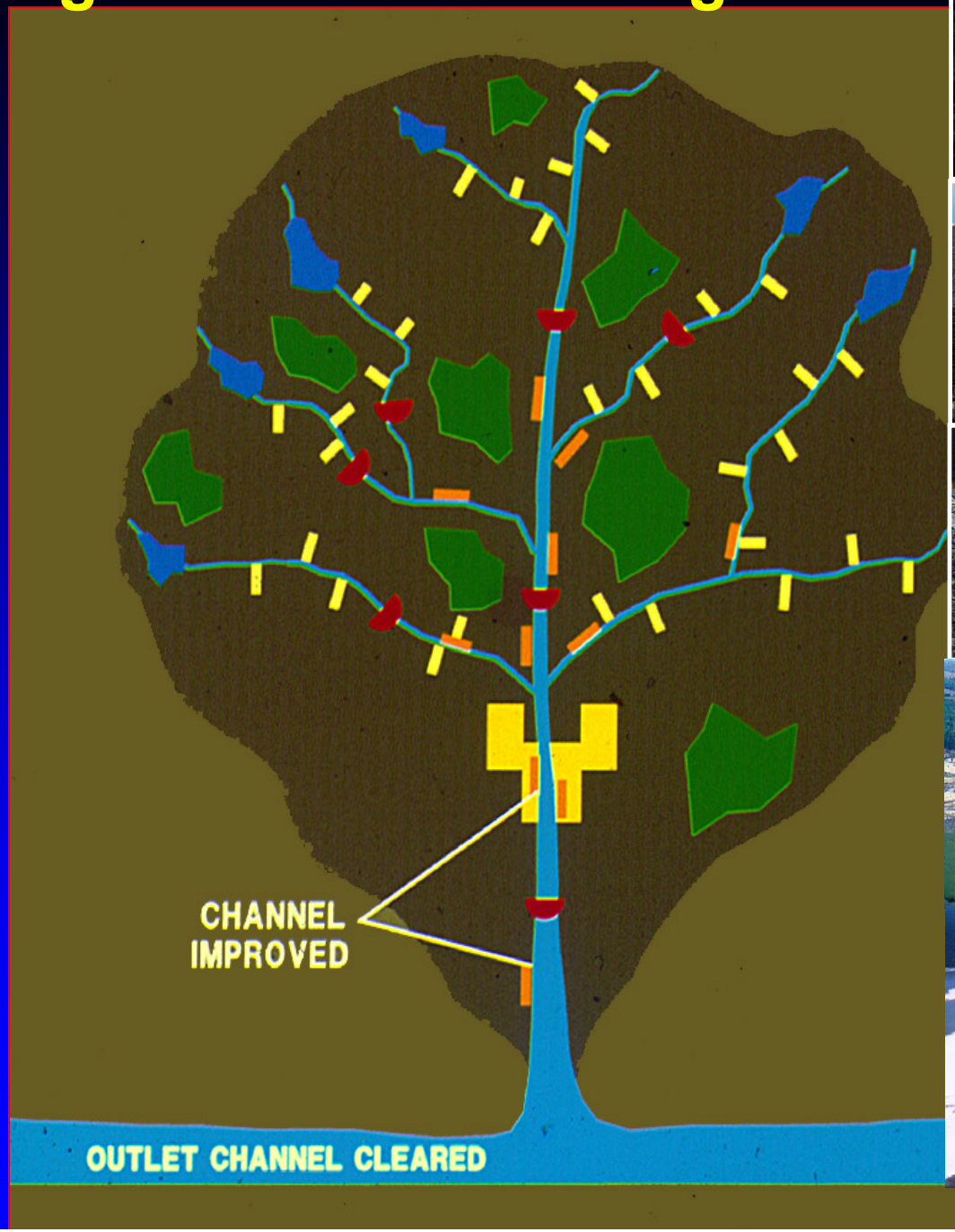
Sediment Impact Assessment Model (SIAM)

David S. Biedenharn & Meg Jonas
U.S. Army Corps of Engineers
Engineer Research Development Center

Regional Sediment Management

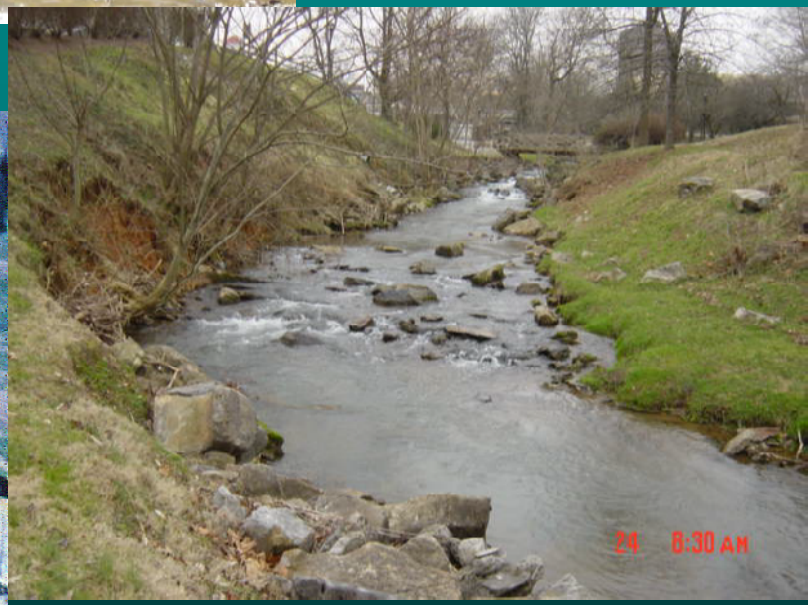


Sediment Impact Assessments

- Sediment Budget Analysis
- Numerical Models (HEC-6)
- SIAM

Sediment Impact Assessments

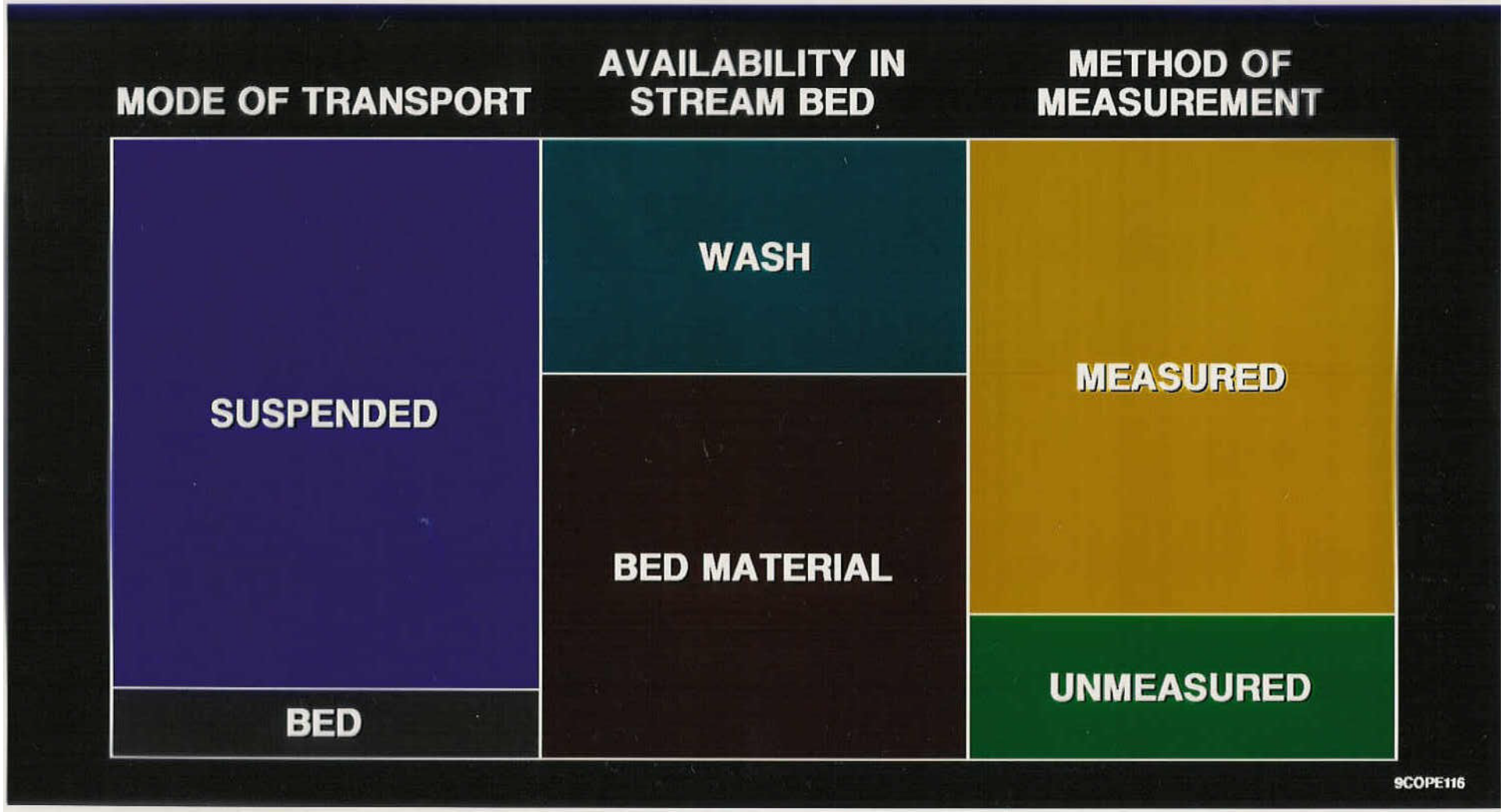
- Sources
- Pathways
- Sinks

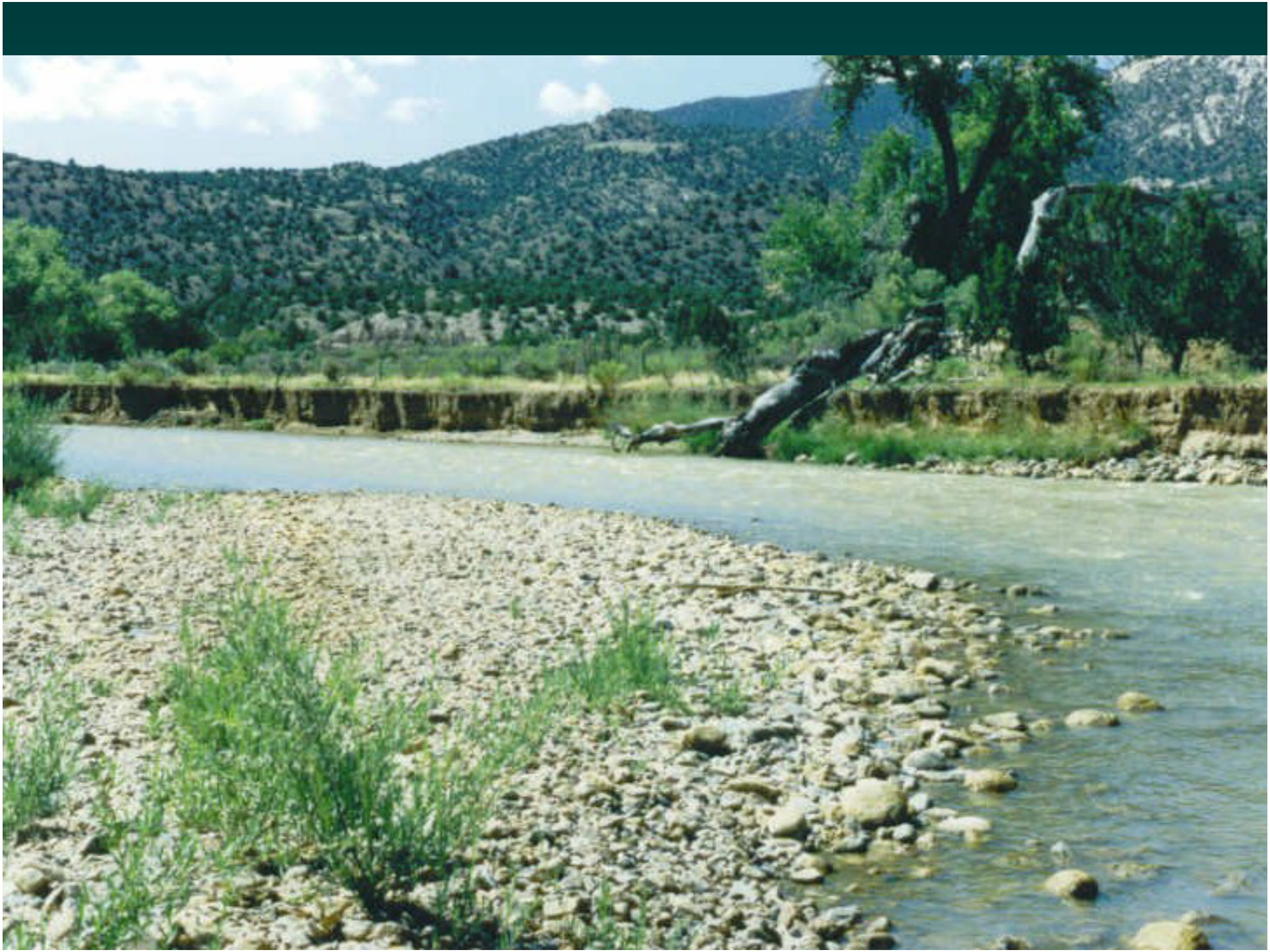


Wash Load – Bed Material Load Relationship

- Wash load is the material that is not found in appreciable quantities in the channel bed
- Bed material is the material that is found in appreciable quantities in the channel bed
- Typically, the grain diameter for which 10 percent of the bed mixture is finer (D_{10})is selected as the dividing size between bed material and wash load.

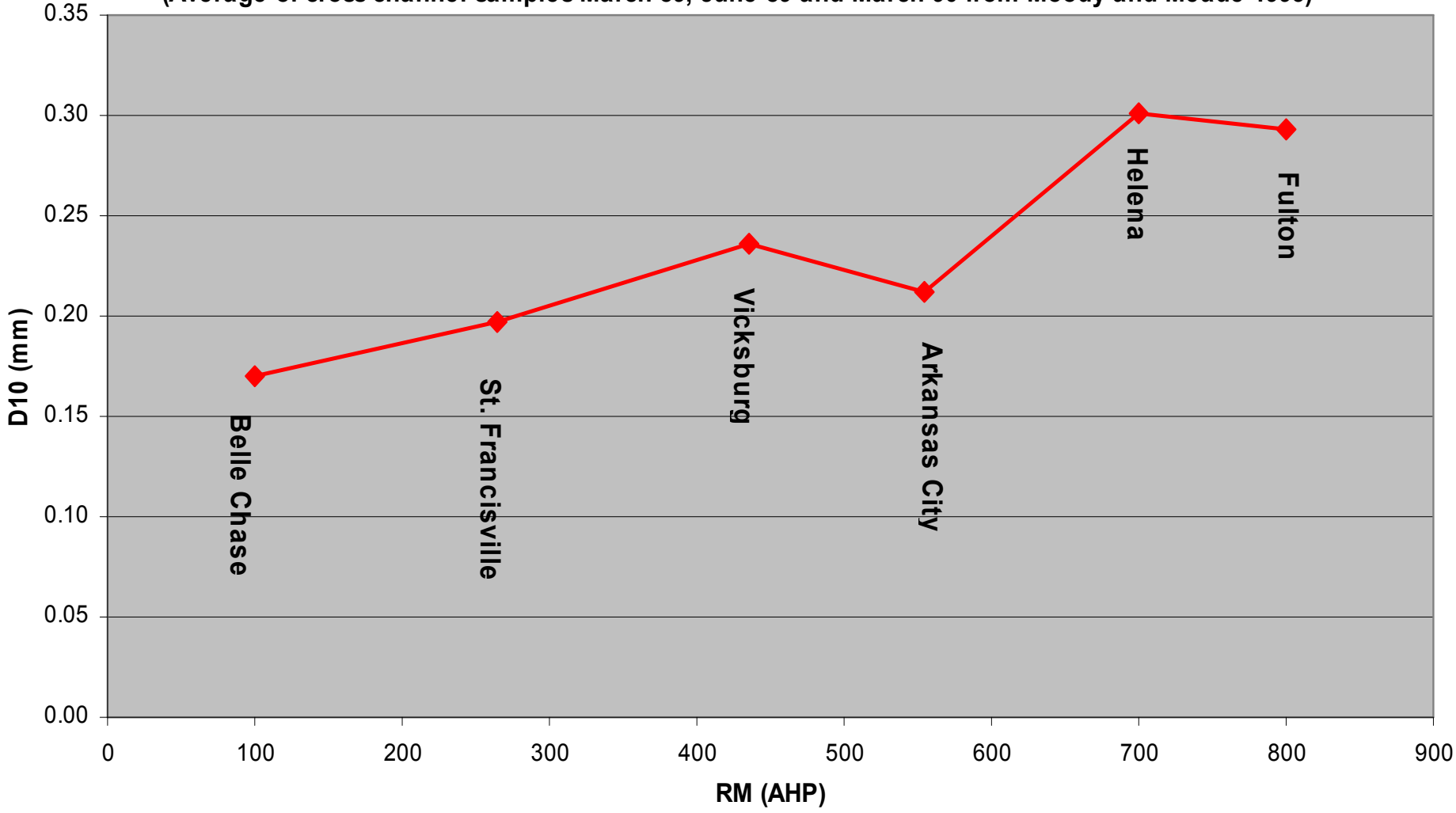
DEFINITIONS OF TOTAL SEDIMENT LOAD





Mississippi River D10 Bed Material

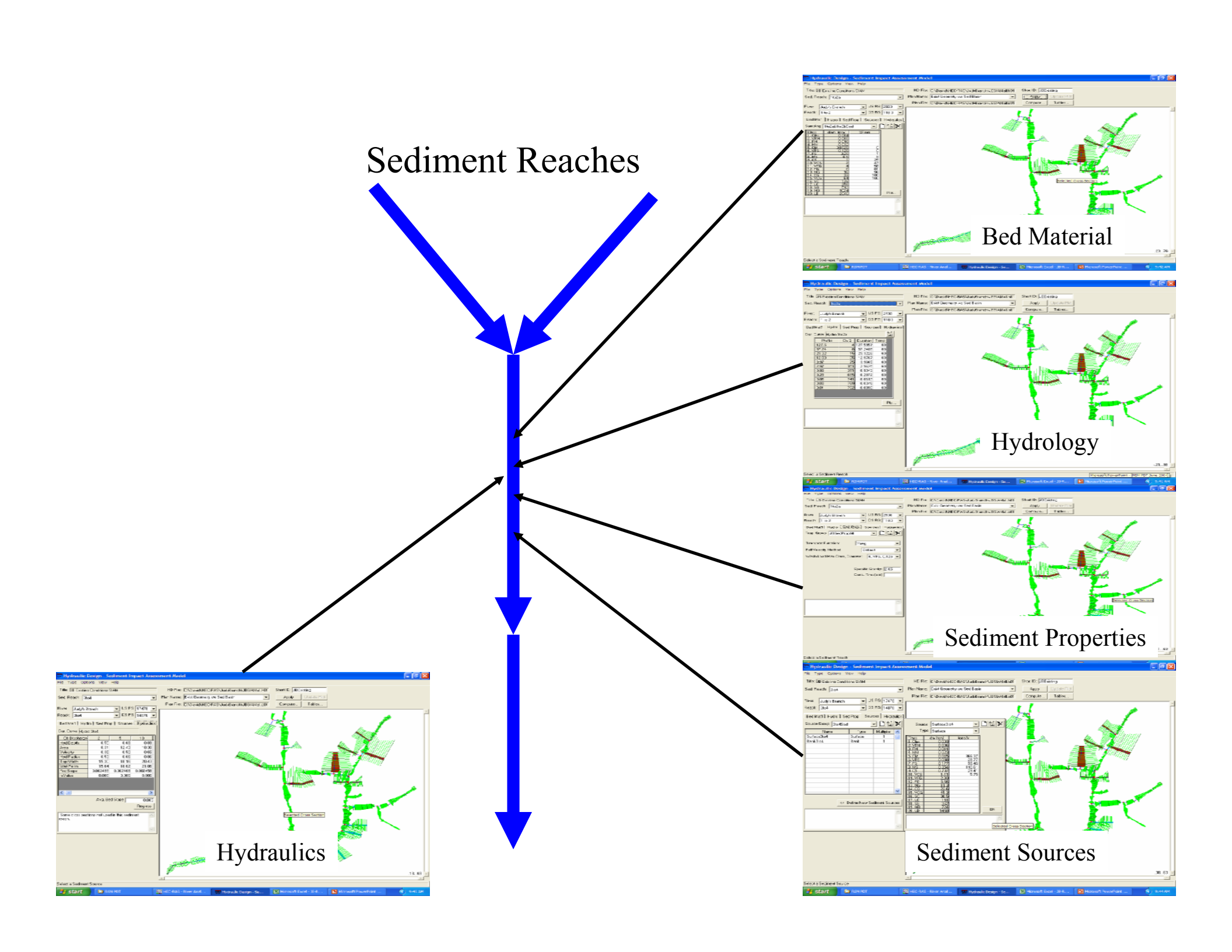
(Average of cross channel samples March 89, June 89 and March 90 from Moody and Meade 1993)



Sediment Impact Assessment Model (SIAM)

SIAM

- One-Dimensional
- Reach Average Hydraulics
- Sediment Continuity
- Sediment Transport by Grain Size
- Average Annual Loads Based on Flow Duration Data
- Wash Load – Bed Material Load Distinction


Sediment Reaches
Bed Material
Hydrology
Sediment Properties
Hydraulics
Sediment Sources

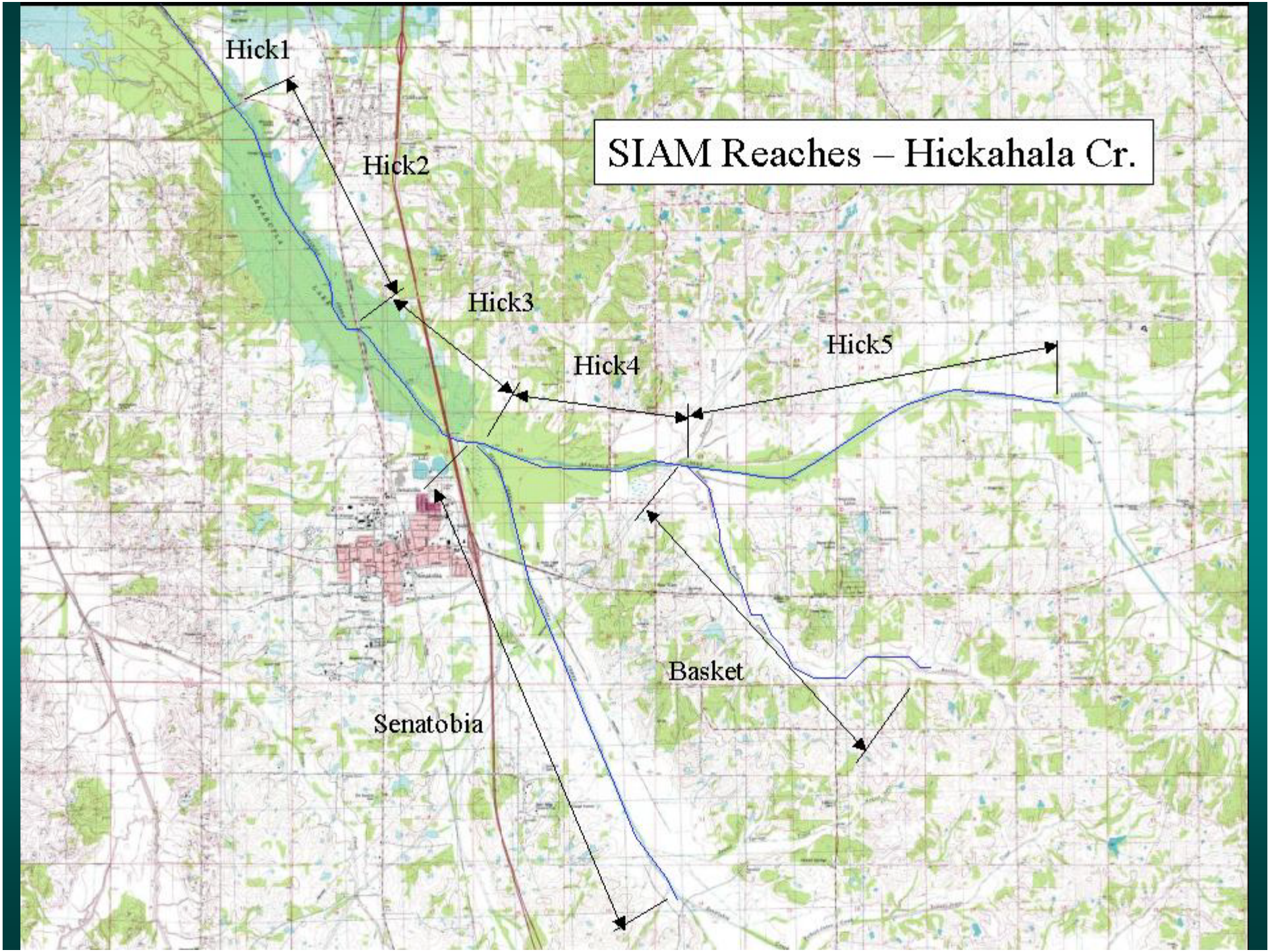
SIAM Output

- For each reach and each grain size class the output table displays the total supply from sediment sources, upstream wash load supply, upstream bed material supply, the transport capacity, and sediment balance
- Output from the SIAM model can also be summarized in a tabular format which provides the ability to view the stability of multiple scenarios simultaneously over all reaches. Color-coding identifies significant trends.

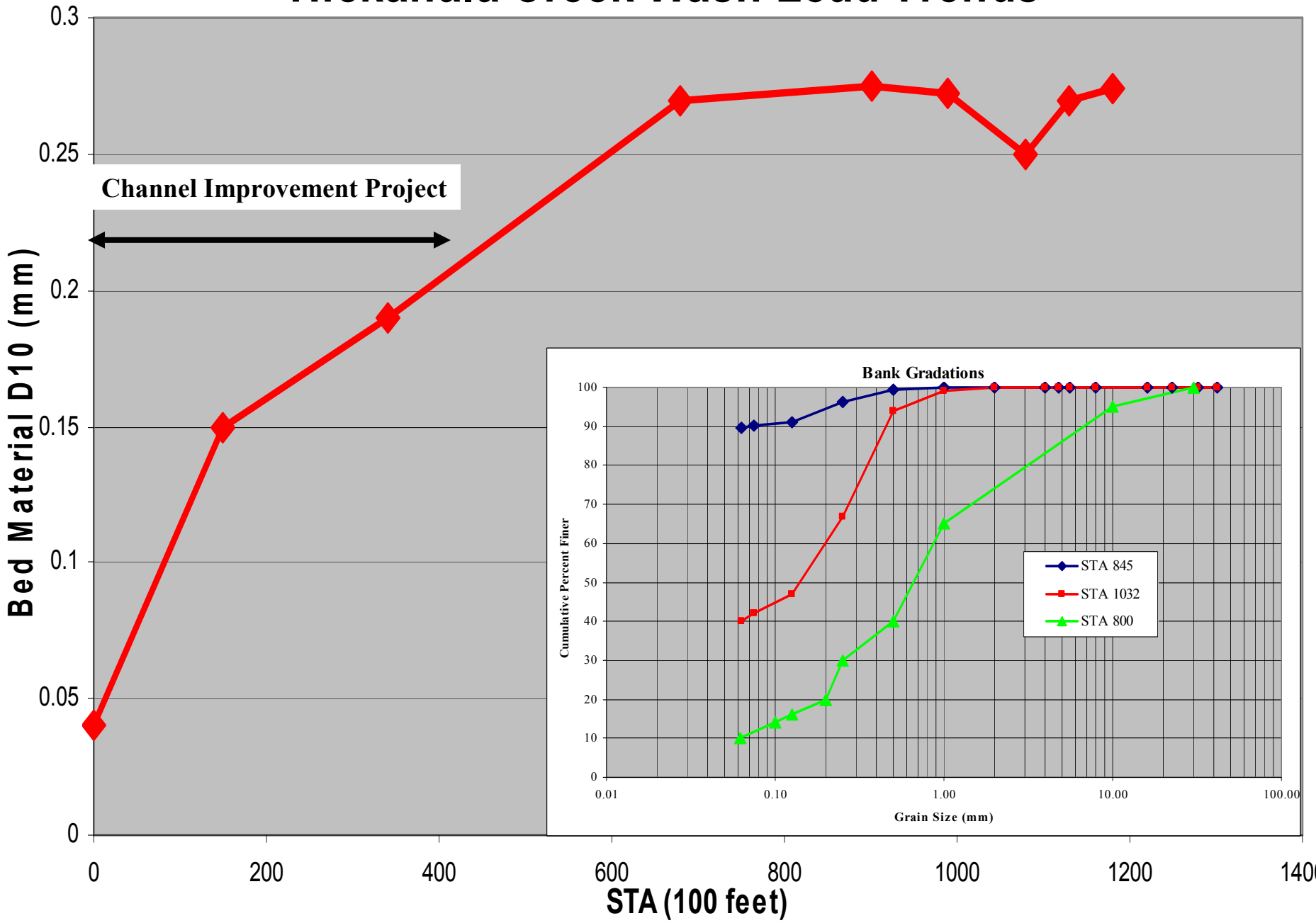
Judy's Branch Total Sediment Loads (tons/yr) and Sediment Balance (Transport Capacity Minus Supply in Tons/yr)

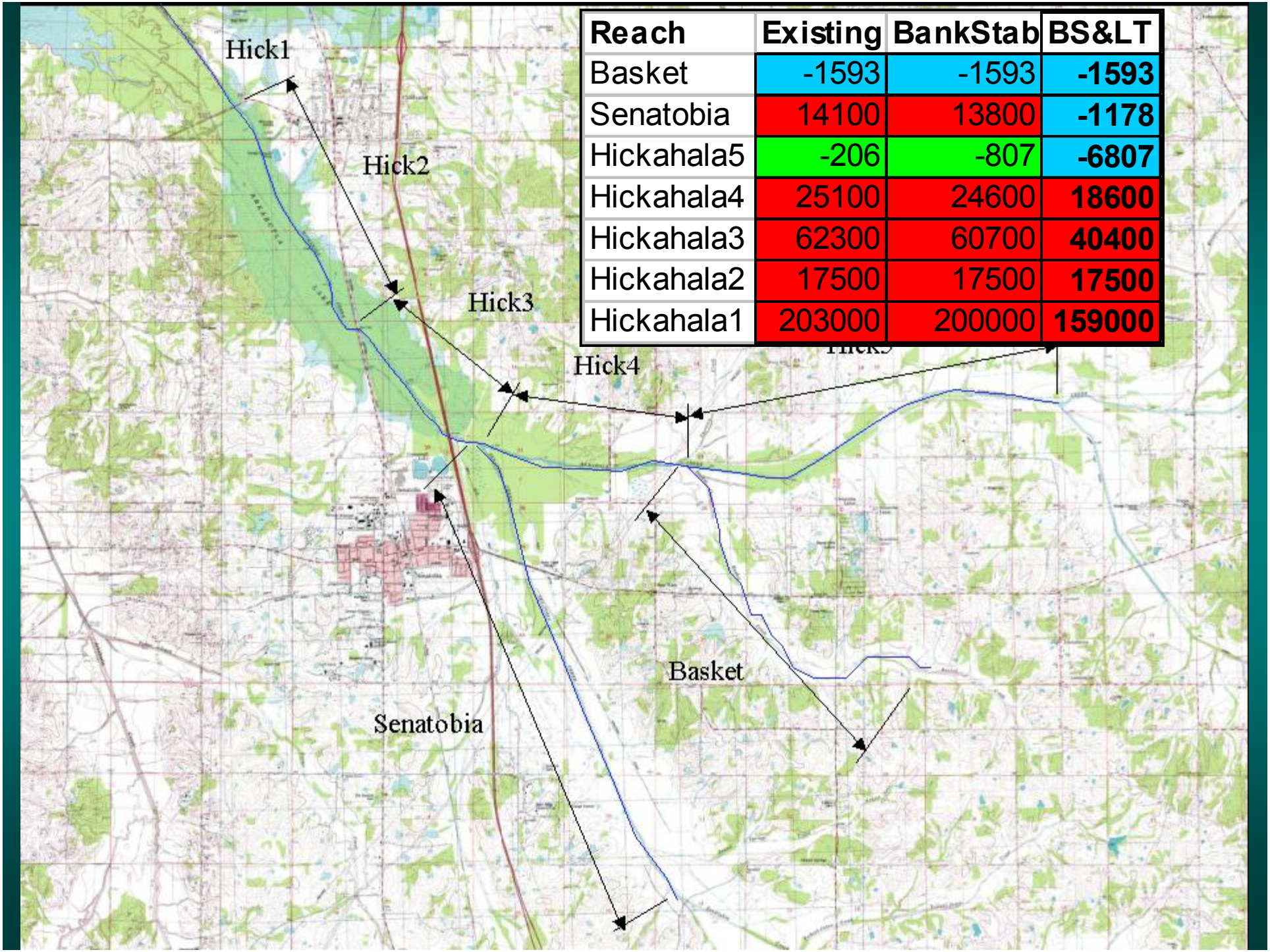
Reach Name	Total Load Existing Tons/yr	Balance Existing Tons/yr	Total Load SB Tons/yr	Percent Reduction	Balance SB Tons/yr	Total Load SB VFS Tons/yr	Percent Reduction	Balance SB VFS Tons/yr	Total Load SB VFS BS Tons/yr	Percent Reduction	Balance SB VFS BS Tons/yr	Total Load SB VFS BS GC Tons/yr	Percent Reduction	Balance SB VFS BS GCS Tons/yr
1to2a Bed	27,462	-116	18,109	34	-104	12,266	55	-104	10,447	62	-104	10,352	62	-104
1to2b Bed	27,008	220	17,828	34	69	11,823	56	69	10,105	63	69	10,105	63	69
1to2c Bed	26,133	362	16,826	36	235	11,080	58	235	9,585	63	235	9,585	63	235
2to3 Bed	24,882	602	15,837	36	478	10,340	58	338	9,003	64	293	8,883	64	173
3to4 Bed	16,542	185	9,684	41	283	6,034	64	161	5,330	68	113	5,330	68	113
4to5 Bed	15,701	300	8,882	43	246	5,523	65	218	4,917	69	190	4,917	69	190
5to6 Bed	15,436	374	8,801	43	364	5,499	64	347	4,957	68	338	4,906	68	287
6to7 Bed	16,183	1260	9,182	43	586	5,925	63	586	5,407	67	586	4,792	70	22
7to8 Bed	10,425	-1058	5,955	43	-588	3,905	63	-588	3,459	67	-588	3,444	67	13
8to9 Bed	8,842	-14	4,774	46	19	3,033	66	19	2,684	70	19	2,683	70	33
9to10 Bed	9,409	1122	5,032	47	813	3,434	64	813	3,168	66	813	2,412	74	58
10to11 Bec	8,043	-1112	4,108	49	-883	2,514	69	-883	2,253	72	-883	2,199	73	-182
11to12 Bec	7,317	389	3,977	46	381	2,623	64	381	2,395	67	381	1,966	73	-4
12to13 Bec	6,317	29	2,893	54	-22	1,751	72	-22	1,623	74	-22	1,625	74	135
13to14 Bec	6,350	353	2,971	53	162	1,840	71	162	1,726	73	162	1,582	75	16
4toEnda Be	4,325	-386	2,321	46	-202	1,306	70	-202	1,237	71	-202	1,237	71	-58
4toEndb Be	2,756	-149	833	70	-68	510	81	-68	452	84	-68	452	84	-68
Trib1 Bed	389	-33	0	100	-35	0	100	-35	0	100	-35	0	100	-35
Trib2 Bed	139	43	0	100	-4	0	100	-4	0	100	-4	0	100	-4
Trib3 Bed	322	67	0	100	-62	0	100	-62	0	100	-62	0	100	-62
Trib4 Bed	505	161	0	100	-37	0	100	-37	0	100	-37	0	100	-37
Trib5 Bed	4,443	247	2,437	45	301	1,365	69	301	1,365	69	301	1,365	69	301
Trib5a Bed	723	-222	226	69	-104	113	84	-104	113	84	-104	113	84	-104
Trib5b1 Bec	2,958	-264	1,878	37	-229	919	69	-229	919	69	-229	862	71	-286
Trib5b2 Bec	2,327	-129	1,302	44	-74	594	74	-74	594	74	-74	594	74	-17
Trib5b3 Bec	1,566	-44	1,133	28	-28	566	64	-28	566	64	-28	566	64	-28
Trib6 Bed	677	-373	414	39	-267	207	69	-267	207	69	-267	207	69	-267
Trib7 Bed	115	-2	115	0	-2	57	50	-2	57	50	-2	57	50	-2
Trib8 Bed	164	-65	0	100	-14	0	100	-14	0	100	-14	0	100	-14
Trib9 Bed	1,005	64	355	65	19	149	85	19	149	85	19	149	85	29
Trib9a1 Bec	824	25	308	63	46	189	77	46	189	77	46	189	77	46
Trib9a2 Bec	671	-137	238	65	-70	119	82	-70	119	82	-70	119	82	-70
Trib9b Bed	94	-24	0	100	-7	0	100	-7	0	100	-7	0	100	-7
Trib10 Bed	310	-286	310	0	-318	155	50	-318	155	50	-318	155	50	-44
Trib11 Bed	232	-20	0	100	-16	0	100	-16	0	100	-16	0	100	-16
Trib12 Bed	1,078	-183	0	100	-72	0	100	-72	0	100	-72	0	100	-72
3toAa Bed	7,658	242	5,417	29	90	3,815	50	90	3,251	58	90	3,096	60	56
3toAb Bed	5,894	-176	3,825	35	-4	2,735	54	-4	2,346	60	-4	2,157	63	-38
AtoB Bed	3,696	-137	2,312	37	-91	1,676	55	-91	1,435	61	-91	1,298	65	-39
BtoC Bed	1,249	-51	1,070	14	-25	914	27	-25	749	40	-25	618	51	-20
CtoD Bed	548	-351	553	-1	-167	450	18	-167	361	34	-167	328	40	-68
DtoEnd Bec	203	-55	203	0	-60	136	33	-60	115	43	-60	115	43	-27
TribA Bed	626	-48	0	100	-35	0	100	-35	0	100	-35	0	100	-35
TribB Bed	1,128	-62	0	100	-11	0	100	-11	0	100	-11	0	100	-11

Hickahala Creek SIAM


SIAM Reaches – Hickahala Cr.
Hick1
Hick2
Hick3
Hick4
Hick5
Basket
Senatobia

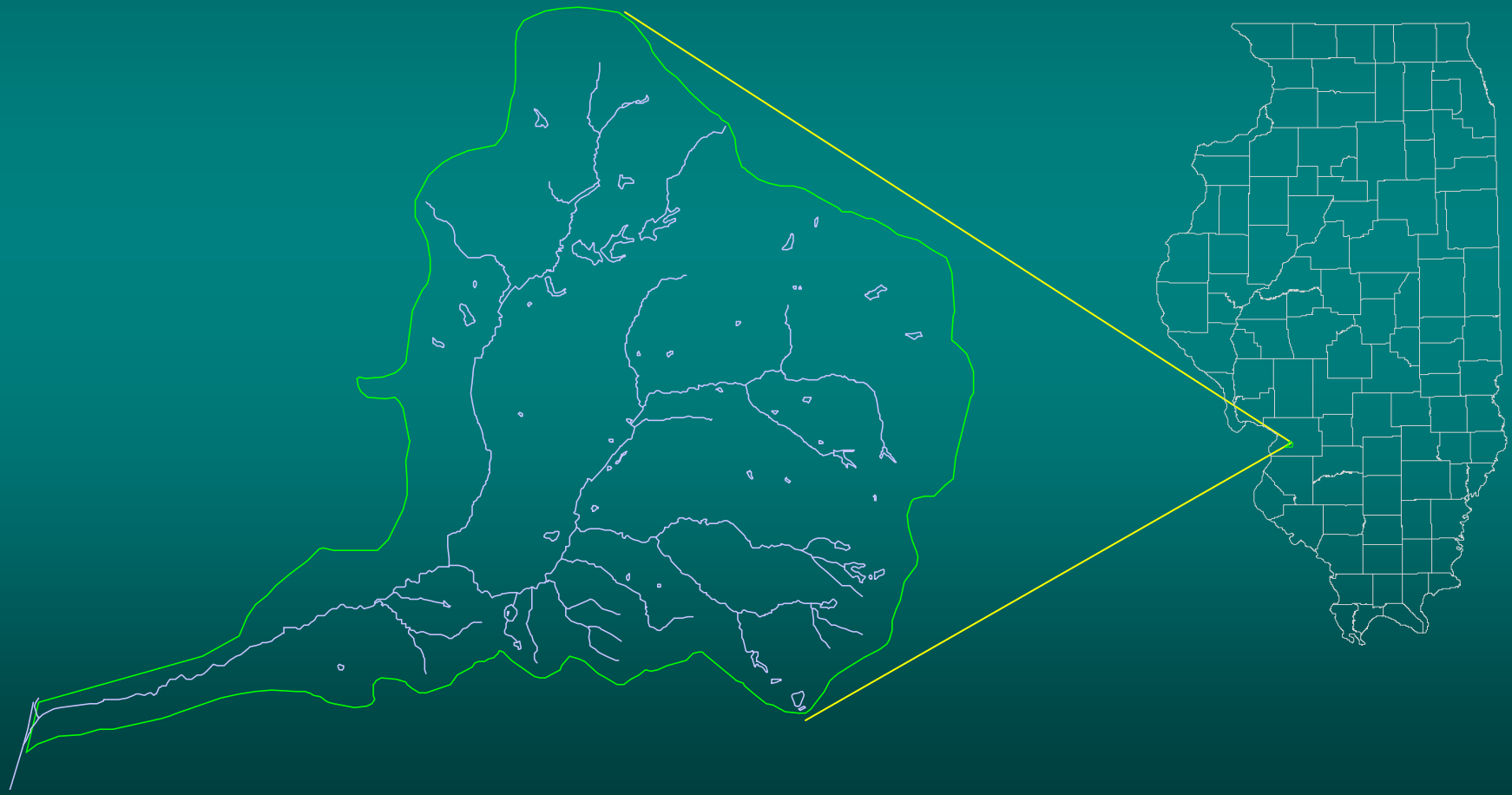
Hickahala Creek Wash Load Trends





Reach	Existing	BankStab	BS&LT
Basket	-1593	-1593	**-1593**
Senatobia	14100	13800	**-1178**
Hickahala5	-206	-807	**-6807**
Hickahala4	25100	24600	**18600**
Hickahala3	62300	60700	**40400**
Hickahala2	17500	17500	**17500**
Hickahala1	203000	200000	**159000**

Judys Branch Watershed



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Features of SIAM

- Unique in bridging gap between sediment yield models and sediment transport models
- Separate wash load and bed material load transport processes
- Accounts for change in wash load gradation
- Explicitly allows for input of any sediment source in reach (bank erosion, upland yield, mining, etc.)
- Allows tracking of sediment source to impact
- Evaluates channel stability for each reach for all alternatives

Features of SIAM (cont.)

- Unique in its ability to perform a quantitative analysis on large networks of nested tributaries
- Incorporation in HEC-RAS for ease of use
- Easily scalable for different levels of detail
- Multiple management alternatives can be rapidly evaluated
- Sensitivity analyses can be quickly performed
- Changes in hydrology or hydraulics easy to evaluate
- Easy update for long-term sediment management

Final Thoughts