EFFECTS OF BANK STABILIZATION ON REGIONAL SEDIMENT MANAGEMENT (RSM)

Kansas Governor's Water Conference

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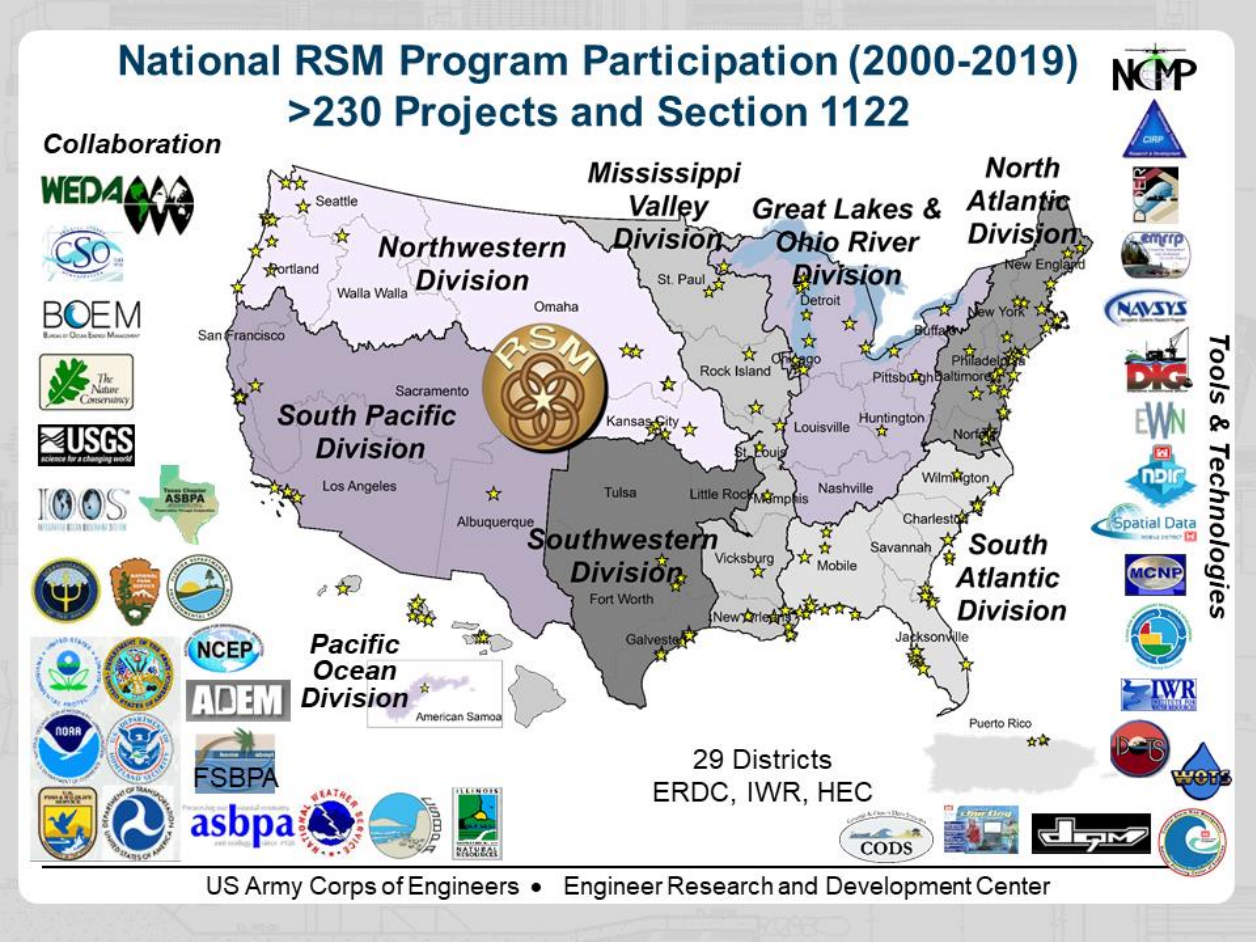
INTRODUCTION

HTTP://RSM.USACE.ARMY.MIL/



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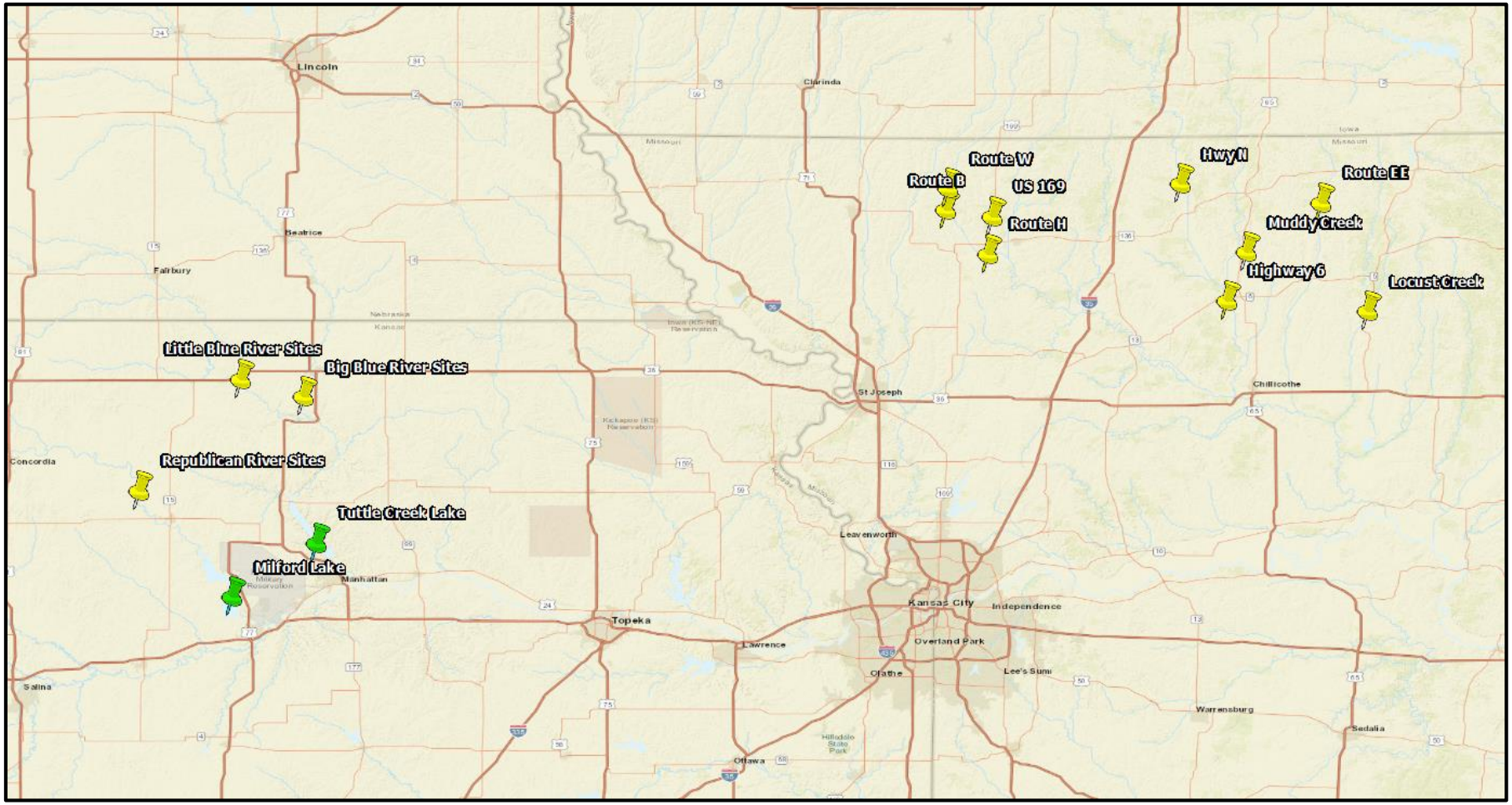
STUDY AREA



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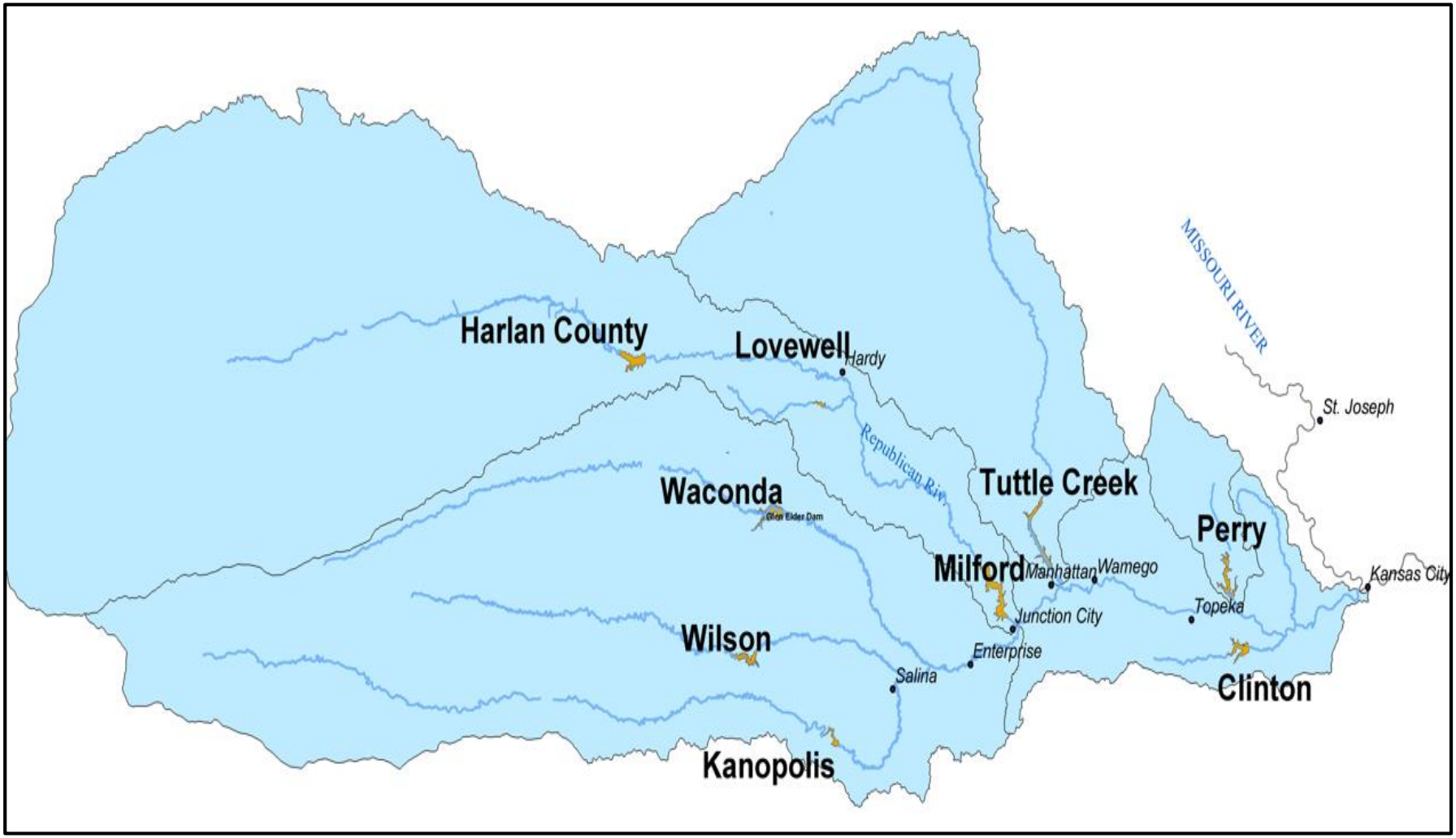
KANSAS RIVER BASIN



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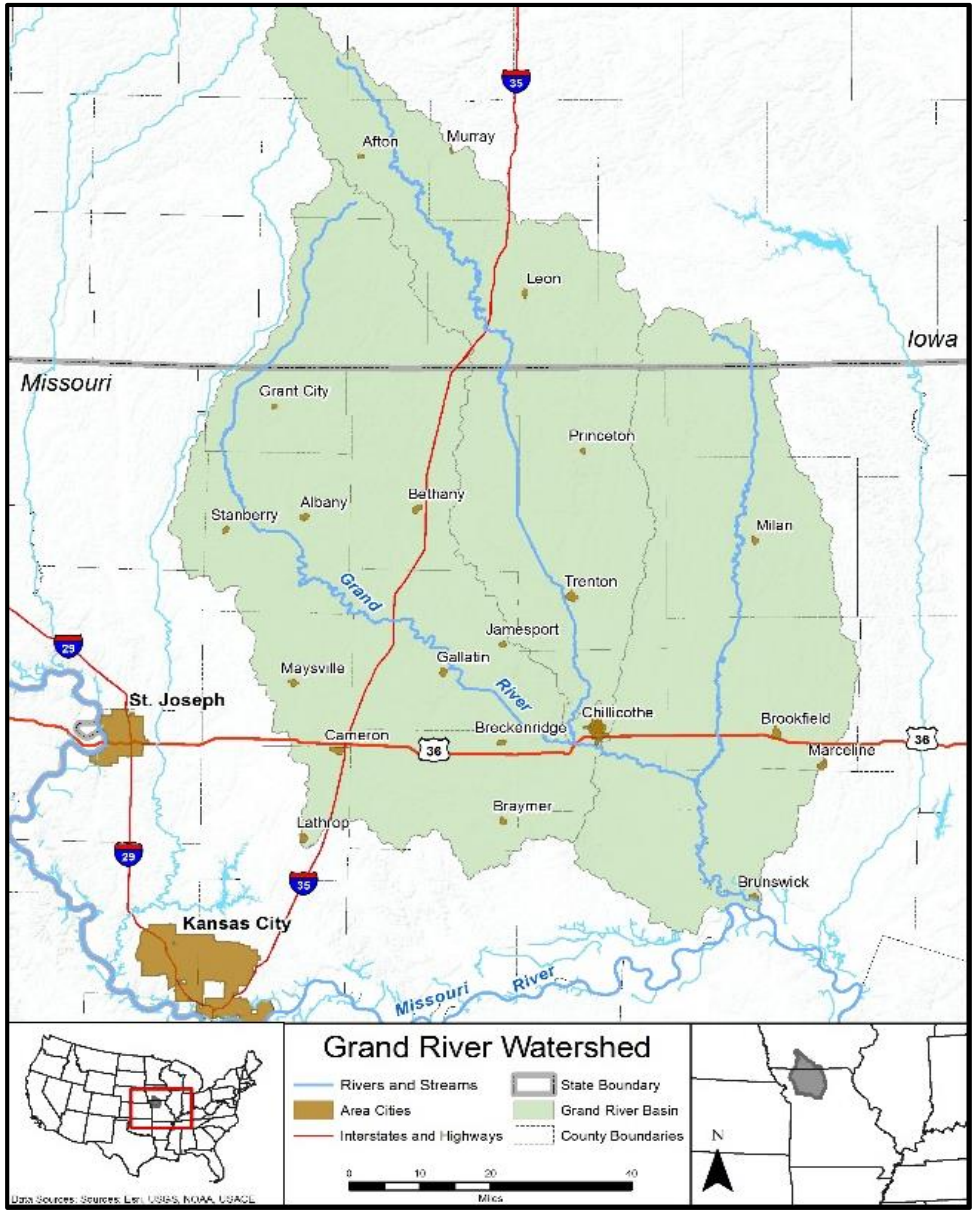
GRAND RIVER BASIN



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REMOVING SEDIMENT FROM RESERVOIRS

- Mechanical Dredging Methods
  - John Redmond
    - $6.67/yd^3
- Hydrosuction Dredging
- Water Injection Dredging

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METHODOLOGY

- Measurements in field (Bank Height and Gradations).
- Estimate Rock Quantities Based on known projects.
- Aerial photography to estimate erosion rate (area).

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Big Blue River			
Site Identifier	BB1	BB2	BB3
Year Constructed	2003	2010	2010
Erosion Area (ac)	6.2	3.8	2.3
Bank Height (ft)	20.3	19.4	22.3
Erosion Rate (yd^3/yr)	16,900	7,000	4,800
% Bank Wash Load	72%	61%	60%
20-year Wash Load Reduction (yd^3)	243,360	85,400	57,600
Quantity of Rock (ton)	993	*1,164**	*744**
Volume of Earthwork (yd^3)	380	446	285
Estimated Project Cost	$53,000	$61,000	$39,000
20-Year Wash Load Dredging Cost	$1,620,000	$570,000	$380,000

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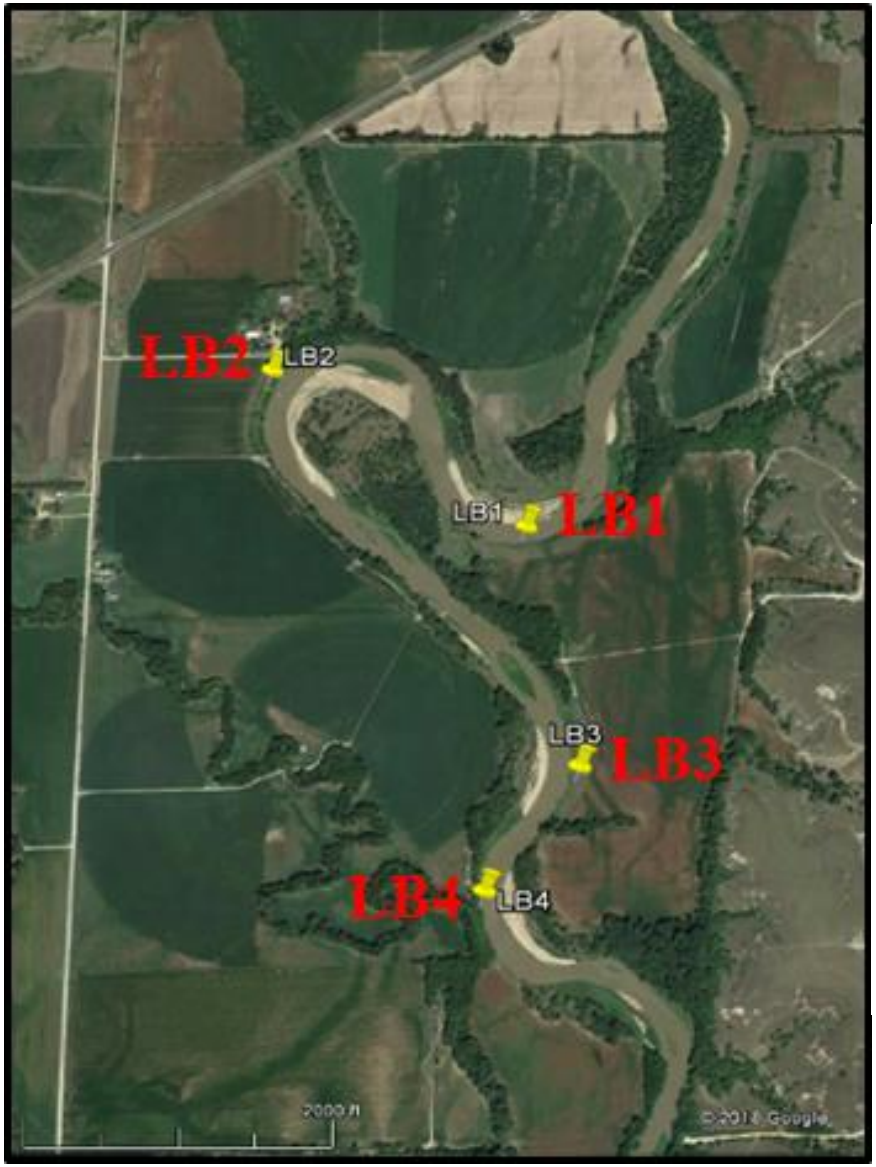

Little Blue River				
Site Identifier	LB1	LB2	LB3	LB4
Year Constructed	2002	2004	2002	2011
Erosion Area (ac)	7.2	7.1	1.5	2.0
Bank Height (ft)	21.0	21.0	17.9	21.0
Erosion Rate (yd^3/yr)	22,000	18,500	3,900	3,900
% Bank Wash Load	54%	62%	57%	52%
20-year Wash Load Reduction (yd^3)	237,600	229,400	44,460	40,560
Quantity of Rock (ton)	1,017	*1,080**	2,016	1,121
Volume of Earthwork (yd^3)	390	414	772	429
Estimated Rock Cost	$53,000	$57,000	$106,000	$59,000
20-Year Wash Load Dredging Cost	$1,580,000	$1,530,000	$300,000	$270,000

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Section 14 (Grand River Basin)				
Site Identifier	Highway 6	Route B	Route EE	Route N
Year Constructed	2005	2012	2011	2013
Erosion Area (ac)	2.4	0.2	1.2	1.2
Bank Height (ft)	25.0	16.0	24.0	26.0
Erosion Rate (yd^3/yr)	10,756	323	3,098	2,961
% Bank Wash Load	54%	55%	55%	56%
20-year Wash Load Reduction (yd^3)	116,200	3,500	34,100	33,200
Quantity of Rock (ton)	10,900	5,140	5,230	4,362
Volume of Earthwork (yd^3)	2,658	1,365	3,520	1,527
Estimated Project Cost	$562,000	$257,000	$261,500	$218,100
20-Year Wash Load Dredging Cost	$780,000	$20,000	$230,000	$220,000

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Republican River			
Site Identifier	RR1	RR2	RR3
Year Constructed	2004	2006	2004
Erosion Area (ac)	7.5	5.5	10.6
Bank Height (ft)	13.8	13.8	13.8
Erosion Rate (yd^3/yr)	12,700	8,200	18,100
% Bank Wash Load	71%	55%	49%
20-year Wash Load Reduction (yd^3)	180,340	90,200	62,100
Quantity of Rock (ton)	1,844	1,685	1,727
Volume of Earthwork (yd^3)	706	645	661
Estimated Project Cost	$97,000	$88,000	$91,000
20-Year Wash Load Dredging Cost	$1,200,000	$600,000	$410,000

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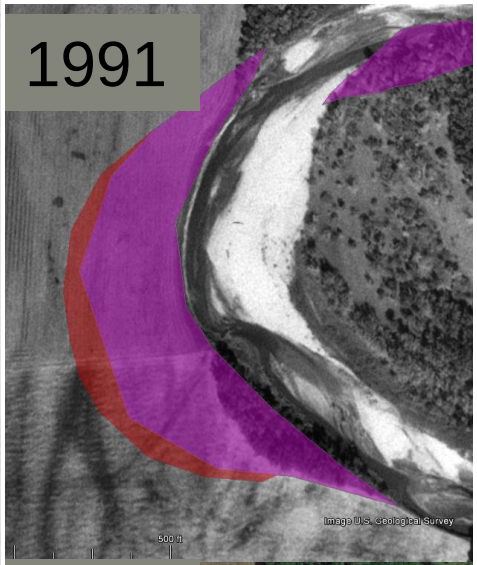
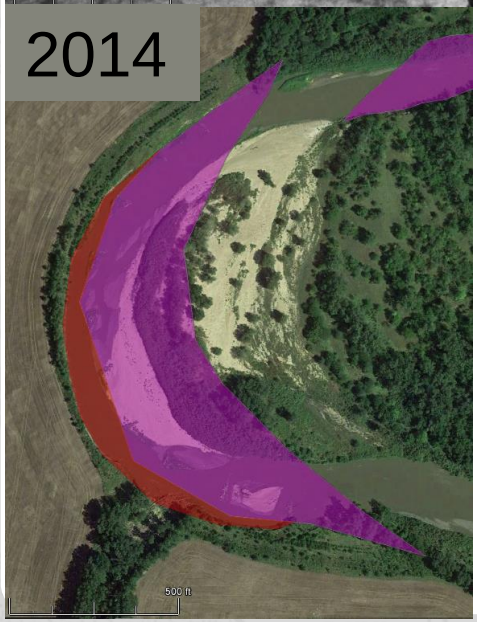
BANK STABILIZATION FAILURE





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CONCLUSION

- KS River: Cost of dredging an equivalent volume of material within 1-2 years.
- Section 14: Dredging cost approximately equals the project cost (20 years).
- Additional bank stabilization methods with lower costs could increase the BC ratio even more (hardwood revetment)

QUESTIONS?

COMMENTS!