Geomorphic Overlay

How Geomorphology Can Inform HEFR Parameters

Sabine River Near HW 12

The Real Answer

- Determine the Desired Bathymetry or Geometry
- Determine Hydrology That Created the Desired Bathymetry
- Allow a Natural - Variable Hydrology That Will Created or Maintain the Desired Bathymetry
- Diversion or Return Flows May Change Fluvial Geometry

Typical Geomorphic Study

- Define Existing Hydrology, Hydraulics and Geomorphic Parameters
- Define Future Hydrologic and Hydraulic Conditions
- Geomorphic – Sediment Analysis Shows How Proposed Future Conditions Effect Hydraulic, Sedimentation, and Channel Stability

Existing Conditions

- Existing Hydrology
- How Has the Hydrology Changed
- How Has the Channel Responded to Hydrologic Changes
- Determine Which Changes are Natural and Which are a Result of Man's Activities

Future Conditions

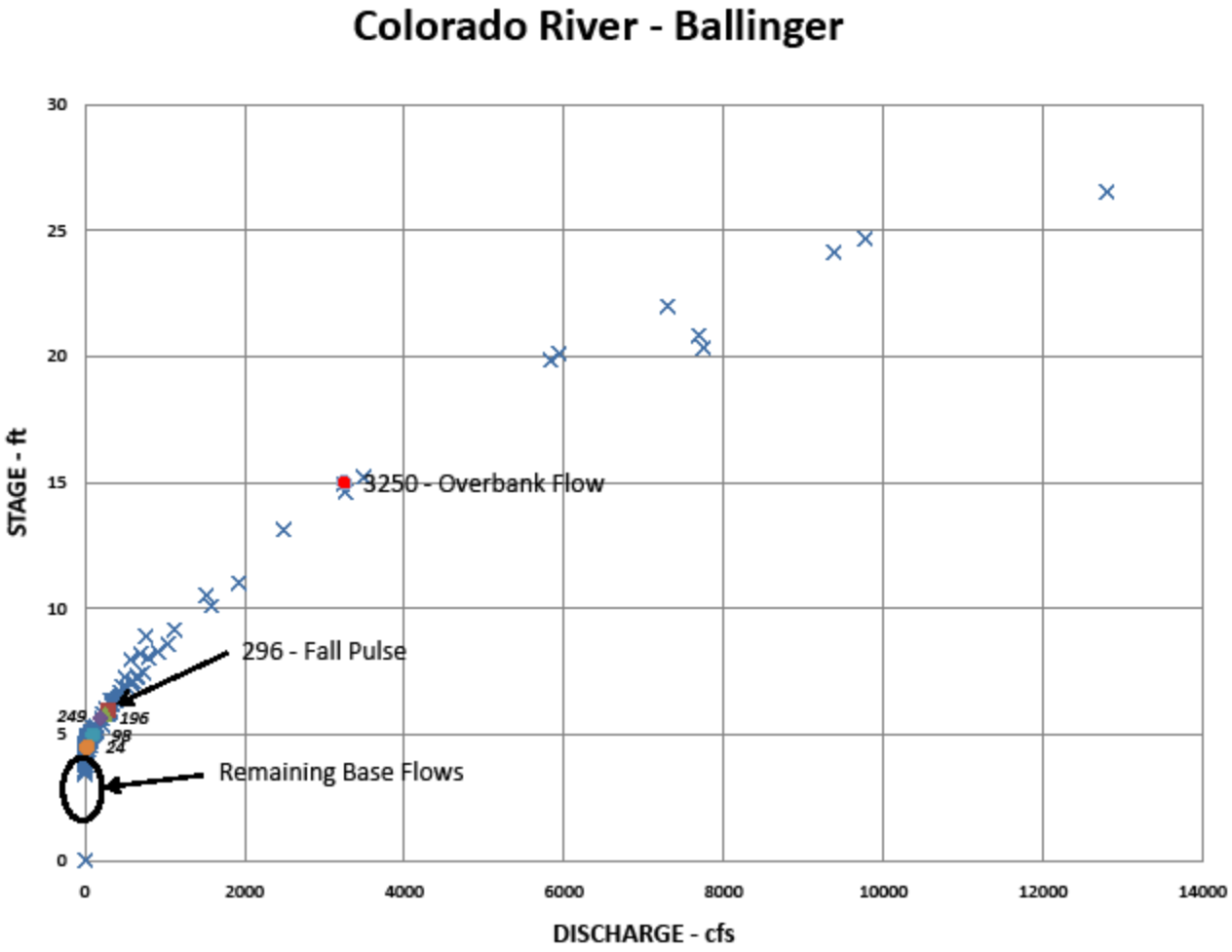
It Remains Unclear How to Adjust Observed or WAM Outputs to Reflect a Future Condition Flow with a HEFR Flow Regime Implemented

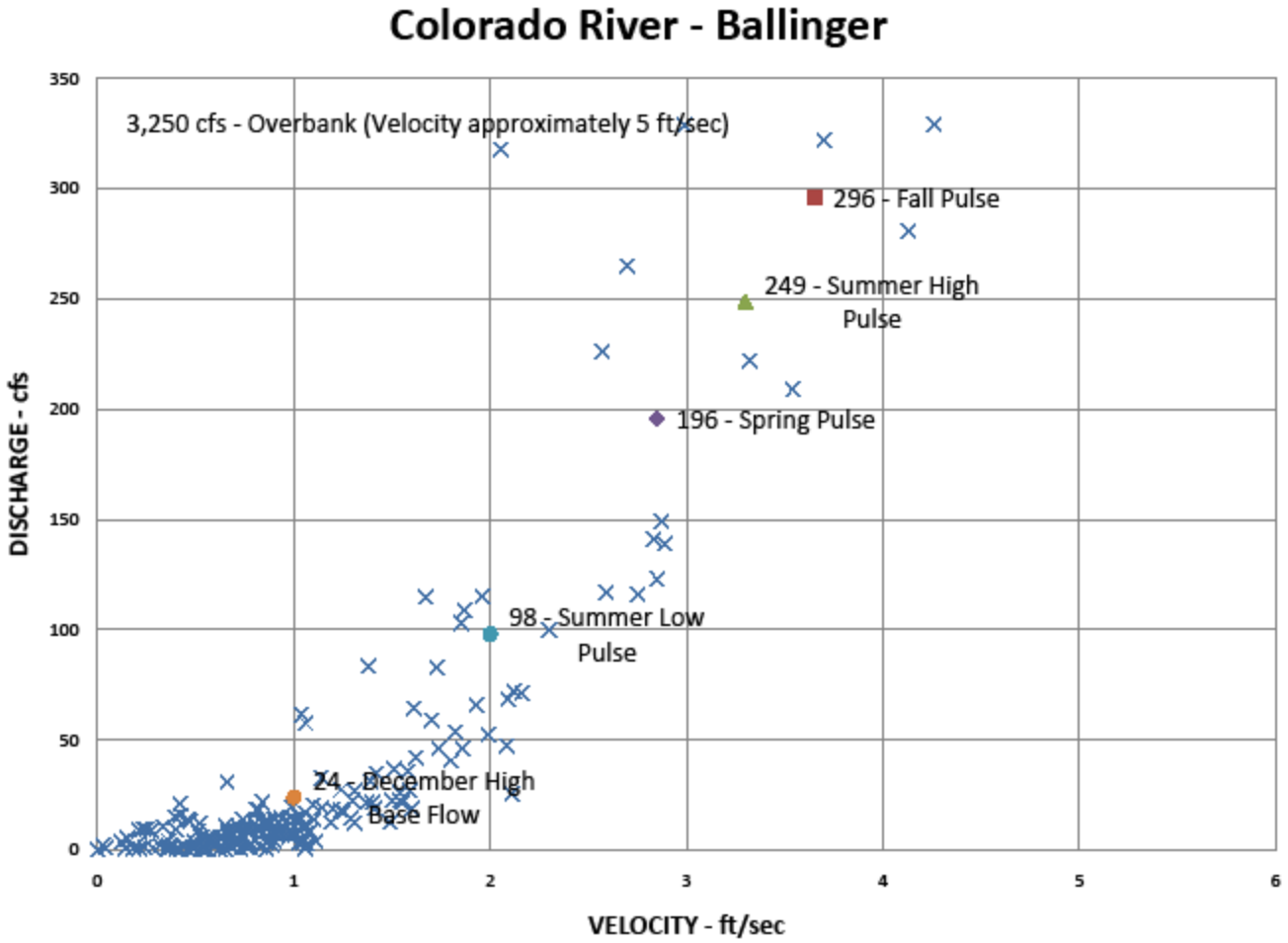
Future Conditions

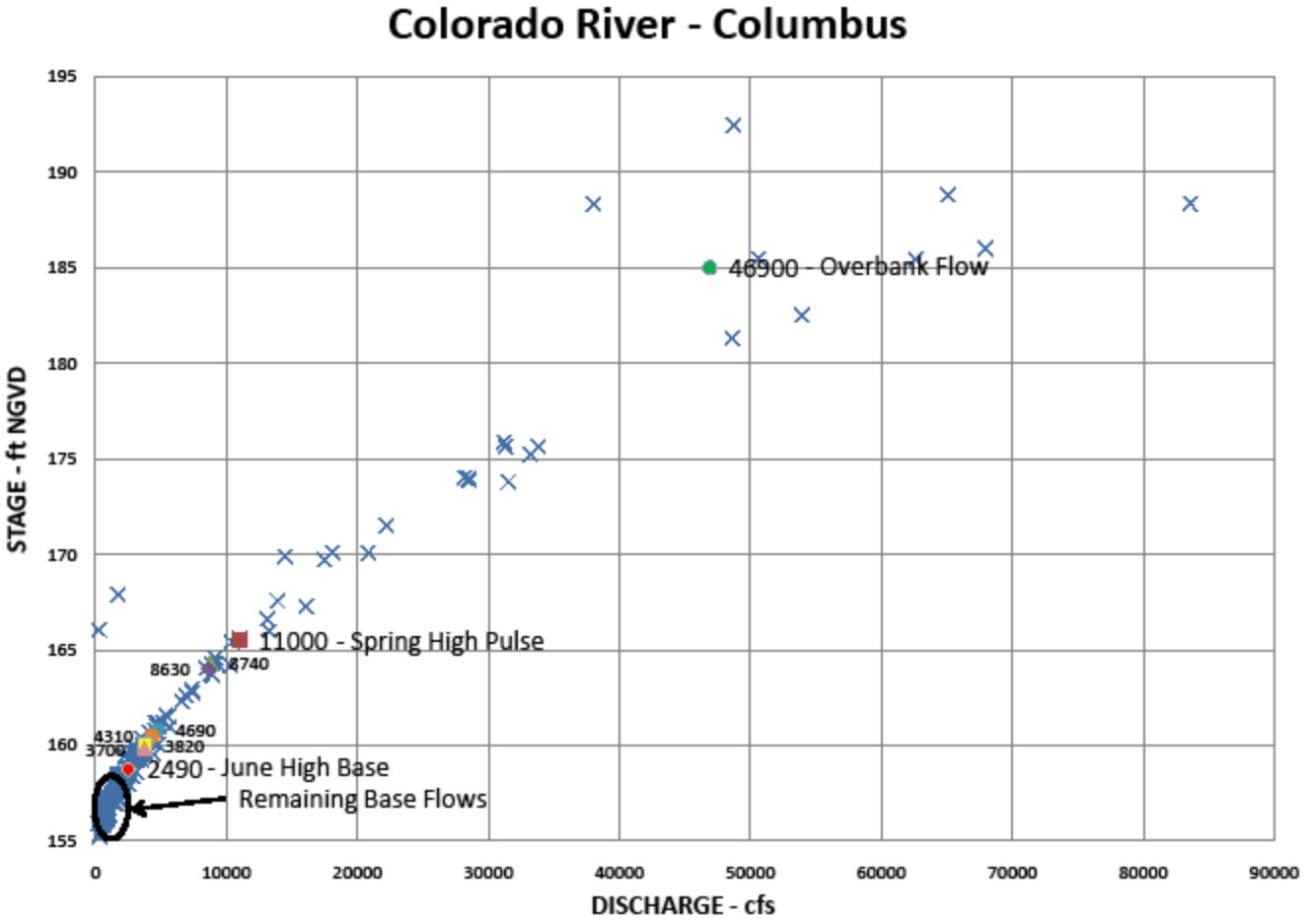
It Remains Unclear How to Adjust Observed or WAM Discharges to Reflect a Future Condition Flow with a HEFR Flow Regime Implemented

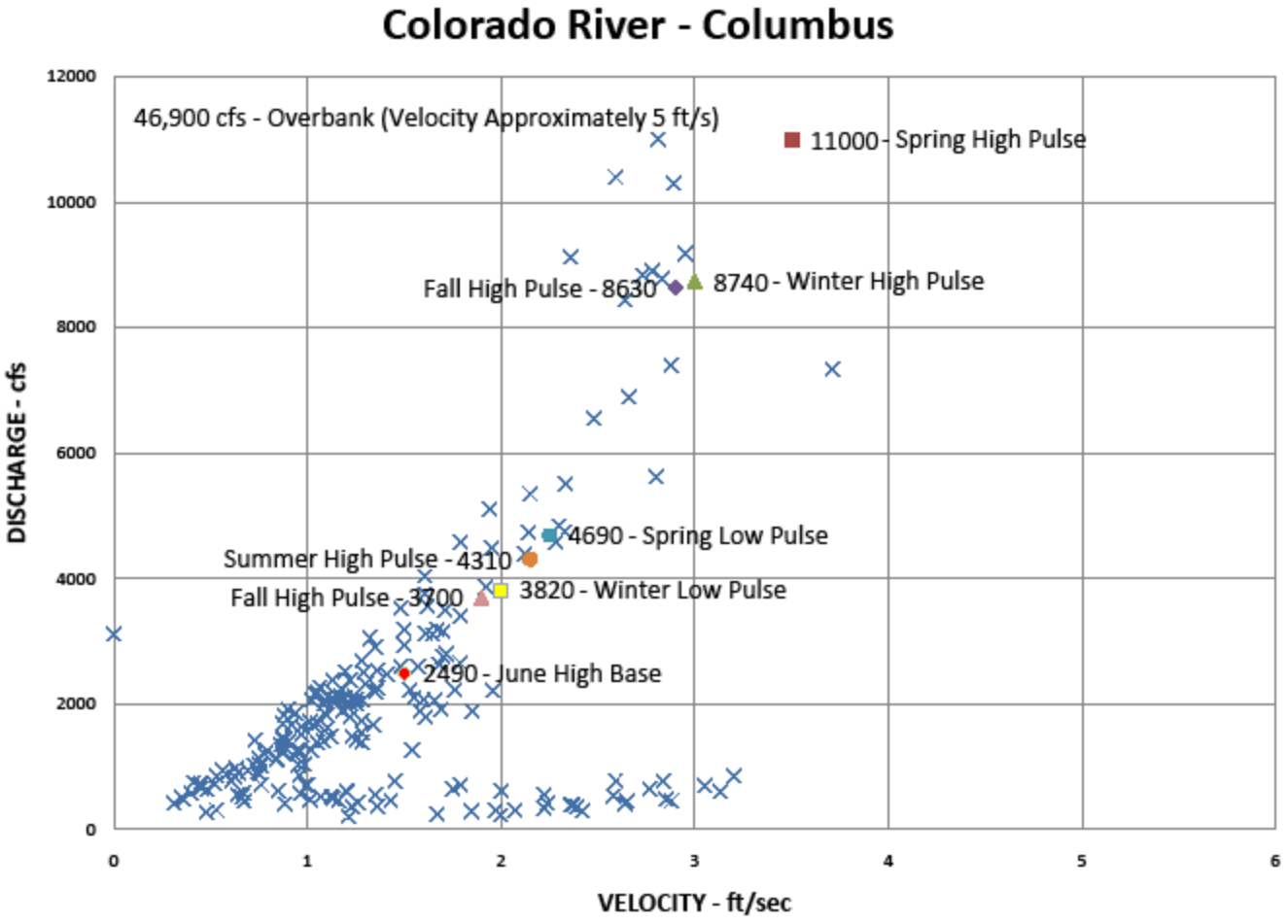
How CAN Geomorphology Inform HEFR Parameters?

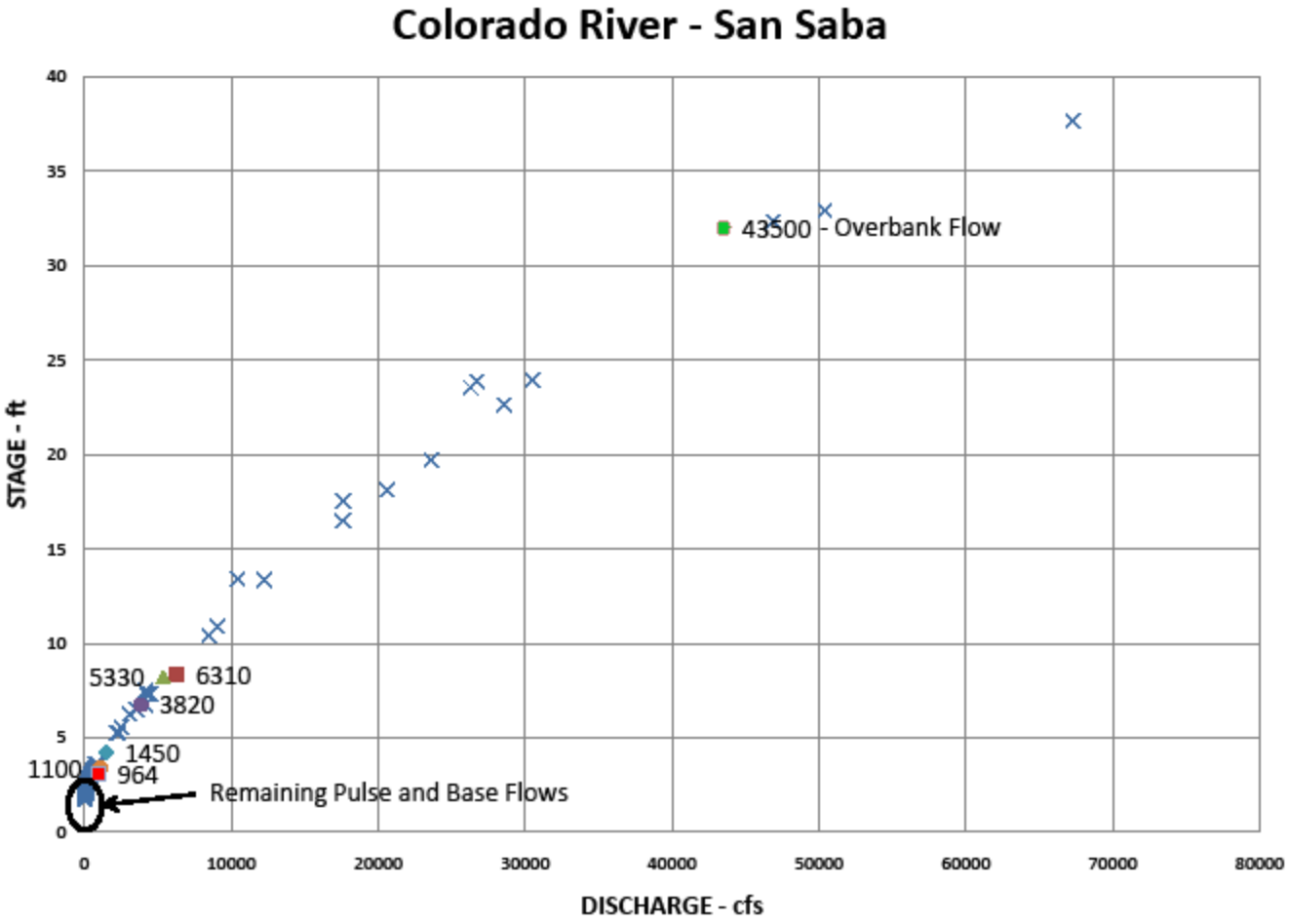
- Determine if the Channel is Stable at USGS Gage Station
- Use Effective Discharge Calculation
- Develop and Understanding How Base, Pulse, and Overbank Flows Fit the Hydraulics of the Stream at the Gage Station

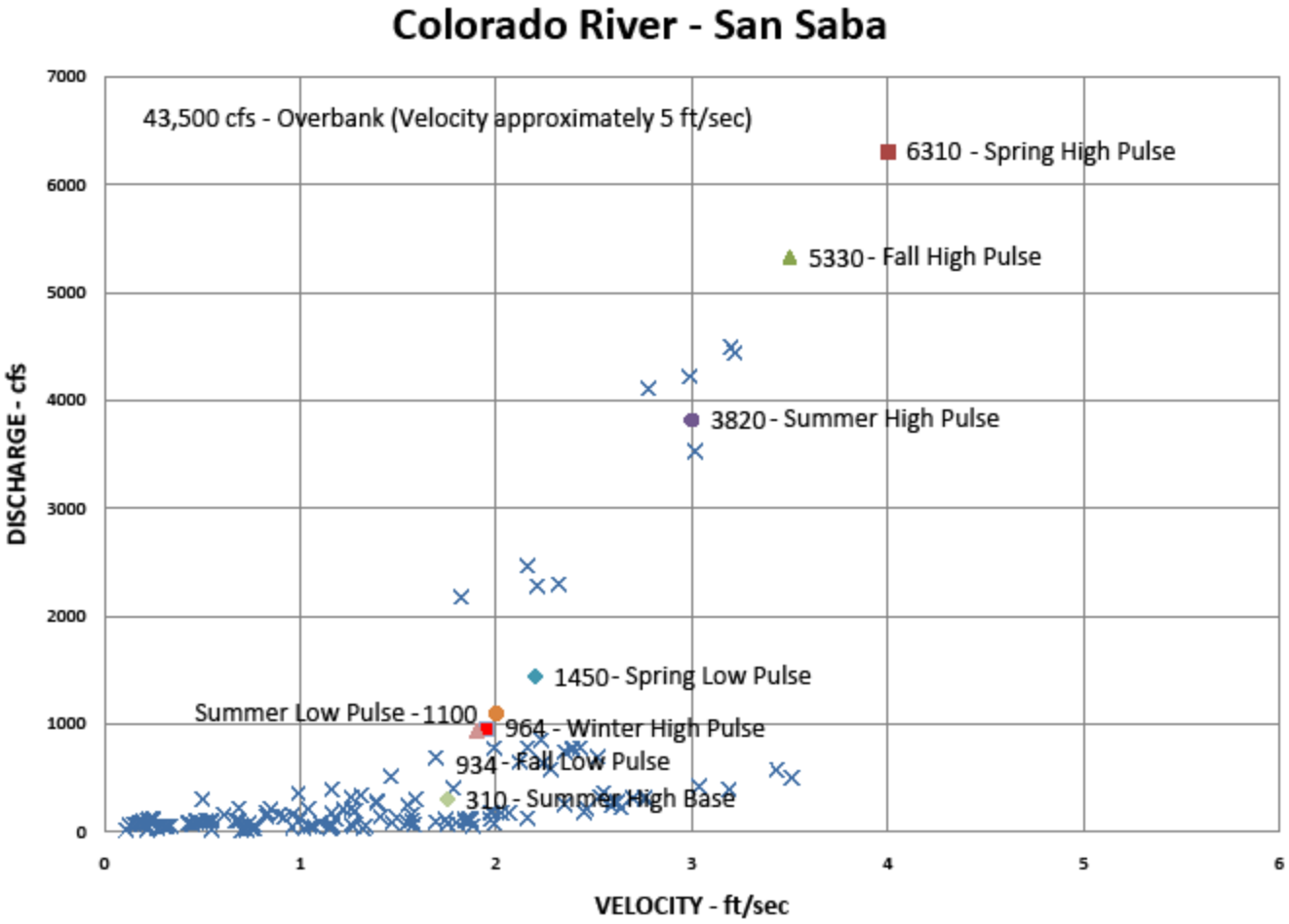

Colorado River - Ballinger
STAGE - ft
DISCHARGE - cfs
30
25
20
15
10
5
0
0
2000
4000
6000
8000
10000
12000
14000
3250 - Overbank Flow
296 - Fall Pulse
249
196
98
24
Remaining Base Flows


Colorado River - Ballinger
3,250 cfs - Overbank (Velocity approximately 5 ft/sec)
296 - Fall Pulse
249 - Summer High Pulse
196 - Spring Pulse
98 - Summer Low Pulse
24 - December High Base Flow
DISCHARGE - cfs
VELOCITY - ft/sec
350
300
250
200
150
100
50
0
0
1
2
3
4
5
6

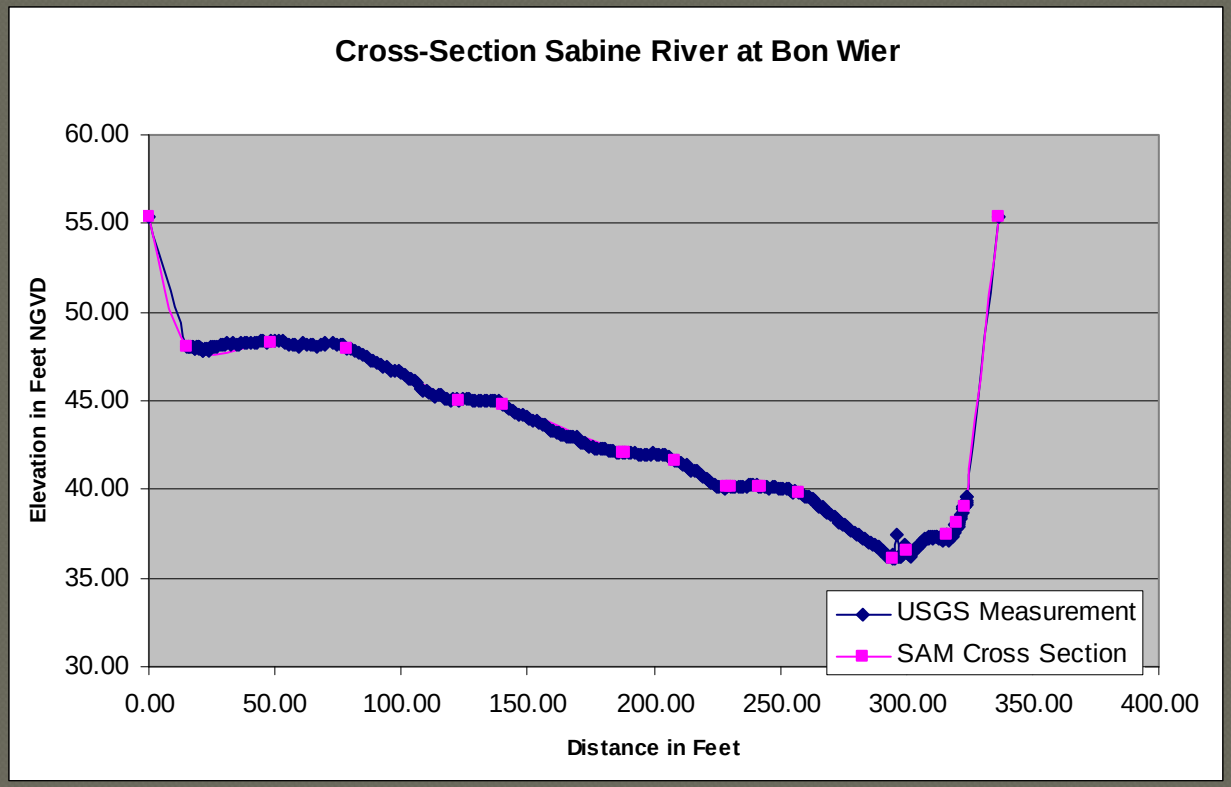

Colorado River - Columbus
STAGE - ft NGVD
DISCHARGE - cfs
195
190
185
180
175
170
165
160
155
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
46900 - Overbank Flow
11000 - Spring High Pulse
8630
4740
4690
4310
3700
3820
2490 - June High Base
Remaining Base Flows


Colorado River - Columbus
46,900 cfs - Overbank (Velocity Approximately 5 ft/s)
11000 - Spring High Pulse
Fall High Pulse - 8630
8740 - Winter High Pulse
4690 - Spring Low Pulse
Summer High Pulse - 4310
Fall High Pulse - 3700
3820 - Winter Low Pulse
2490 - June High Base
DISCHARGE - cfs
VELOCITY - ft/sec
12000
10000
8000
6000
4000
2000
0
0
1
2
3
4
5
6


Colorado River - San Saba
STAGE - ft
DISCHARGE - cfs
43500 - Overbank Flow
5330
6310
3820
1450
1100
964
Remaining Pulse and Base Flows
0
5
10
15
20
25
30
35
40
0
10000
20000
30000
40000
50000
60000
70000
80000

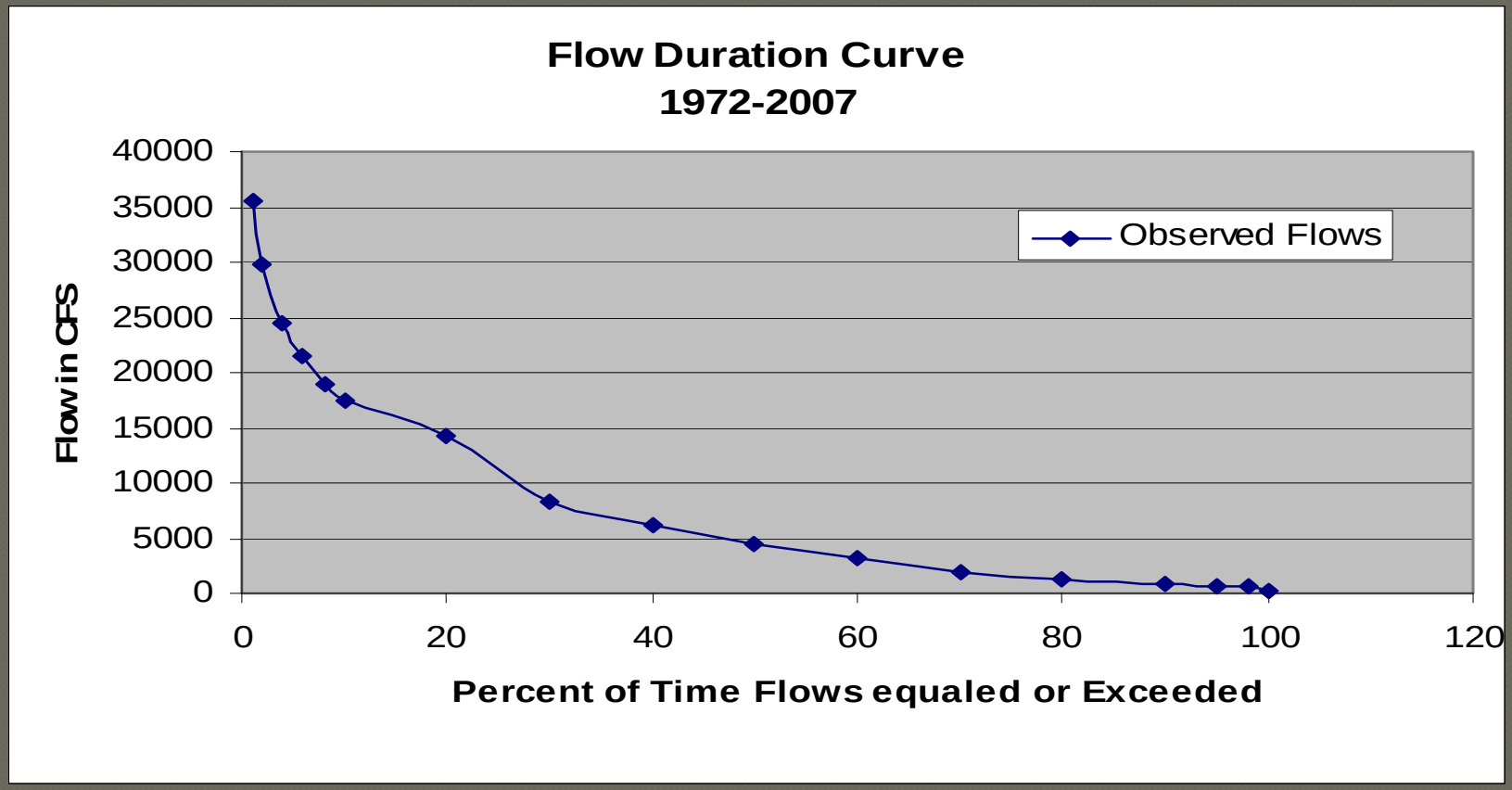

Colorado River - San Saba
43,500 cfs - Overbank (Velocity approximately 5 ft/sec)
6310 - Spring High Pulse
5330 - Fall High Pulse
3820 - Summer High Pulse
1450 - Spring Low Pulse
Summer Low Pulse - 1100
964 - Winter High Pulse
934 - Fall Low Pulse
310 - Summer High Base
DISCHARGE - cfs
VELOCITY - ft/sec
7000
6000
5000
4000
3000
2000
1000
0
0
1
2
3
4
5
6

Sam Inputs


Cross-Section Sabine River at Bon Wier
Elevation in Feet NGVD
60.00
55.00
50.00
45.00
40.00
35.00
30.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
Distance in Feet
USGS Measurement
SAM Cross Section

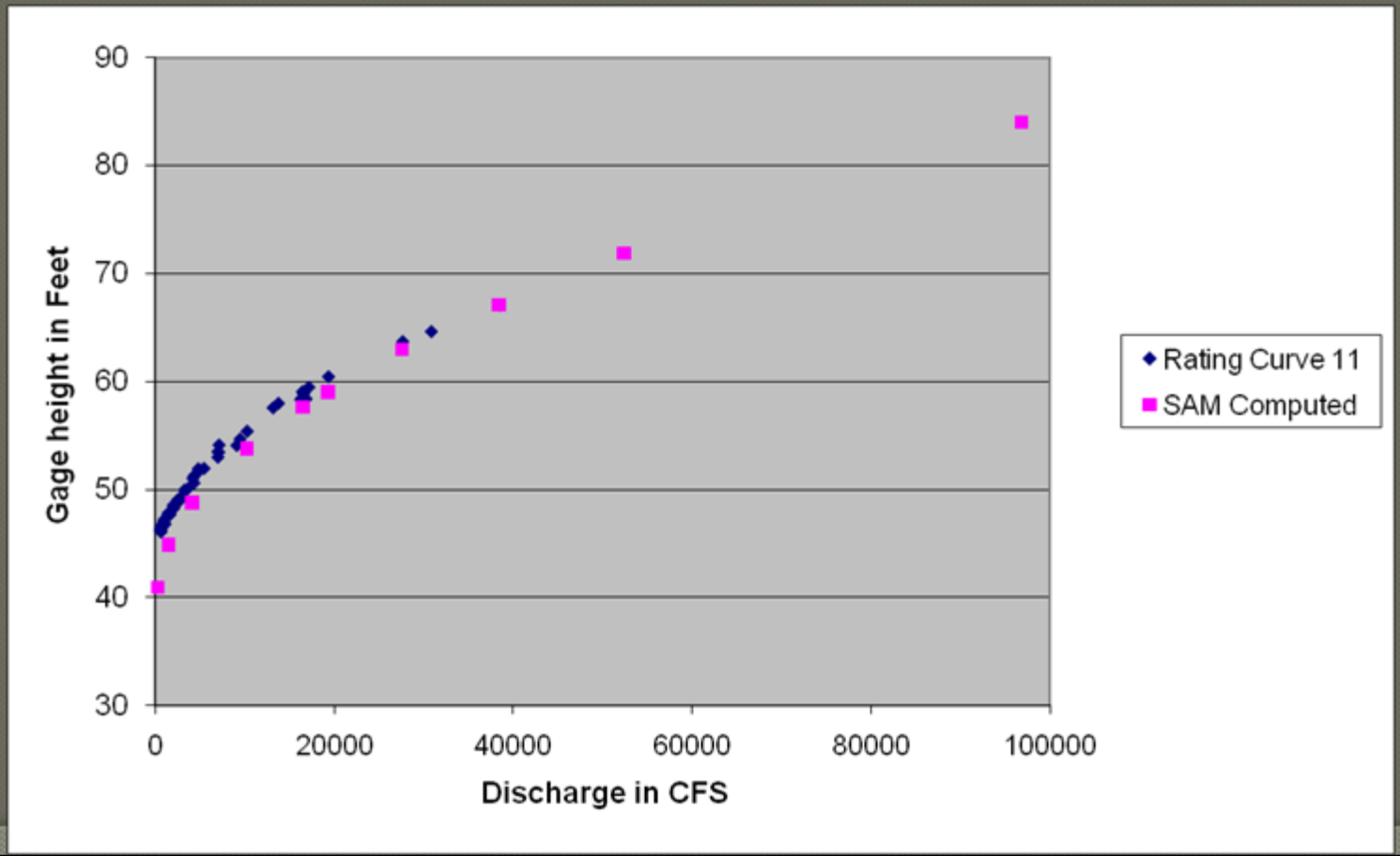
SAM Input

- Flow duration Curve

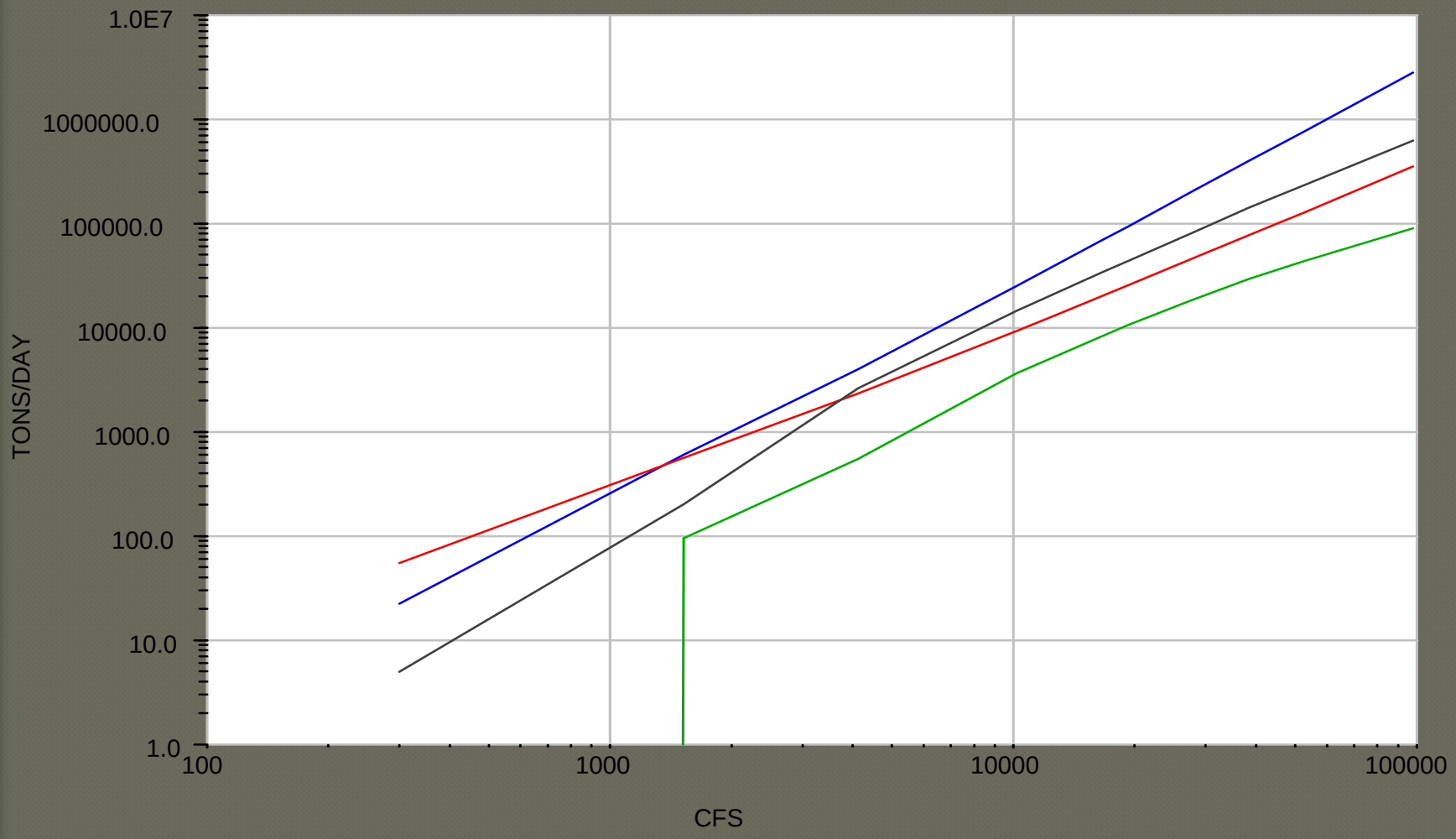


Sam output

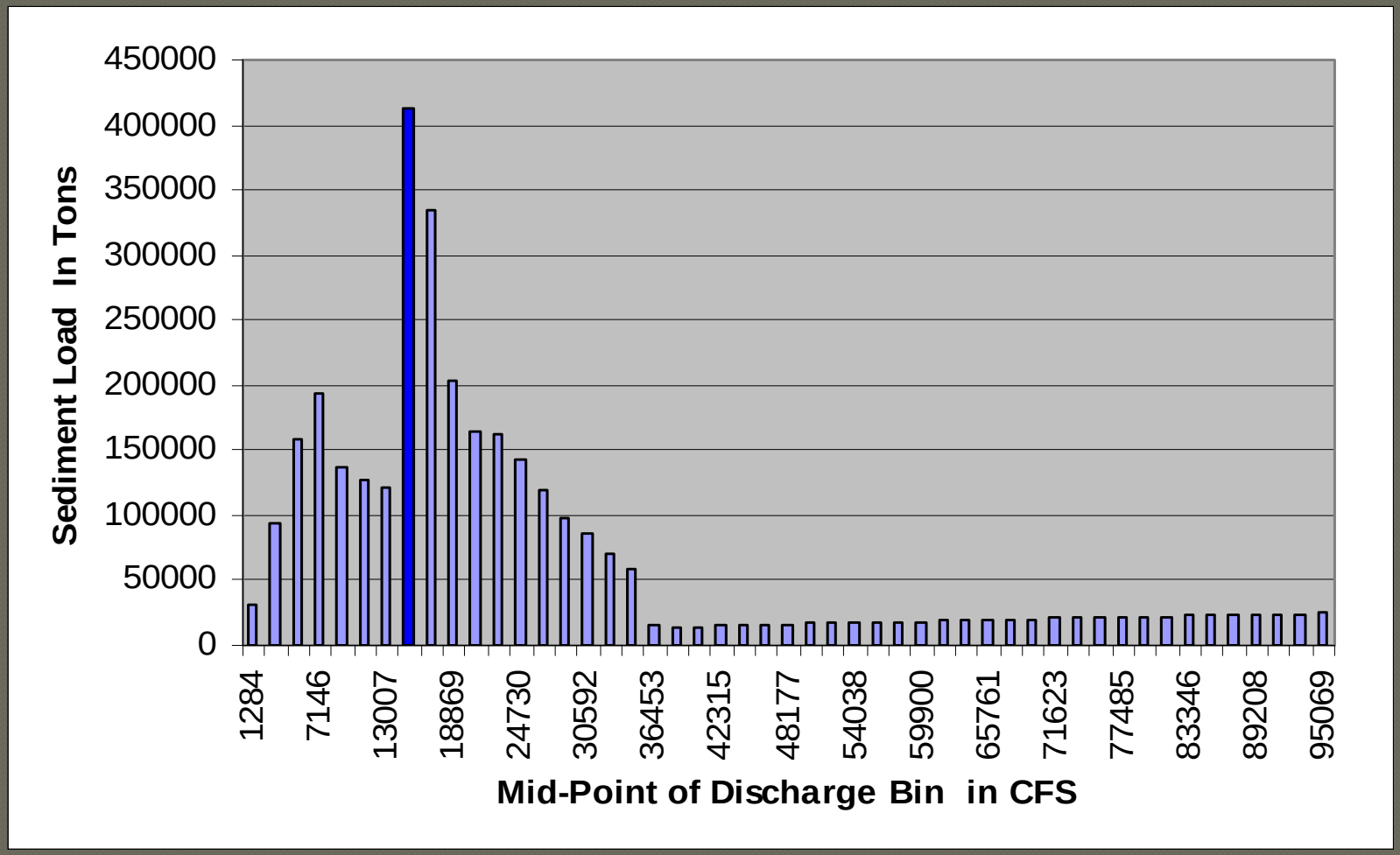
- Hydraulics



Sediment Rating Curve



Sediment Histograms



How Geomorphology Can Inform HEFR Parameters

- Identify Hydraulic Characteristics of the stream at gage location
- Identify critical values for sediment transport