HEC-RAS

US Army Corps of Engineers'
Hydraulic Engineering Center
River Analysis System

Version 4.1

How to Get your Free Version

www.hec.usace.army.mil

HEC-RAS is software that allows the user to perform one dimensional

- Steady and unsteady flow river hydraulics calculations
- Sediment Transport
- Water Quality

Why do we need Models

- Direct Measurements are costly
- Sometimes it is hard
- Prediction

Hec-Ras Capabilities

- Steady flow water surface profiles - single reach, dendritic, mixed flow regime.
- Unsteady flow simulation- full network of open channels, adapted from UNET
- Sediment transport/Movable boundary- long term trends of scour and deposition (not ready, only bridge scour)

Input Data

- Flows
- Geometry
  - Cross Section
  - Spacing
  - Structures
- Manning's n
- Calibration Data

Other Applications and Capabilities

- Bridge Scour
- Culverts
- Drop Structures
- Hydraulic Jumps
- Split Flow
- Lateral Weirs
- In Channel Weirs
- Gated Spillways and Weirs
- Vertical Variation in Roughness
- GIS import and export features (HEC-GeoRAS 4.0 with ArcView)

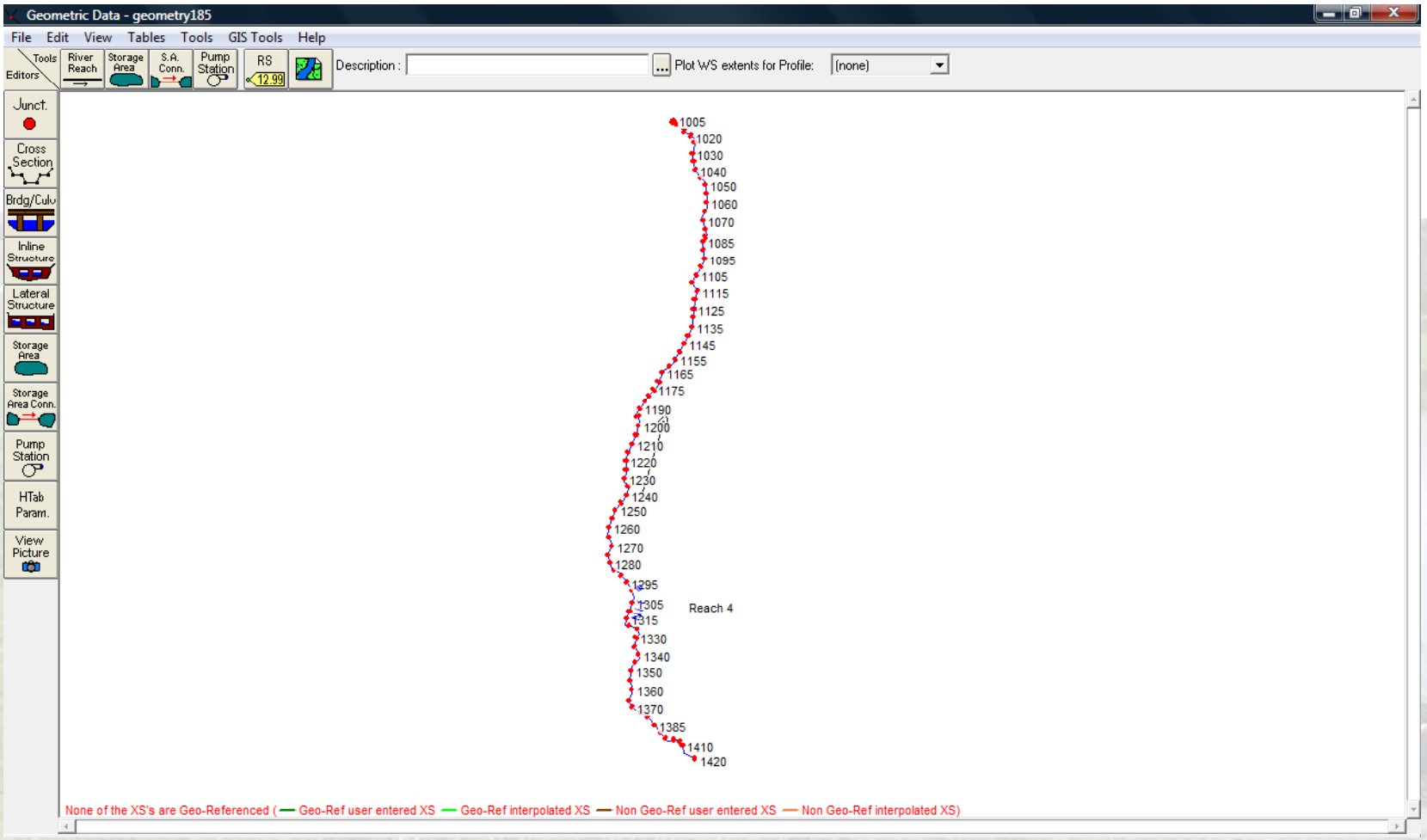
HEC-RAS - Documentation

❶ User's Manual: provides an introduction and overview of the modeling system, installation instructions, how to get started, a simple example, detailed descriptions of each of the major modeling components, and how to view graphical and tabular output

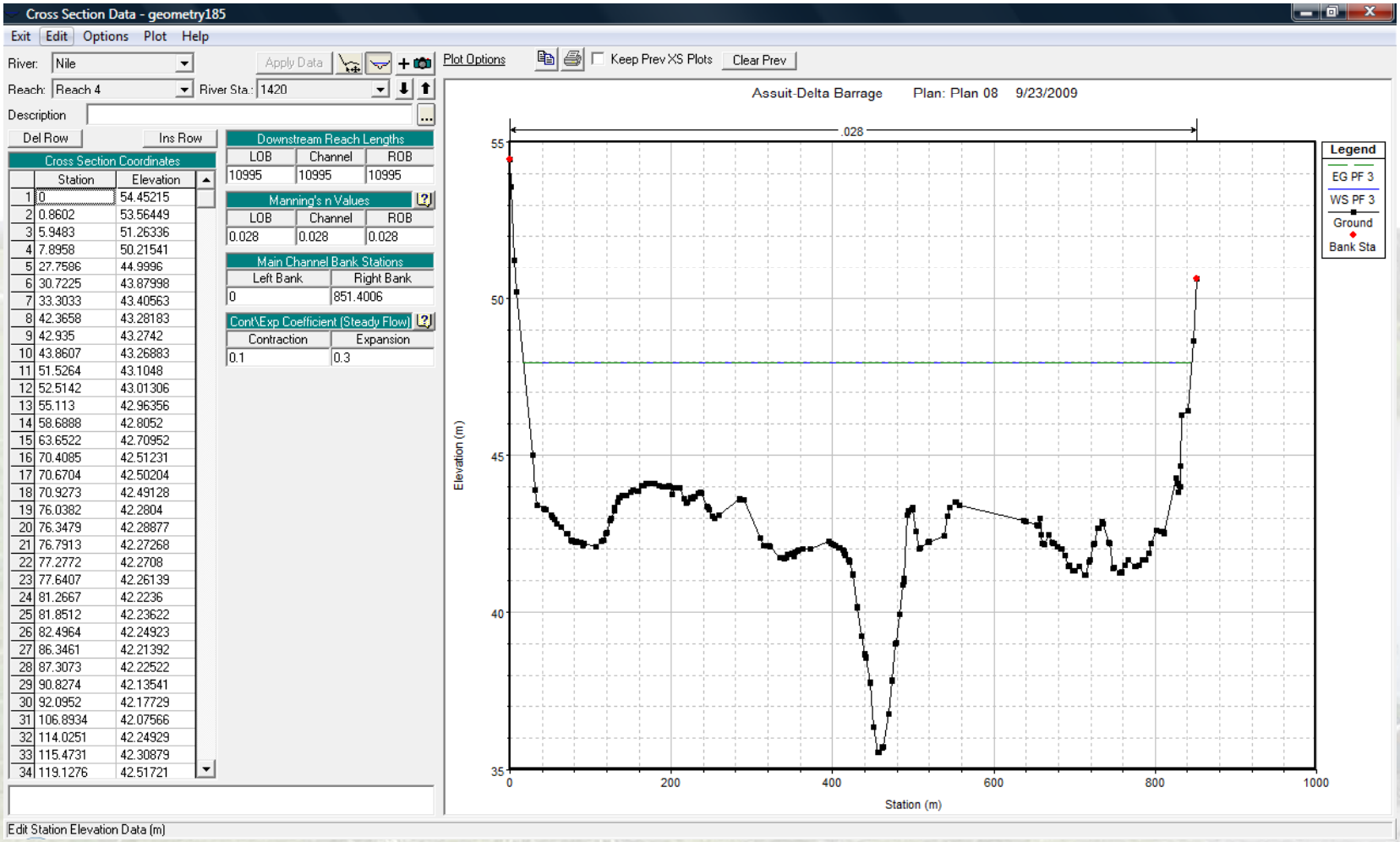
❷ Hydraulic Reference Manual: describes the theory and data requirements for hydraulic calculations

❸ Applications Guide: contains a series of examples that demonstrate various aspects of HEC-RAS.

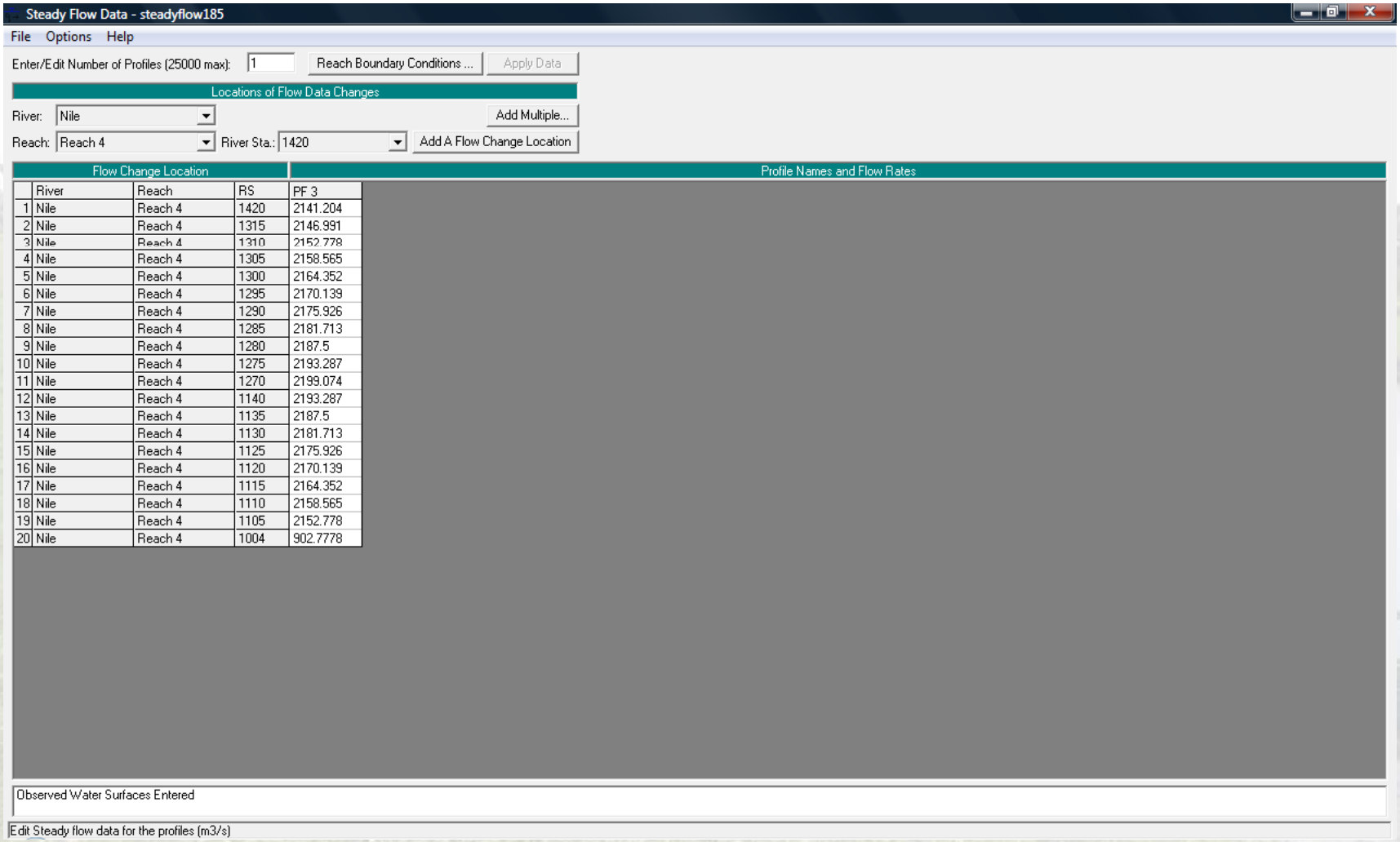
Geometric Data



Cross Section Data

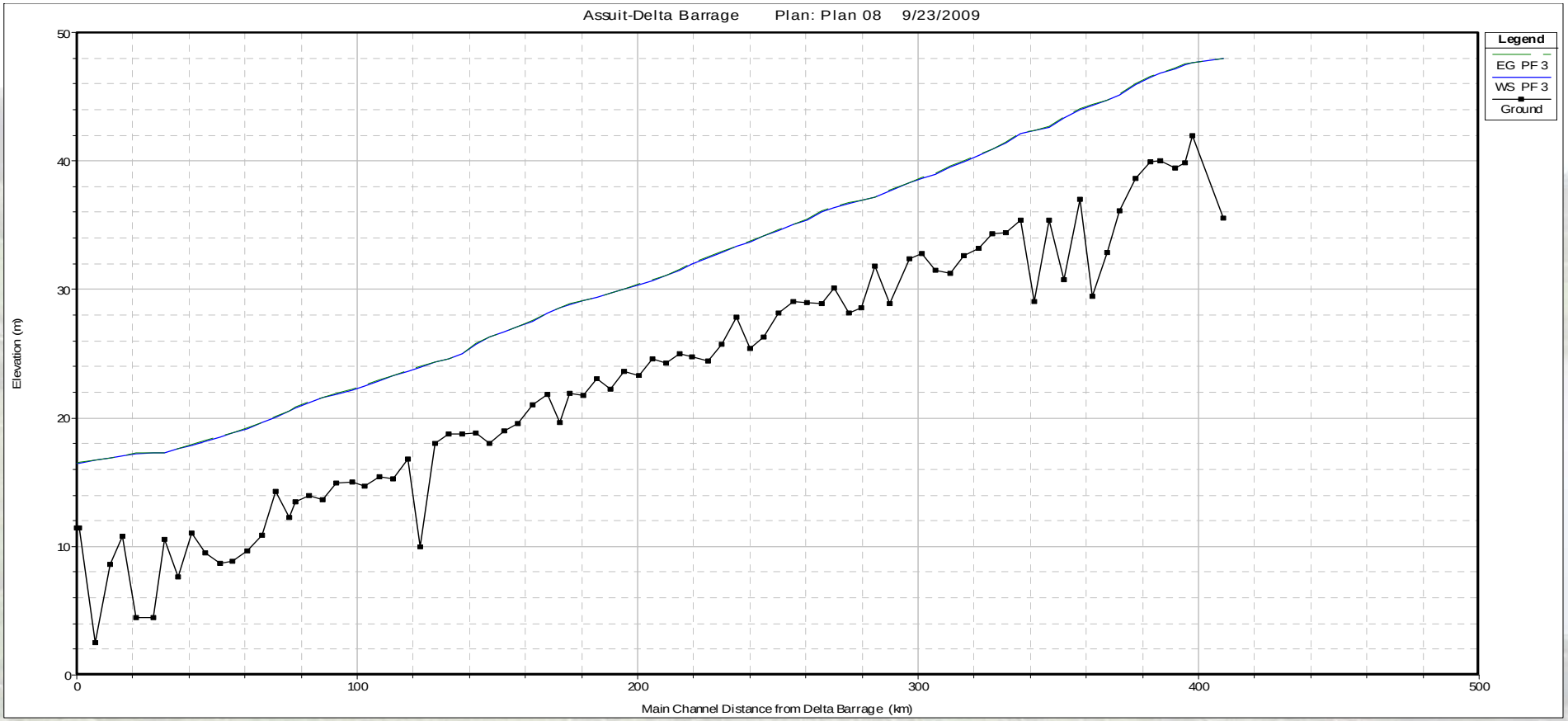


Steady Flow Data



	River	Reach	RS	PF 3
1	Nile	Reach 4	1420	2141.204
2	Nile	Reach 4	1315	2146.991
3	Nile	Reach 4	1310	2152.778
4	Nile	Reach 4	1305	2158.565
5	Nile	Reach 4	1300	2164.352
6	Nile	Reach 4	1295	2170.139
7	Nile	Reach 4	1290	2175.926
8	Nile	Reach 4	1285	2181.713
9	Nile	Reach 4	1280	2187.5
10	Nile	Reach 4	1275	2193.287
11	Nile	Reach 4	1270	2199.074
12	Nile	Reach 4	1140	2193.287
13	Nile	Reach 4	1135	2187.5
14	Nile	Reach 4	1130	2181.713
15	Nile	Reach 4	1125	2175.926
16	Nile	Reach 4	1120	2170.139
17	Nile	Reach 4	1115	2164.352
18	Nile	Reach 4	1110	2158.565
19	Nile	Reach 4	1105	2152.778
20	Nile	Reach 4	1004	902.7778

Summary Figure



Summary Table

Profile Output Table - Standard Table 1

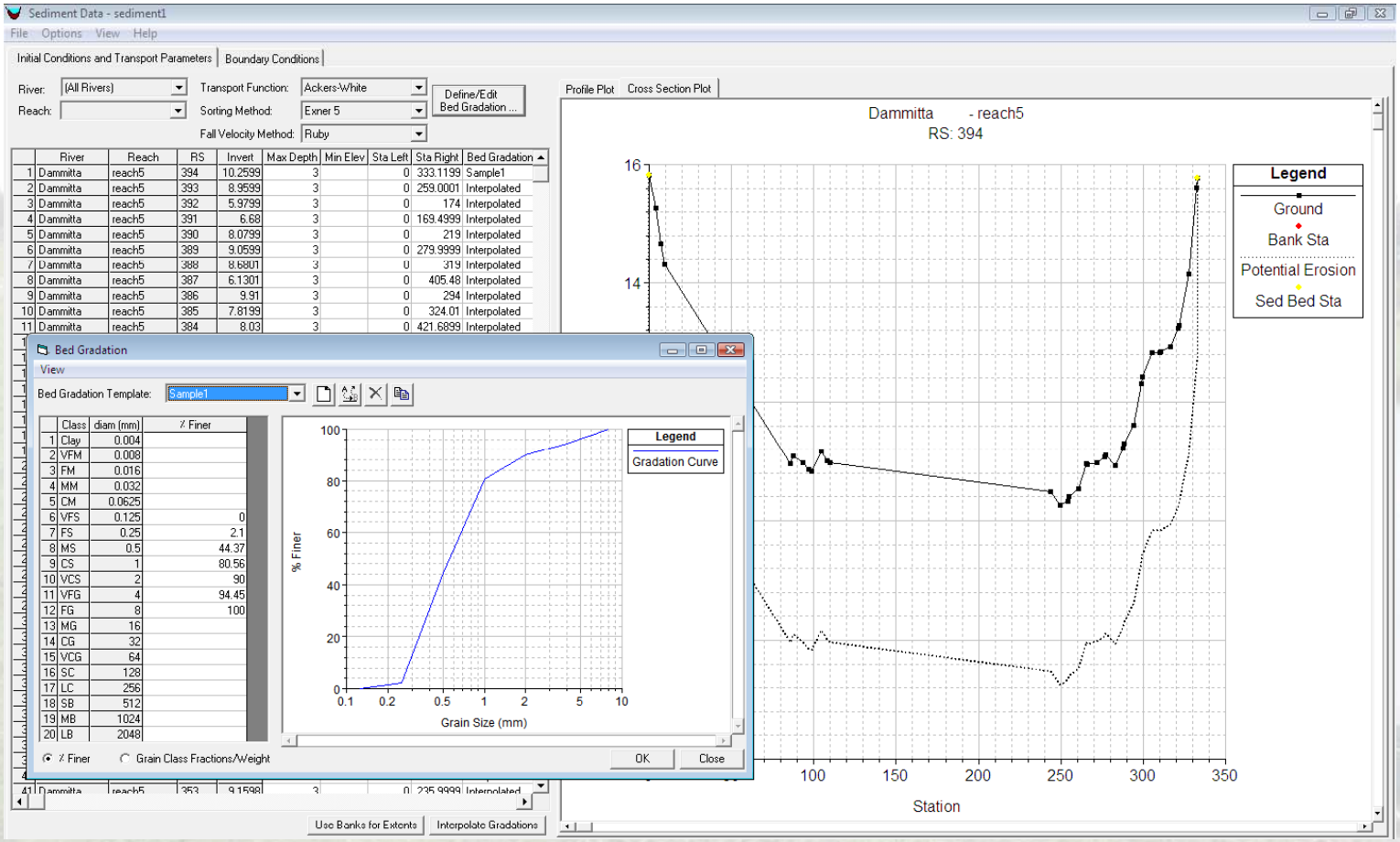
File Options Std. Tables Locations Help

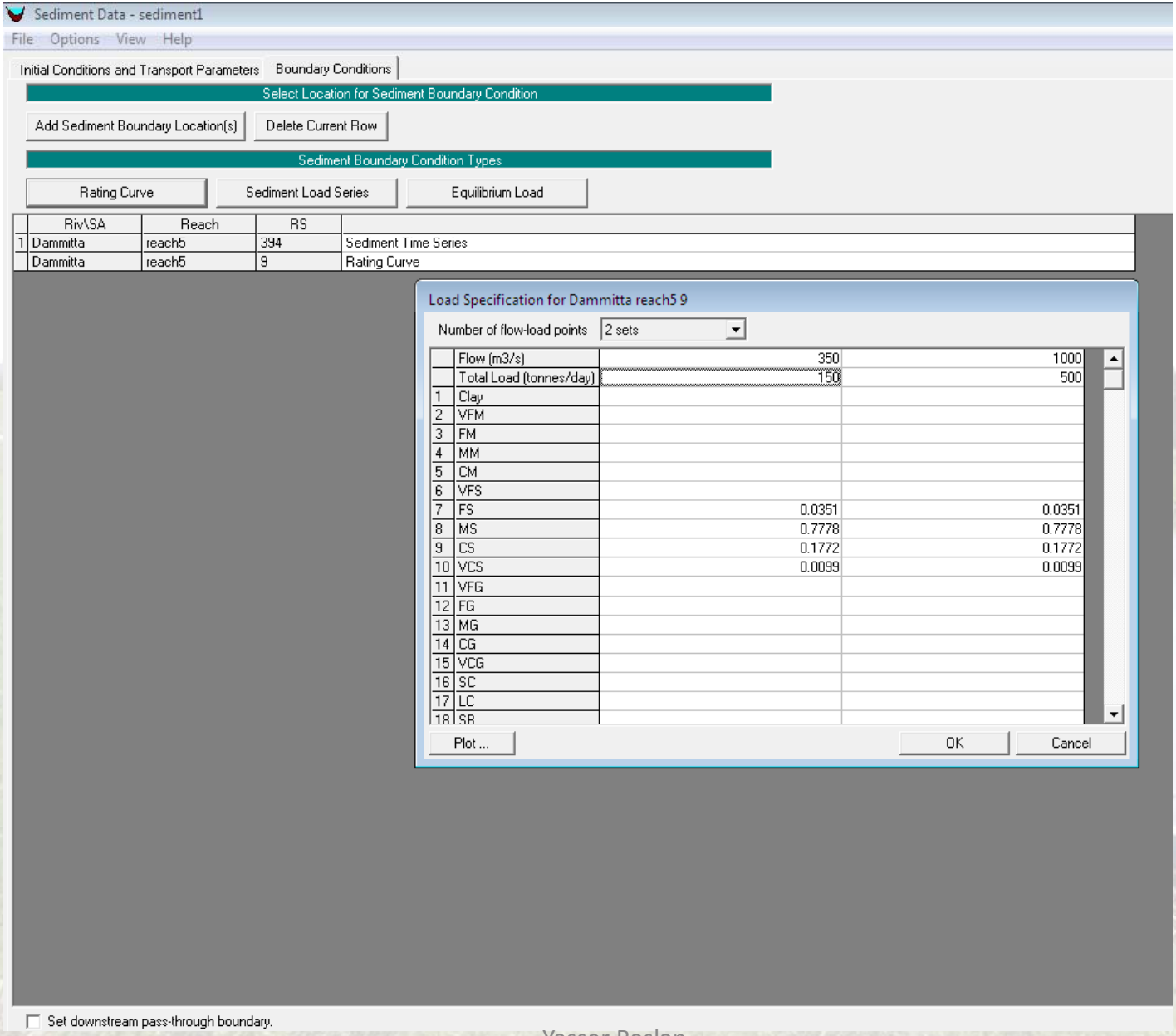
HEC-RAS Plan: Plan 08 River: Nile Reach: Reach 4 Profile: PF 3 — Reload Data

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 4	1420	PF 3	2141.20	35.55	47.96		47.97	0.000018	0.47	4545.24	828.66	0.06
Reach 4	1410	PF 3	2141.20	41.99	47.65		47.67	0.000043	0.60	3558.57	819.60	0.09
Reach 4	1405	PF 3	2141.20	39.83	47.49		47.53	0.000076	0.85	2527.37	506.28	0.12
Reach 4	1400	PF 3	2141.20	39.48	47.18		47.22	0.000089	0.83	2571.58	551.30	0.12
Reach 4	1395	PF 3	2141.20	40.02	46.80		46.84	0.000064	0.79	2697.14	495.68	0.11
Reach 4	1390	PF 3	2141.20	39.90	46.53		46.56	0.000102	0.78	2734.69	622.83	0.12
Reach 4	1385	PF 3	2141.20	38.62	45.94		45.98	0.000117	0.95	2260.69	401.87	0.13
Reach 4	1380	PF 3	2141.20	36.13	45.14		45.20	0.000155	1.05	2031.59	379.98	0.15
Reach 4	1375	PF 3	2141.20	32.84	44.74		44.76	0.000073	0.66	3222.66	688.36	0.10
Reach 4	1370	PF 3	2141.20	29.50	44.33		44.38	0.000060	0.99	2159.39	281.37	0.11
Reach 4	1365	PF 3	2141.20	37.04	44.02		44.08	0.000100	1.07	1995.87	341.45	0.14
Reach 4	1360	PF 3	2141.20	30.77	43.37		43.43	0.000113	1.10	1950.93	354.09	0.15
Reach 4	1355	PF 3	2141.20	35.41	42.64		42.71	0.000199	1.16	1848.12	476.02	0.19
Reach 4	1350	PF 3	2141.20	29.07	42.37		42.40	0.000025	0.73	2952.40	481.99	0.09
Reach 4	1345	PF 3	2141.20	35.41	42.13		42.18	0.000104	0.98	2178.02	653.62	0.17
Reach 4	1340	PF 3	2141.20	34.40	41.40		41.48	0.000166	1.24	1727.25	523.80	0.22
Reach 4	1335	PF 3	2141.20	34.35	40.87		40.92	0.000088	0.96	2234.18	619.37	0.16
Reach 4	1330	PF 3	2141.20	33.19	40.45		40.50	0.000078	1.08	1985.15	418.51	0.16
Reach 4	1325	PF 3	2141.20	32.64	39.94		40.02	0.000109	1.24	1729.63	357.54	0.18
Reach 4	1320	PF 3	2141.20	31.25	39.52		39.57	0.000082	1.03	2079.44	488.93	0.16
Reach 4	1315	PF 3	2146.99	31.46	38.99		39.06	0.000104	1.19	1802.92	406.23	0.18
Reach 4	1310	PF 3	2152.78	32.78	38.65		38.68	0.000061	0.80	2690.53	745.34	0.13
Reach 4	1305	PF 3	2158.57	32.41	38.28		38.33	0.000094	0.96	2253.97	656.99	0.17
Reach 4	1300	PF 3	2164.35	28.87	37.64		37.72	0.000088	1.26	1719.73	314.81	0.17
Reach 4	1295	PF 3	2170.14	31.83	37.16		37.22	0.000102	1.02	2132.44	601.83	0.17
Reach 4	1290	PF 3	2175.93	28.58	36.95		36.97	0.000028	0.57	3830.74	979.71	0.09
Reach 4	1285	PF 3	2181.71	28.17	36.68		36.75	0.000086	1.18	1850.24	366.42	0.17
Reach 4	1280	PF 3	2187.50	30.09	36.40		36.43	0.000049	0.71	3083.10	859.42	0.12
Reach 4	1275	PF 3	2193.29	28.87	36.03		36.10	0.000117	1.17	1872.27	443.90	0.18
Reach 4	1270	PF 3	2199.07	29.00	35.41		35.47	0.000125	1.11	1984.87	540.18	0.18
Reach 4	1265	PF 3	2199.07	29.04	35.04		35.07	0.000051	0.73	3011.86	830.32	0.12
Reach 4	1260	PF 3	2199.07	28.18	34.61		34.67	0.000115	1.10	2004.07	553.63	0.18
Reach 4	1255	PF 3	2199.07	26.32	34.14		34.19	0.000076	0.91	2422.54	694.17	0.16
Reach 4	1250	PF 3	2199.07	25.42	33.72		33.79	0.000094	1.21	1815.67	395.14	0.18
Reach 4	1245	PF 3	2199.07	27.82	33.35		33.38	0.000069	0.79	2797.44	933.35	0.14
Reach 4	1240	PF 3	2199.07	25.75	32.89		32.94	0.000106	1.01	2168.78	678.67	0.18
Reach 4	1235	PF 3	2199.07	24.42	32.48		32.52	0.000067	0.86	2554.44	720.92	0.15
Reach 4	1230	PF 3	2199.07	24.77	32.01		32.06	0.000097	1.04	2121.47	599.84	0.18
Reach 4	1225	PF 3	2199.07	25.00	31.50		31.57	0.000121	1.22	1808.29	473.18	0.20
Reach 4	1220	PF 3	2199.07	24.27	31.06		31.10	0.000087	0.91	2429.45	775.40	0.16

Total flow in cross section.

Sediment transport Module




Sediment Data - sediment1
File Options View Help
Initial Conditions and Transport Parameters
Boundary Conditions
Select Location for Sediment Boundary Condition
Add Sediment Boundary Location(s)
Delete Current Row
Sediment Boundary Condition Types
Rating Curve
Sediment Load Series
Equilibrium Load
Riv\SA Reach RS
1 Dammitta reach5 394 Sediment Time Series
Dammitta reach5 9 Rating Curve
Load Specification for Dammitta reach5 9
Number of flow-load points 2 sets
Flow (m3/s) 350 1000
Total Load (tonnes/day) 150 500
1 Clay
2 VFM
3 FM
4 MM
5 CM
6 VFS
7 FS 0.0351 0.0351
8 MS 0.7778 0.7778
9 CS 0.1772 0.1772
10 VCS 0.0099 0.0099
11 VFG
12 FG
13 MG
14 CG
15 VCG
16 SC
17 LC
18 SB
Plot ...
OK
Cancel
Set downstream pass-through boundary.

Limitations

- Uncoupled
- Flow is constant with respect to time (unsteady is optional)
- Flow is gradually varied with distance
- Dominant flows in x direction (1-D)
- Channel slopes less than 1:10H