22.88	1.10			
	32			Moderate	High	0.8000	24	4.0	96.0	76.80	3.70			
	31			Low	Low	0.0170	98	2.2	215.6	3.67	0.18			
	30			Moderate	Low	0.1100	204	3.3	673.2	74.05	3.57			
	29			Very High	High	1.0000	53	4.8	254.4	254.40	12.25			
	29a			Very Low	Low	0.0000	32	4.8	153.6	0.00	0.00			
	28			High	Low	0.4000	65	3.4	221.0	88.40	4.26			
	28			High	High	1.0000	56	3.4	190.4	190.40	9.17			
	27			High	Low	0.4000	121	3.4	411.4	164.56	7.92			
	26			Low	Low	0.0170	88	3.5	308.0	5.24	0.25			
	25			Low	Low	0.0170	88	2.5	220.0	3.74	0.18	**217.05**	**0.28**	
2	24	462		Low	Low	0.0170	462	2.3	1,062.6	18.06	0.87			
	23			Low	Low	0.0170	462	2.3	1,062.6	18.06	0.87	**1.74**	**0.00**	
3	22	536		Low	Low	0.0170	167	3.0	501.0	8.52	0.41			
	21			Moderate	Low	0.1100	453	3.0	1,359.0	149.49	7.20			
	20			High	Low	0.4000	349	3.5	1,221.5	488.60	23.53			
	19			Low	High	0.2000	98	2.2	215.6	43.12	2.08	**33.21**	**0.06**	
4	18	417		High	High	1.0000	78	3.5	273.0	273.00	13.14			
	17			Moderate	Low	0.1100	153	2.5	382.5	42.08	2.03			
	16			Moderate	Low	0.1100	72	2.5	180.0	19.80	0.95			
	15			High	Low	0.4000	95	6.0	570.0	228.00	10.98			
	14			Low	High	0.2000	82	2.0	164.0	32.80	1.58			
	14			Low	Low	0.0170	77	2.0	154.0	2.62	0.13	**28.81**	**0.07**	
5	13	598		Moderate	Low	0.1100	93	2.6	241.8	26.60	1.28			
	13			Moderate	Moderate	0.3050	122	2.6	317.2	96.75	4.66			
	12			High	Low	0.4000	172	10.0	1,720.0	688.00	33.13			
	11			High	Low	0.4000	116	11.0	1,276.0	510.40	24.57			
	10			High	Low	0.4000	135	4.8	648.0	259.20	12.48			
	9			Very Low	Low	0.0000	77	6.0	462.0	0.00	0.00			
	8			Moderate	Low	0.1100	147	3.5	514.5	56.60	2.72			
	7			High	Low	0.4000	129	4.7	606.3	242.52	11.68			
	6			Moderate	Low	0.1100	129	13.0	1,677.0	184.47	8.88	**99.40**	**0.17**	
6	5	366		Very Low	Low	0.0000	255	4.0	1,020.0	0.00	0.00			
	4			Very Low	High	0.0000	111	5.5	610.5	0.00	0.00			
	3			Very Low	Low	0.0000	157	4.0	628.0	0.00	0.00			
	2			Very Low	Low	0.0000	93	7.0	651.0	0.00	0.00			
	1			Very Low	High	0.0000	116	5.5	638.0	0.00	0.00	**0.00**	**0.00**	
		3,157				TOTAL	6,056	TOTAL		7896.65	380.21		0.12	

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office

March 2006