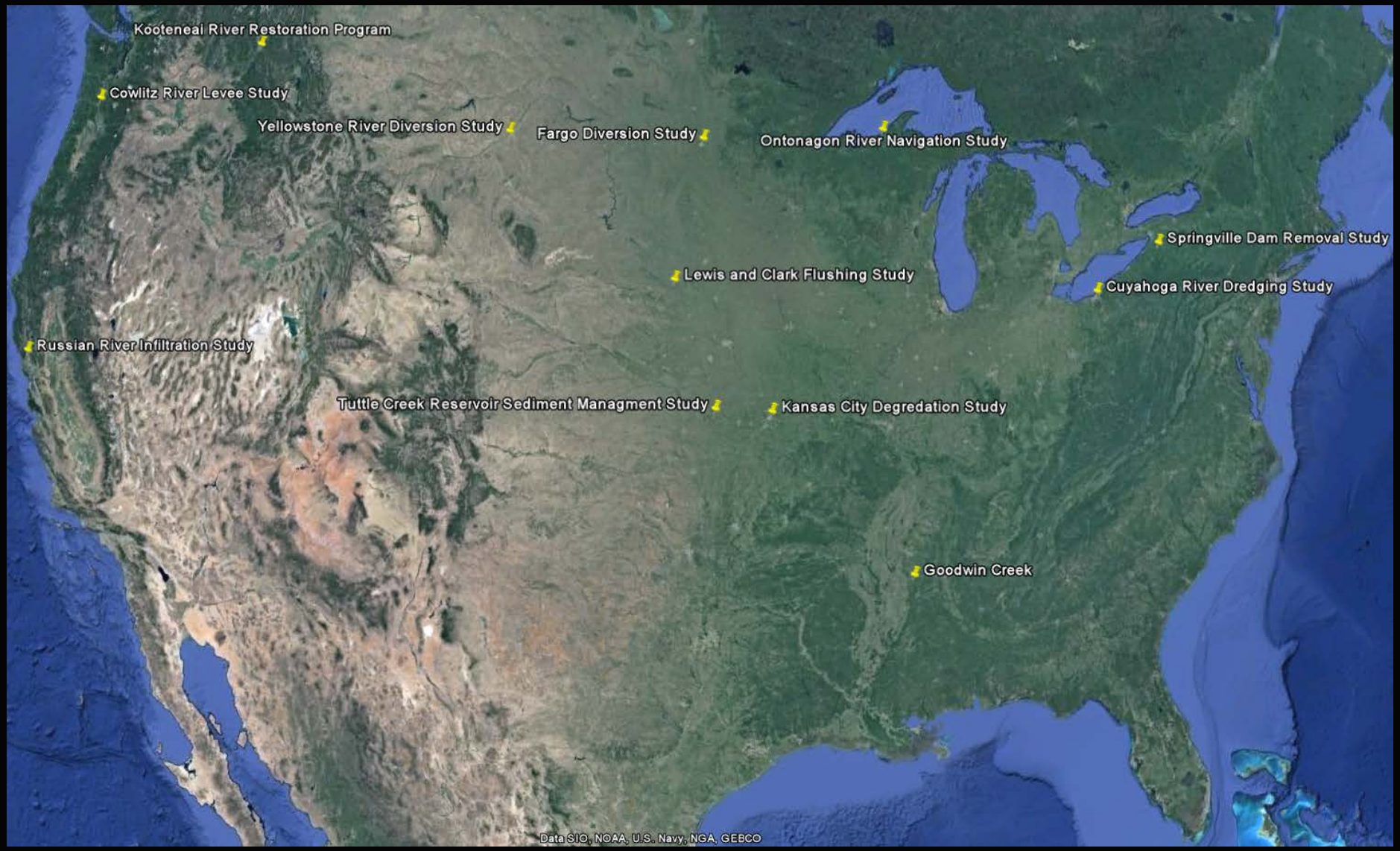
Sediment Projects and Problems



Stanford Gibson, Phd
Hydrologic Engineering Center

Introduction to Sediment Projects and Problems

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   iii. Diversions – Fargo
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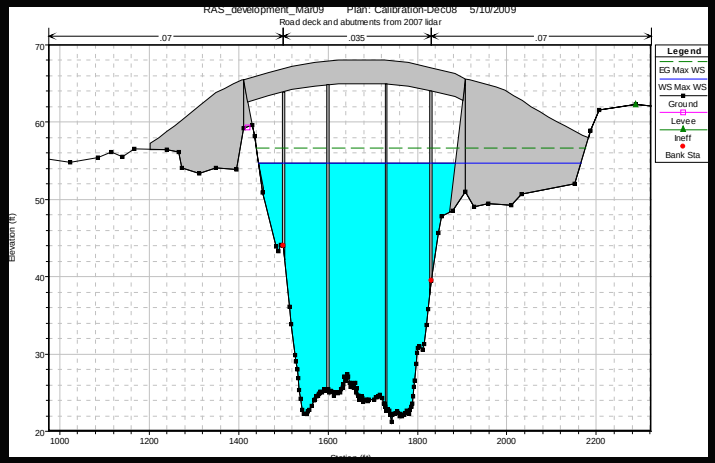
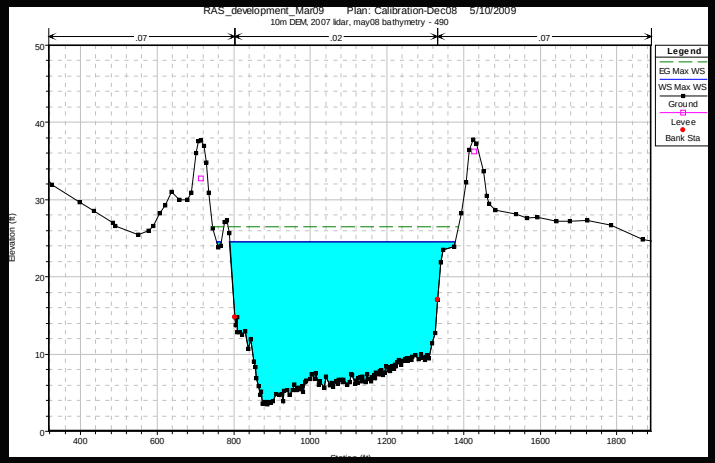
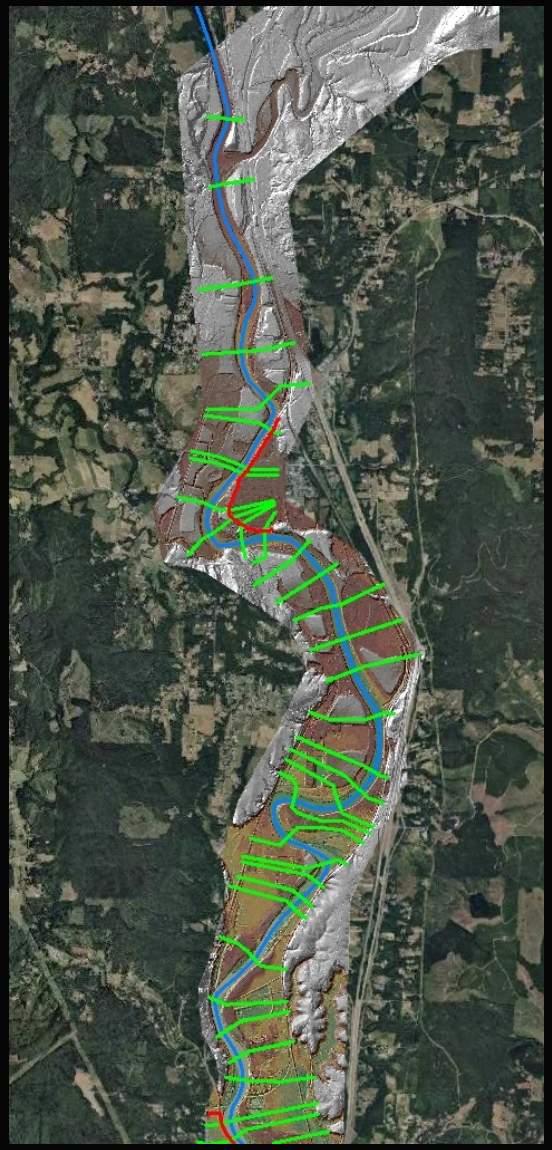
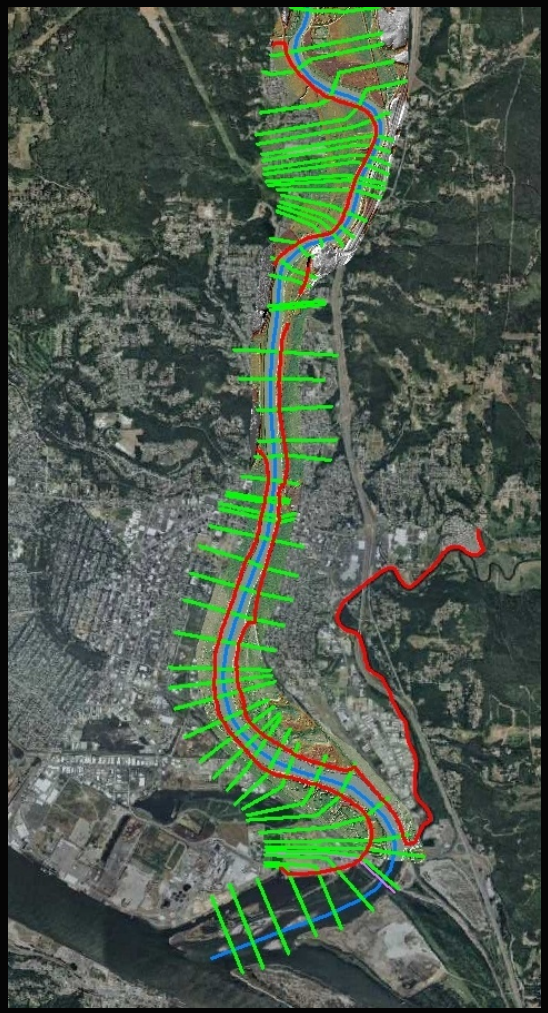
Flood Damage Reduction: Levees - The Cowltiz River

Cowlitz HEC-RAS Mobile Bed Model

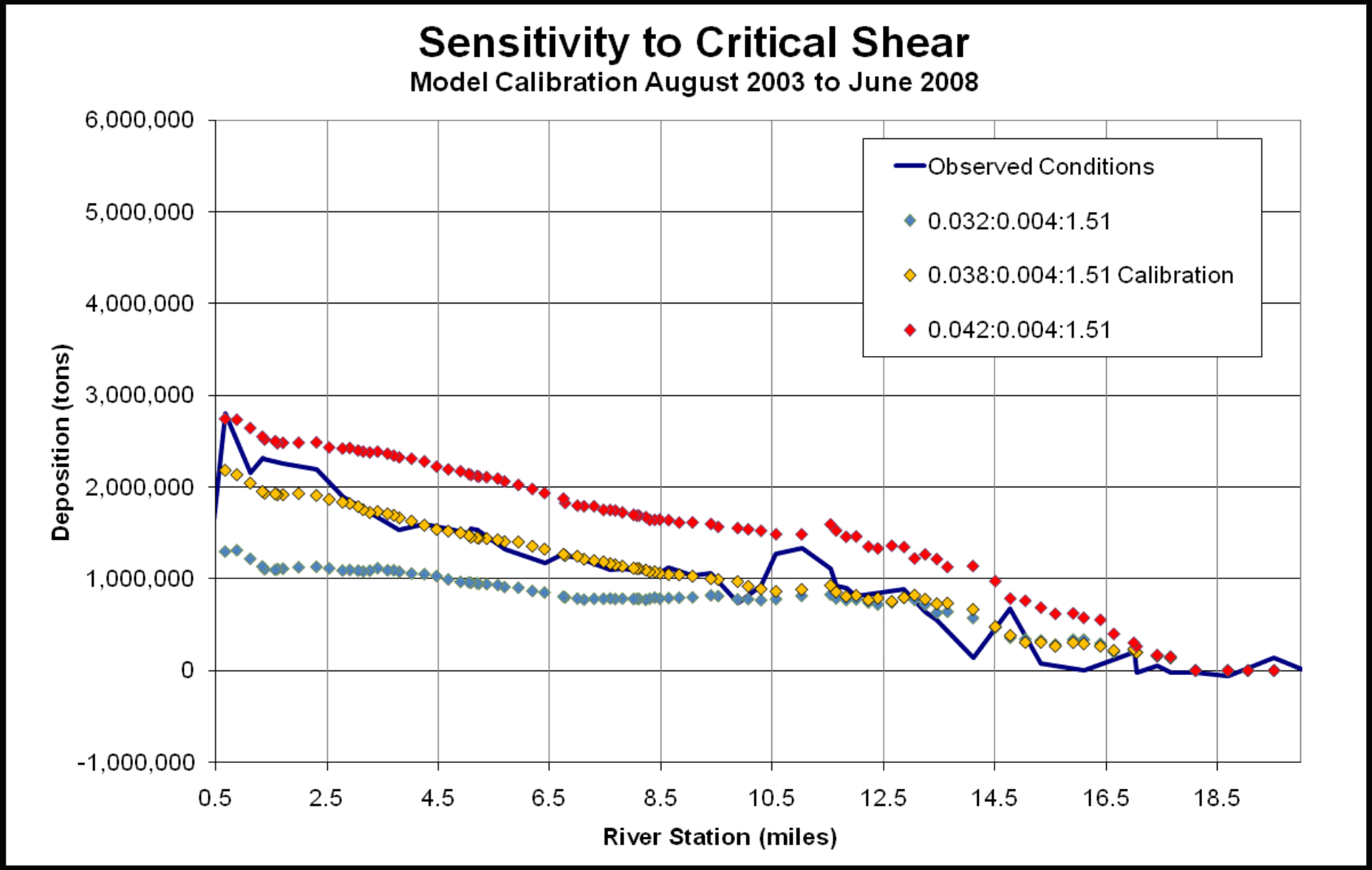




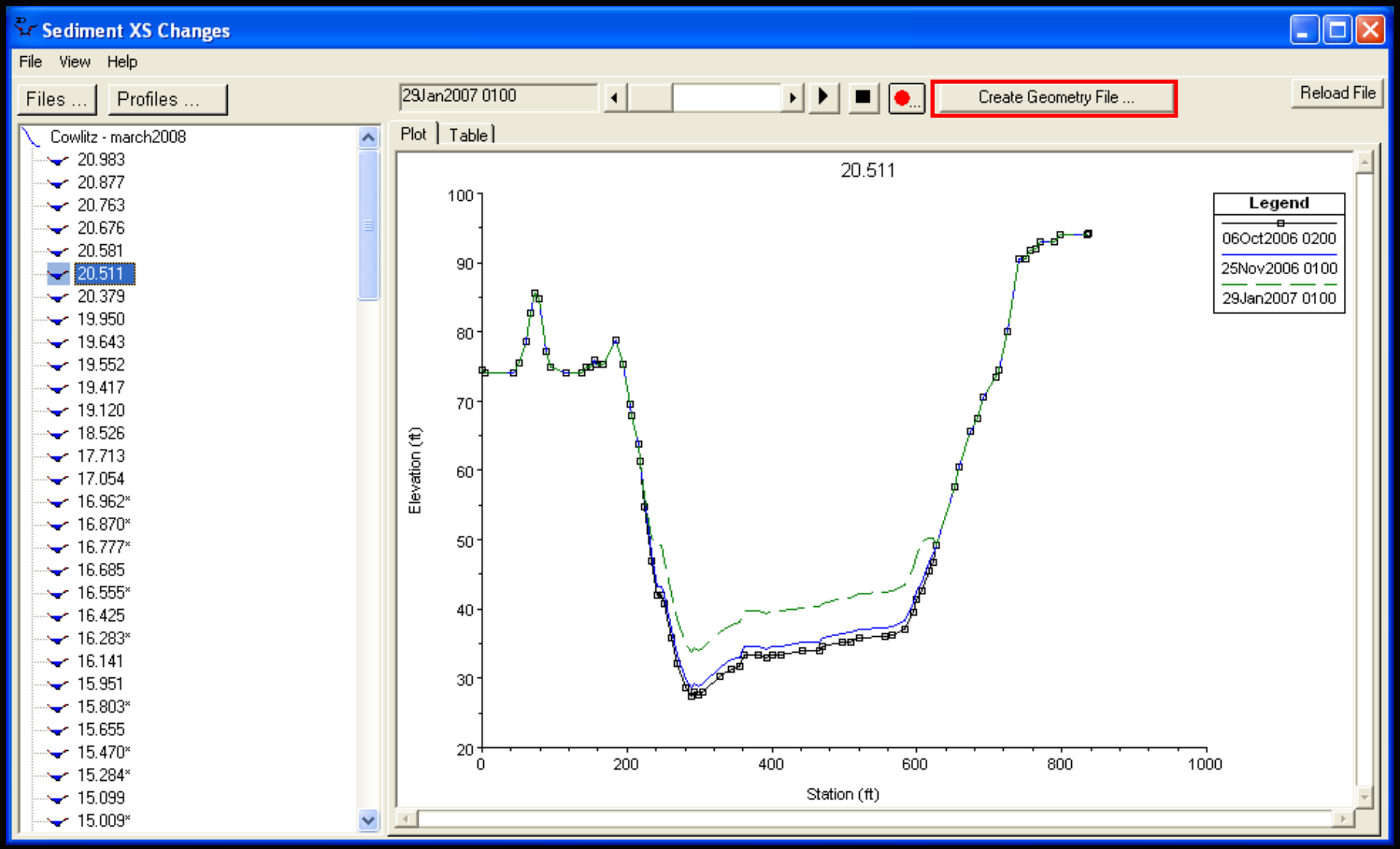




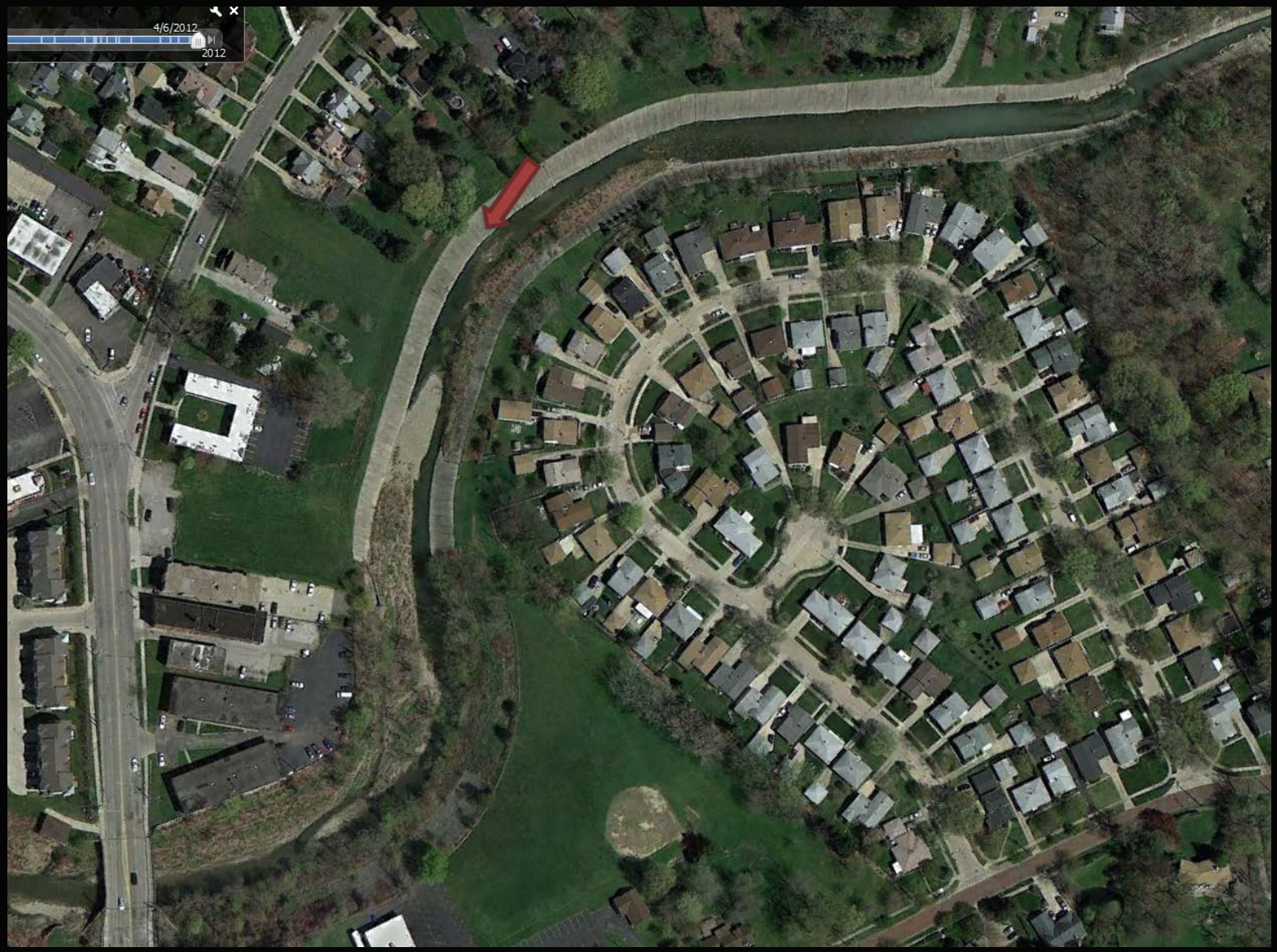
Sedimentation Calibration



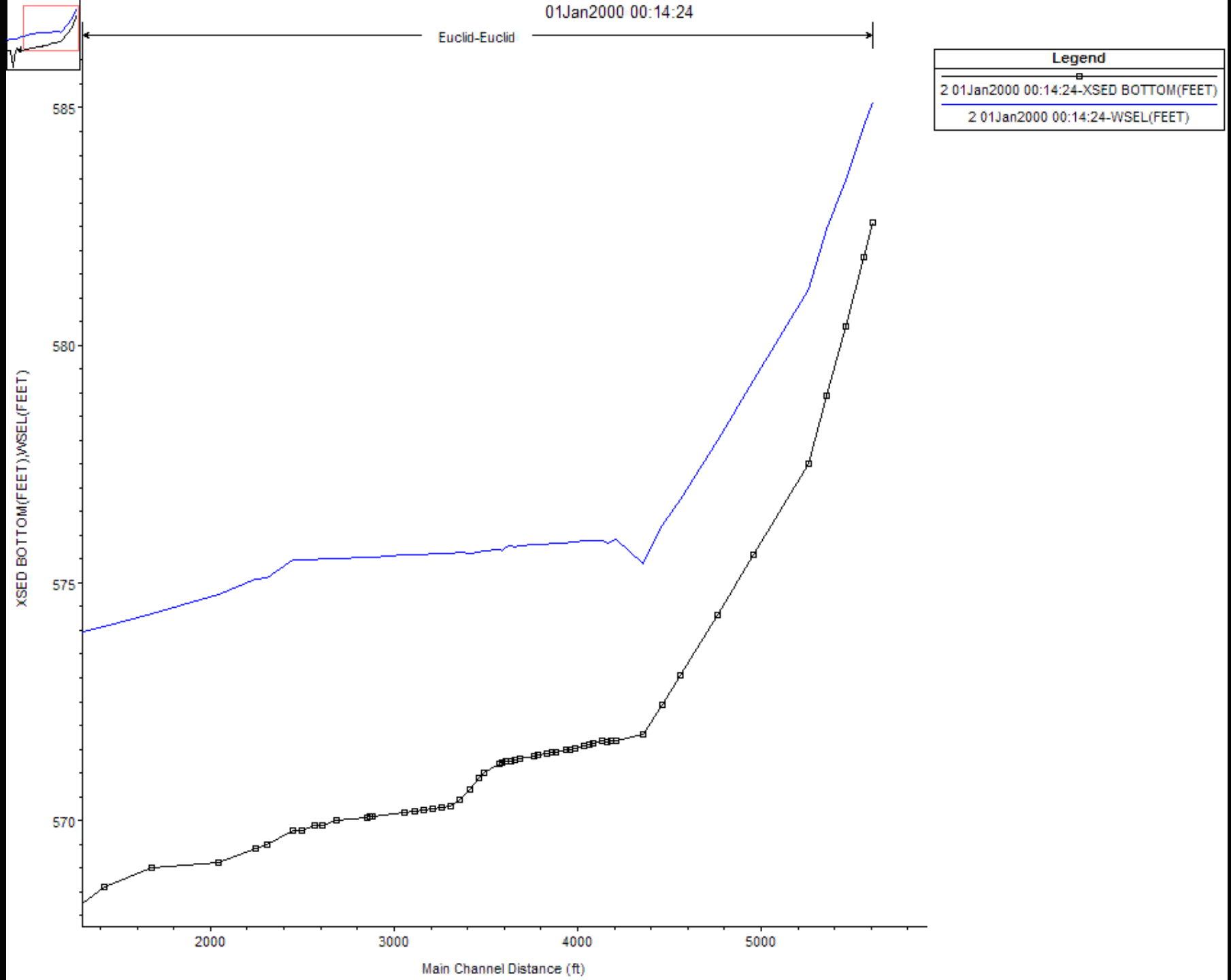
Sediment Transport in HEC-RAS: Export New Bathymetry



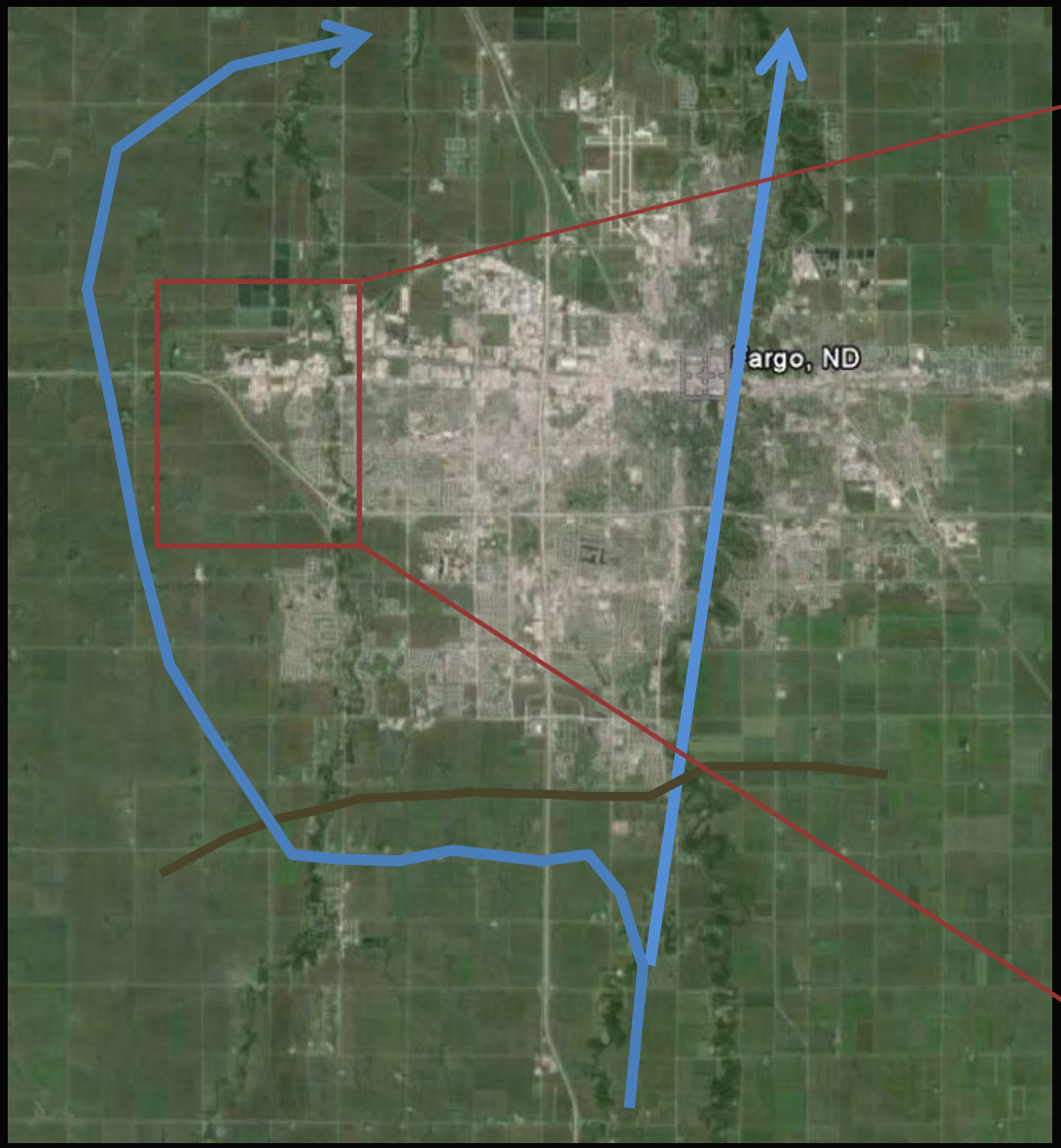
Flood Damage Reduction: Channel Modification – Euclid Creek

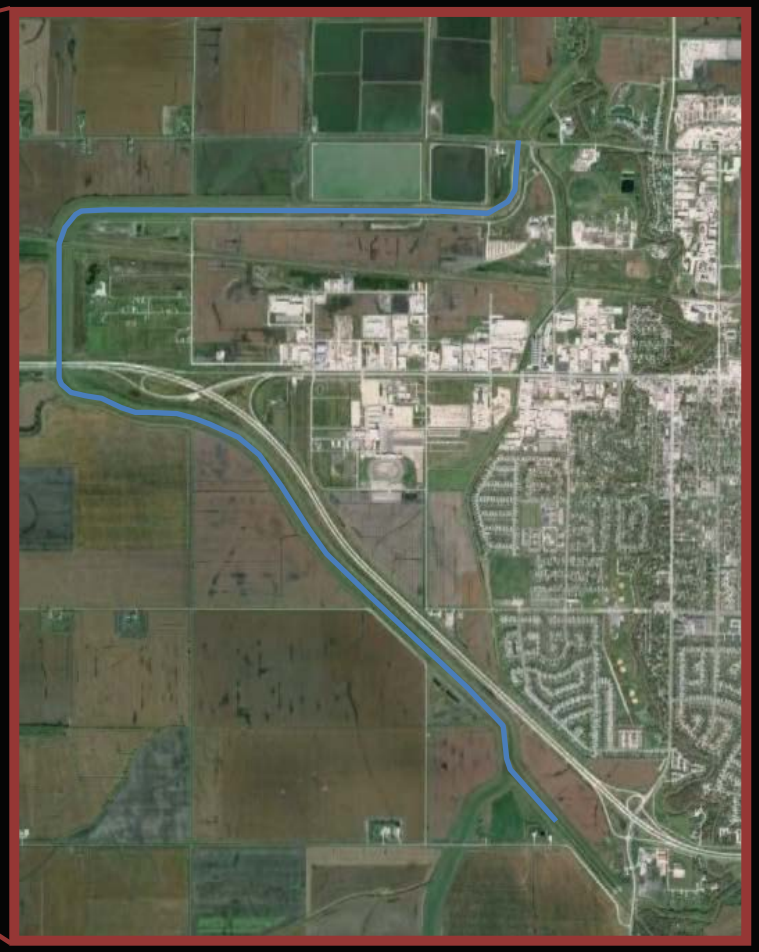


Channel Modification - Euclid Creek

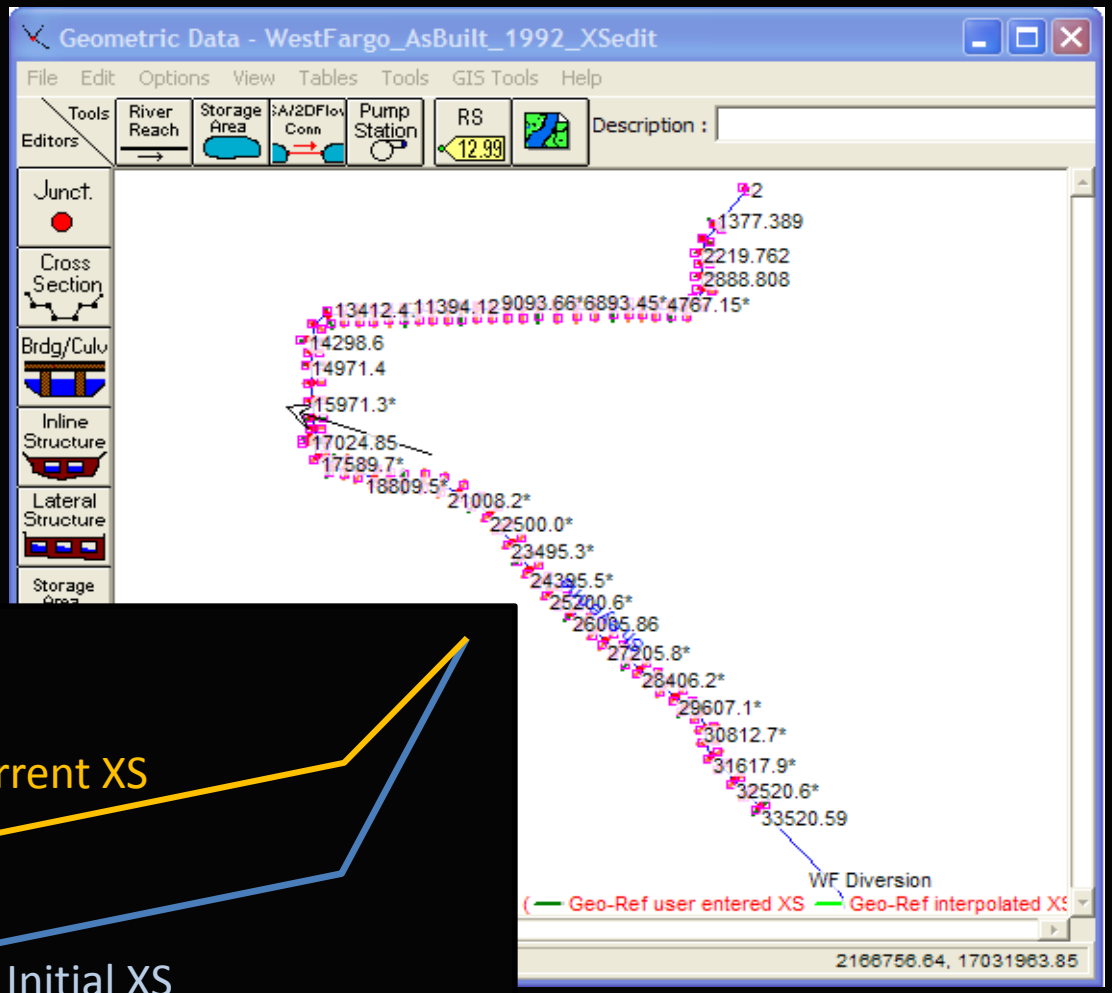

01Jan2000 00:14:24
Euclid-Euclid
Legend
2 01Jan2000 00:14:24-XSED BOTTOM(FEET)
2 01Jan2000 00:14:24-WSEL(FEET)
585
580
575
570
XSED BOTTOM(FEET),WSEL(FEET)
2000
3000
4000
5000
Main Channel Distance (ft)

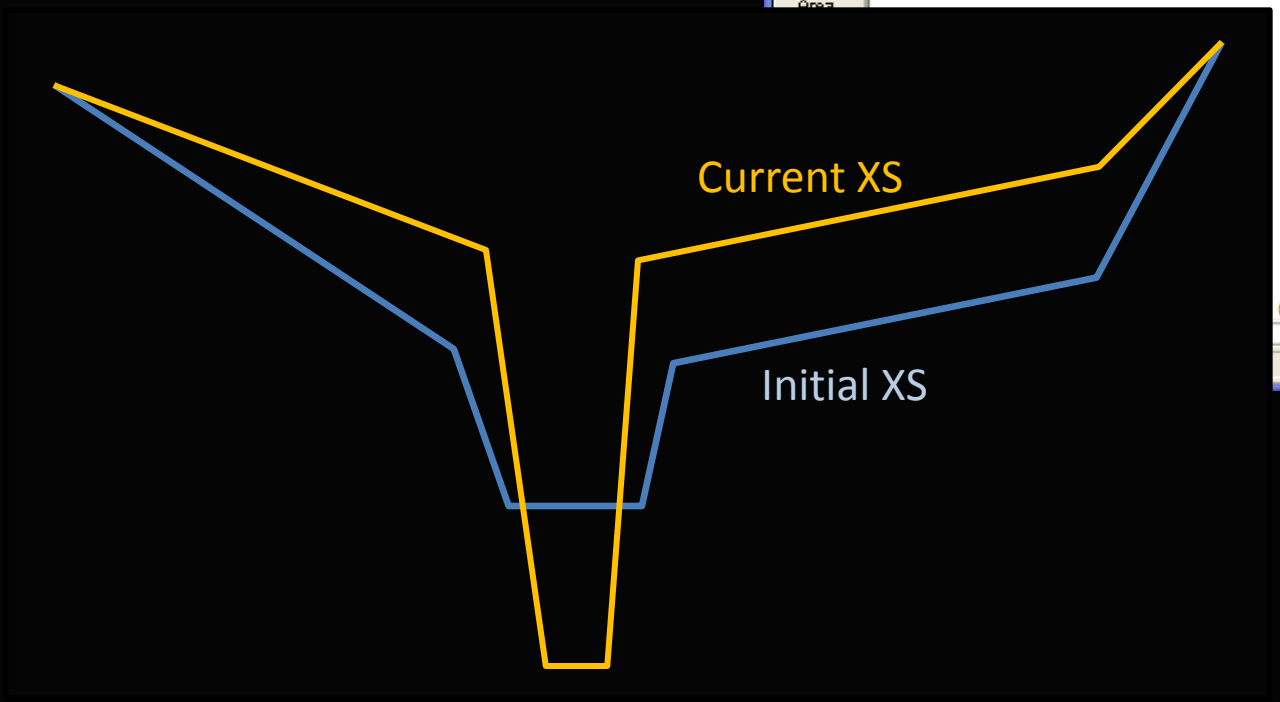
Flood Damage Reduction:
Flood Diversion – Fargo Diversion Study



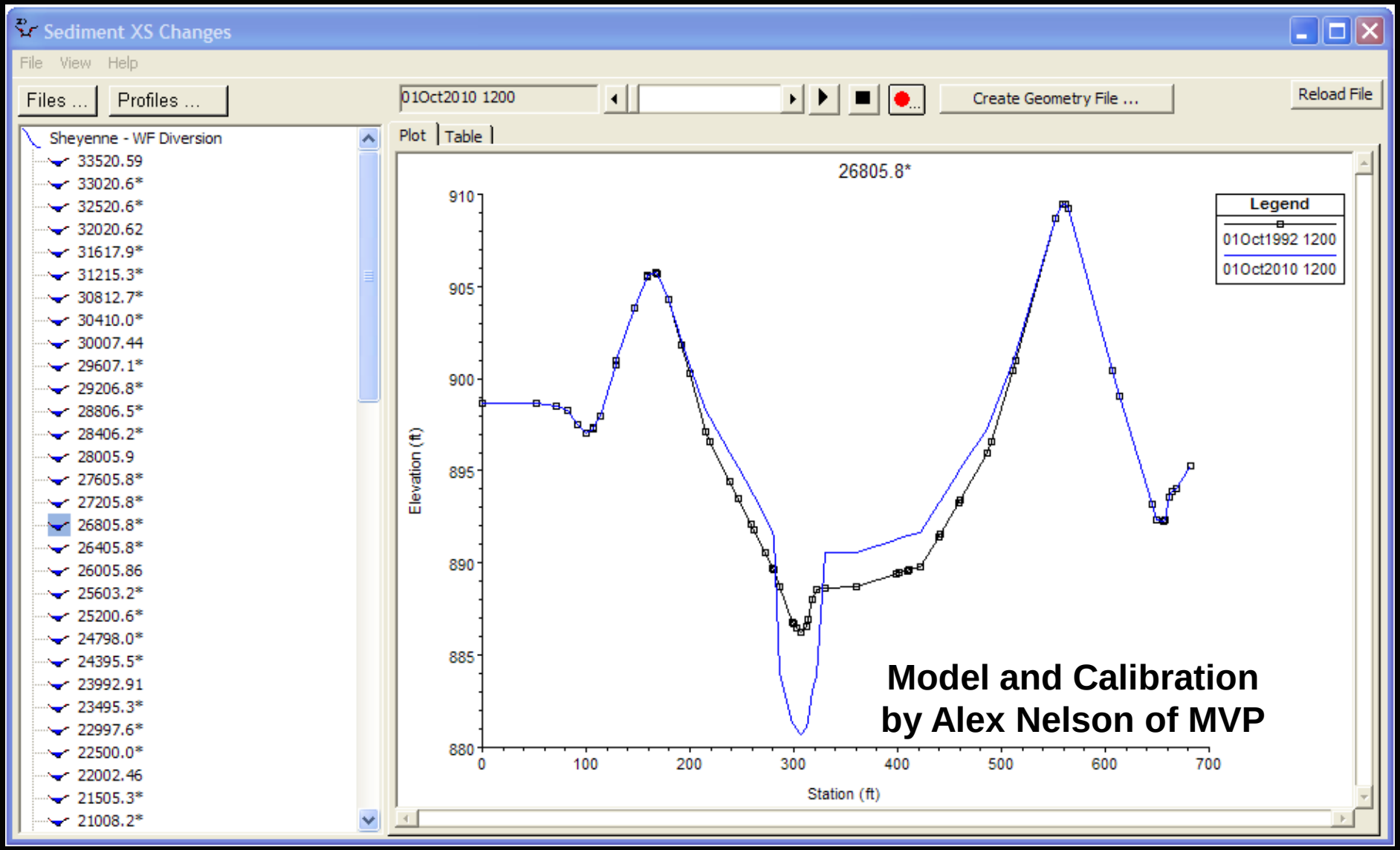


Flood Diversion – Fargo Diversion Study

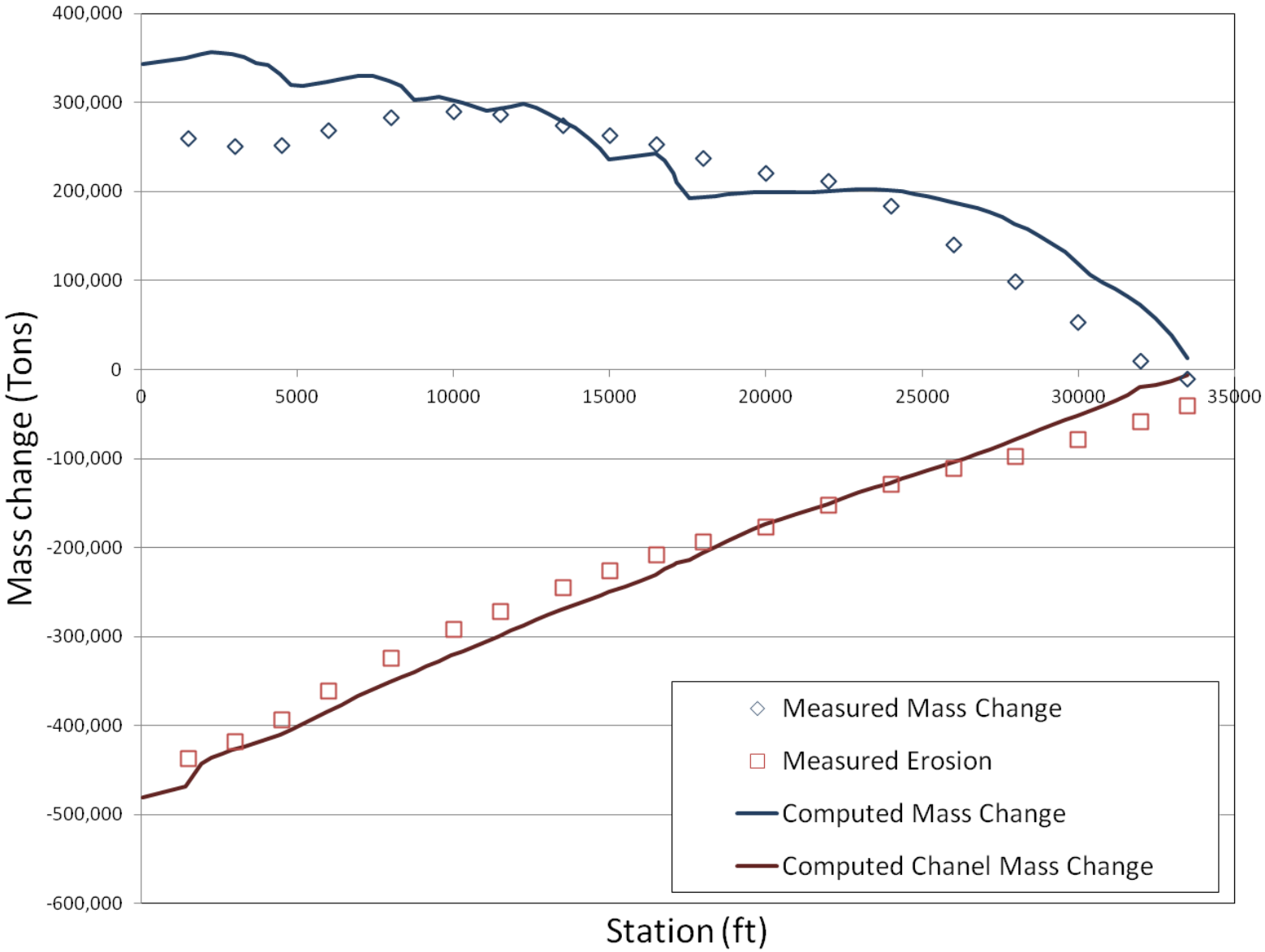




Flood Diversion – Fargo Diversion Study



Flood Diversion – Fargo Diversion Study



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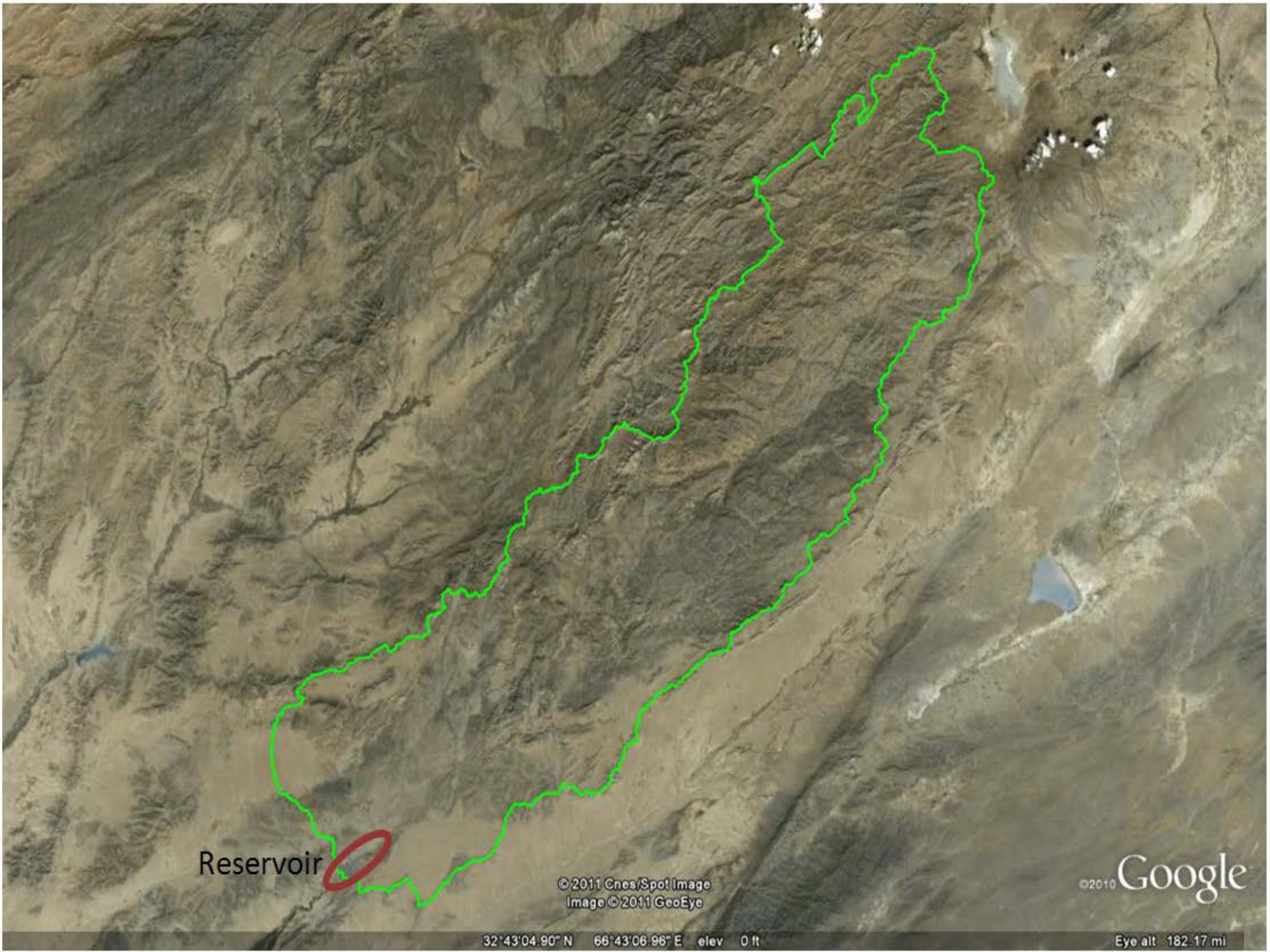
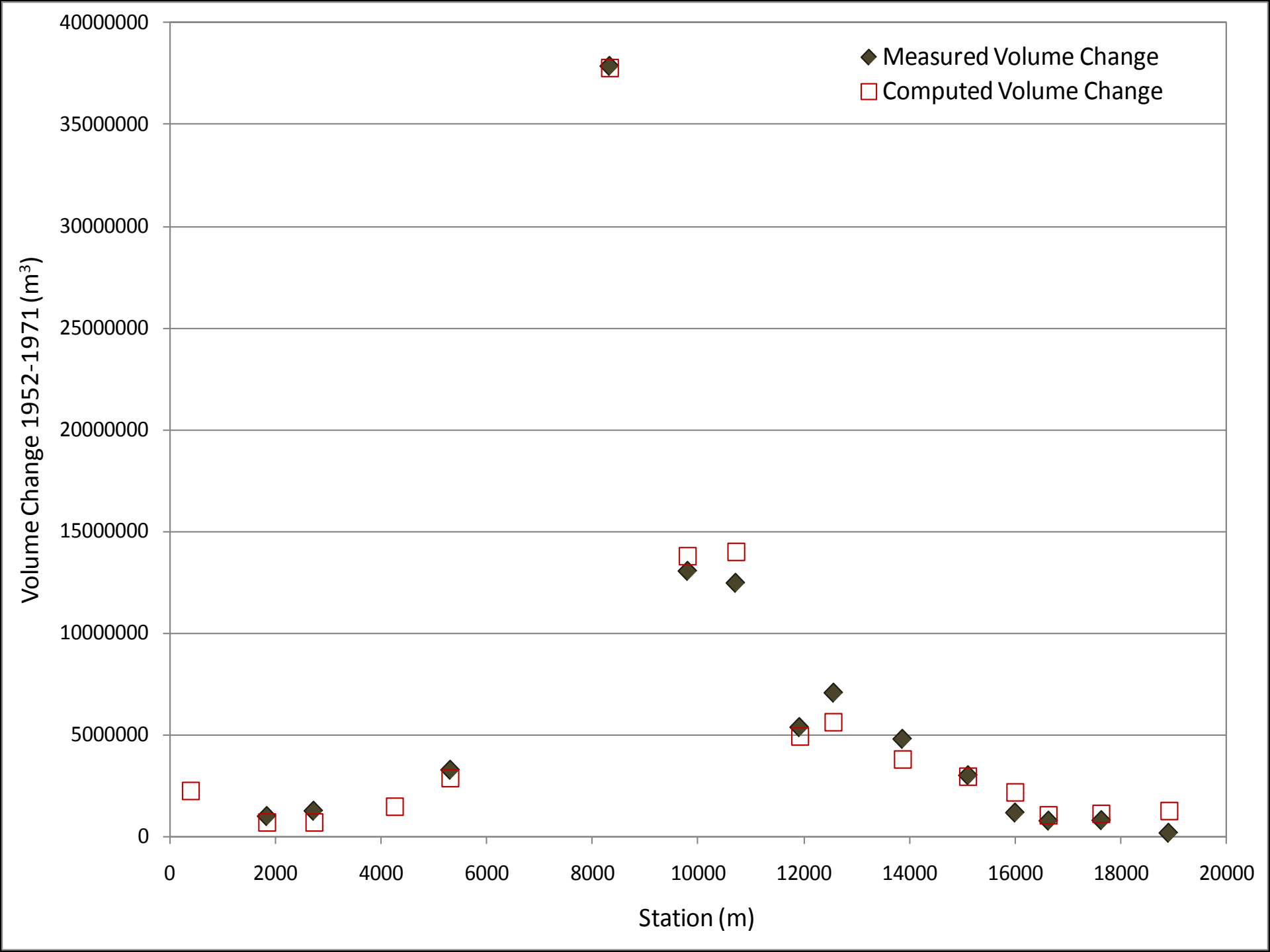
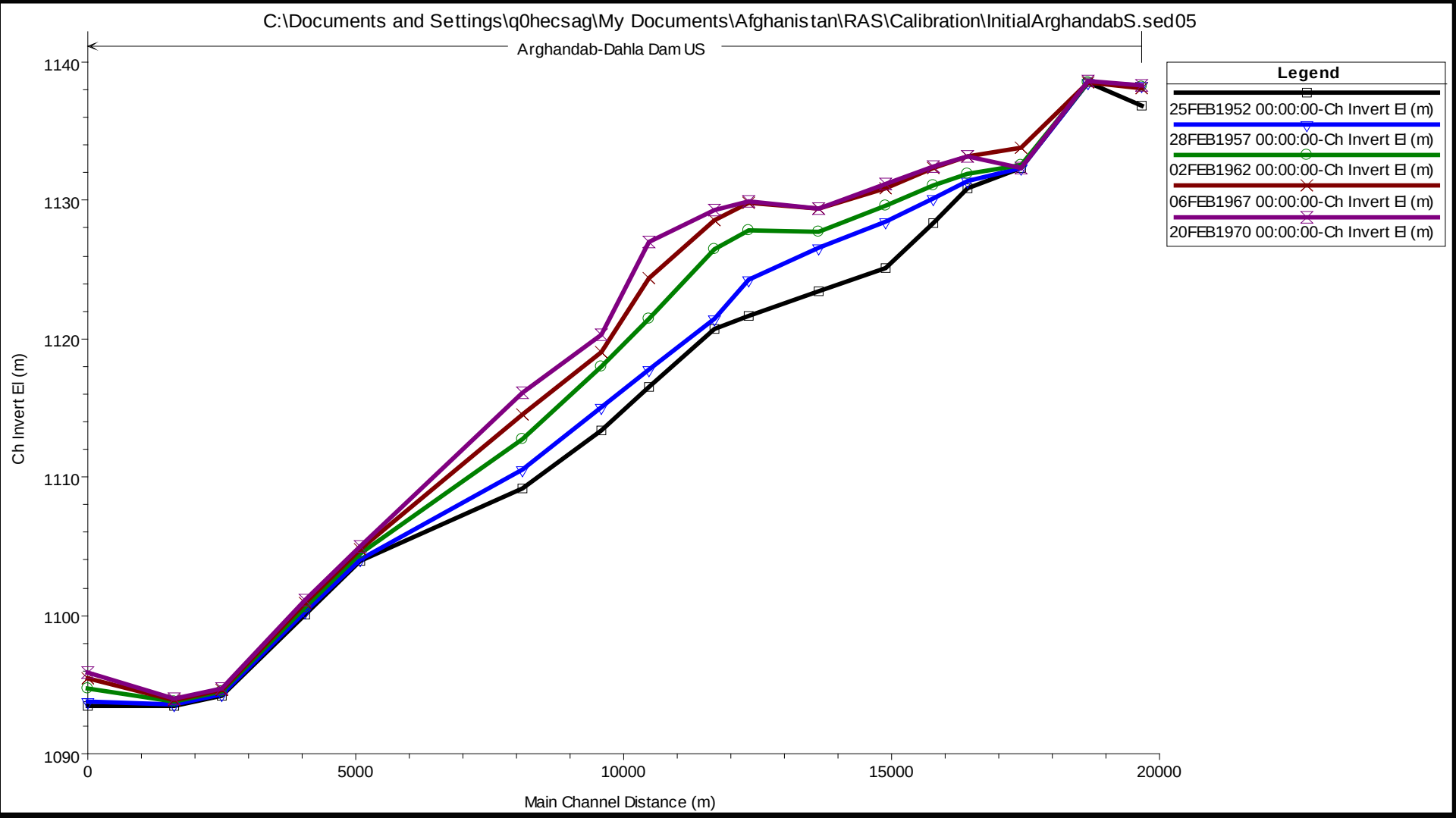
Reservoir Management
Volume Projections - Arghandab Reservoir


Reservoir
© 2011 Cnes/Spot Image
Image © 2011 GeoEye
©2010 Google
32°43'04.90" N 66°43'06.96" E elev 0 ft
Eye alt 182.17 mi


Measured Volume Change
Computed Volume Change
Volume Change 1952-1971 (m³)
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
0
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
Station (m)

Arghandab Reservoir: 50 year simulation



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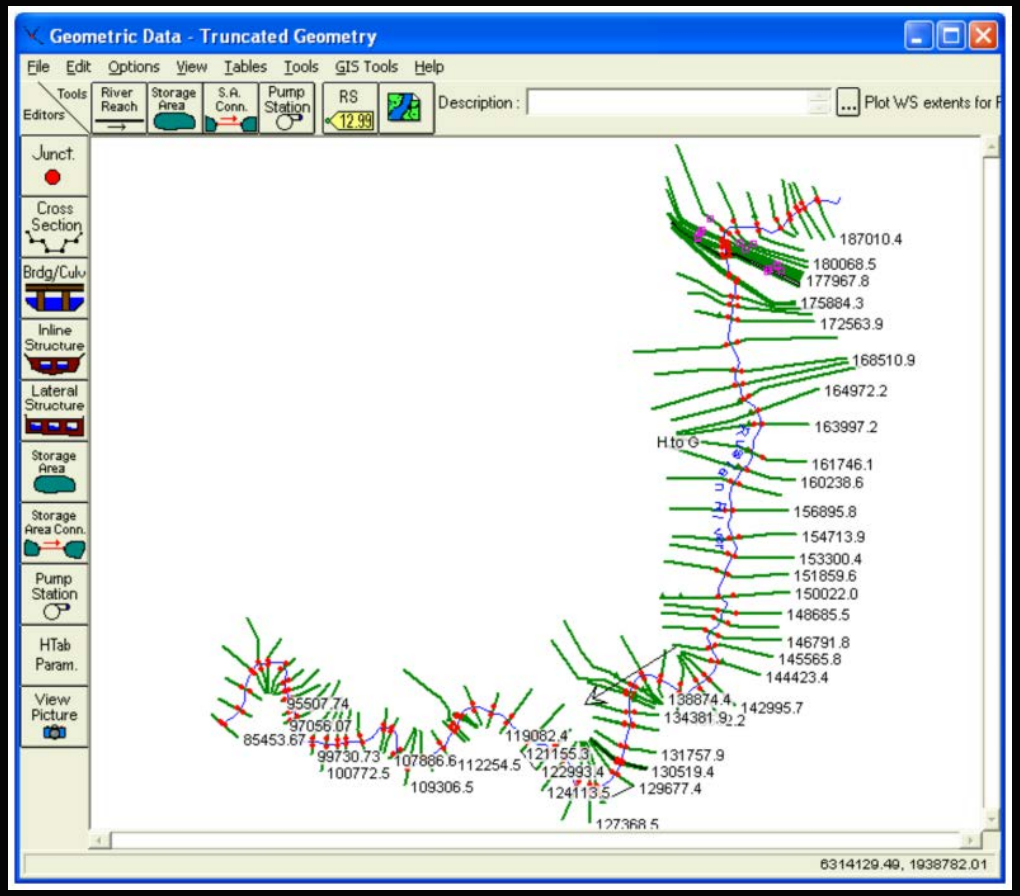
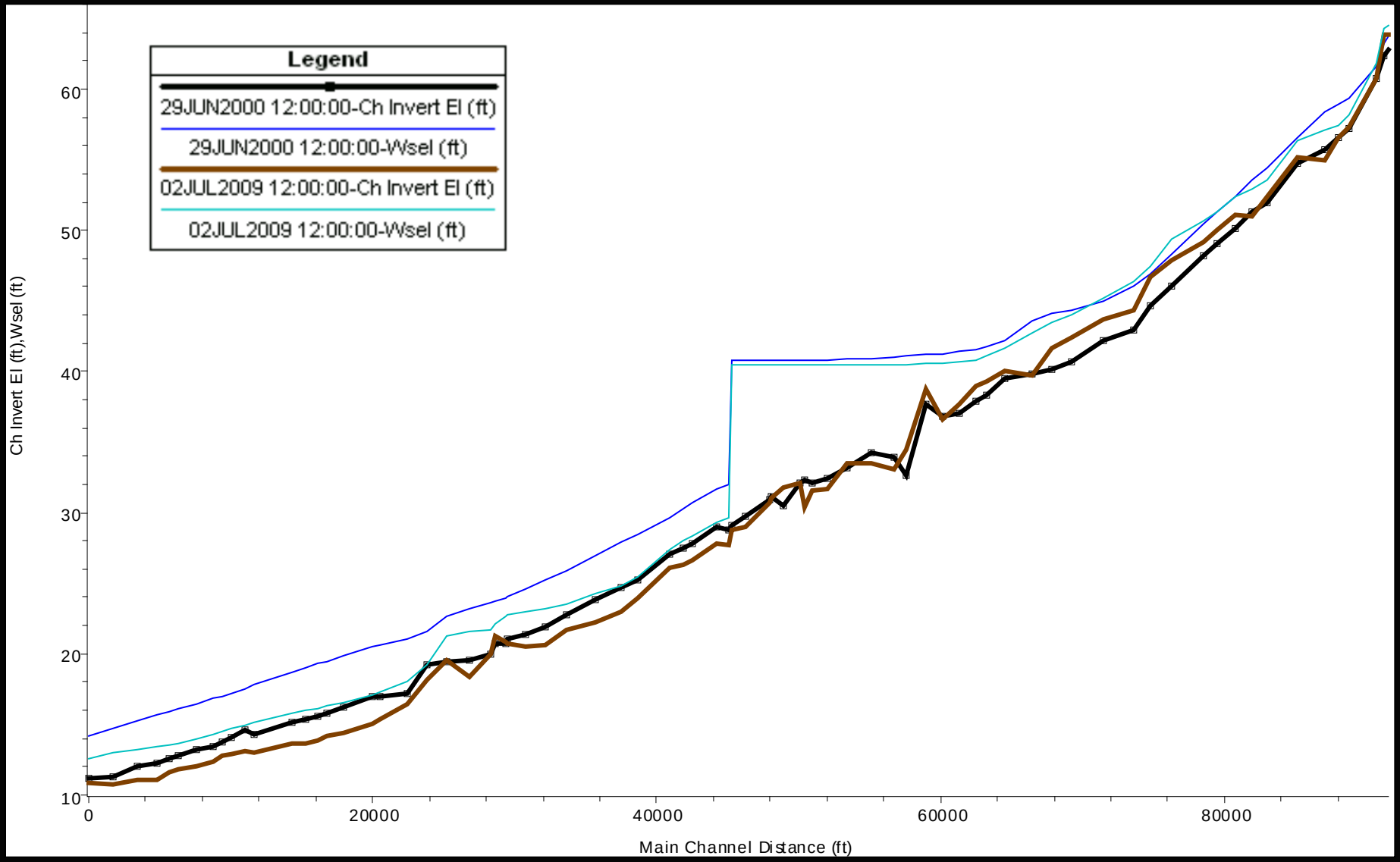
Water Supply:
River Bank Infiltration - Russian River



River Bank Infiltration - Russian River

Russian River Infiltration Project



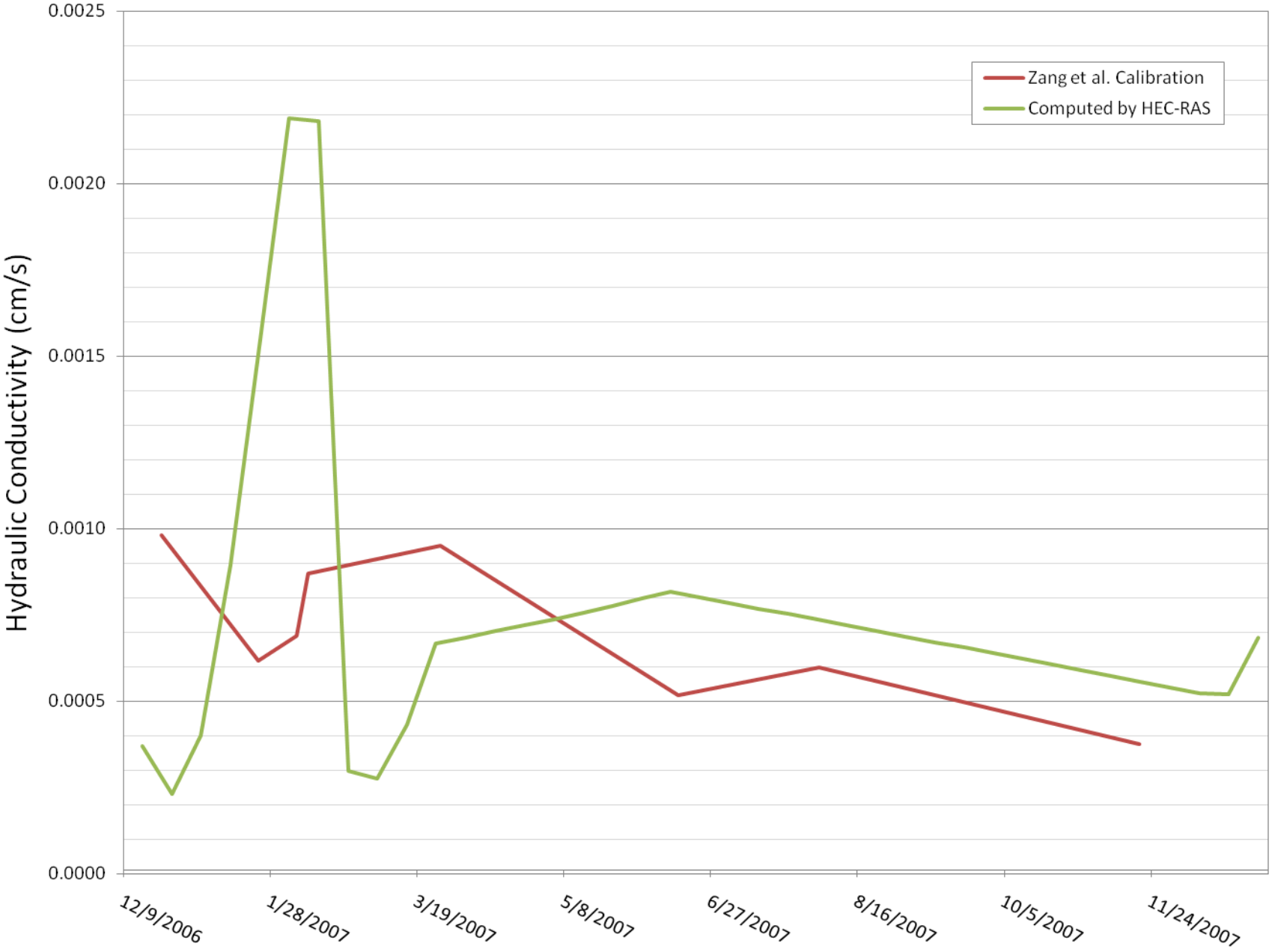
Computing Conductivity: The Hazen Equation

$$K = C(d_{10})^2$$

Where: K is hydraulic conductivity
C is an empirical coefficient
d_{10} is the 10th percentile sediment particle diameter

$$K = 0.116(d_{10})^2 + (0.7 + 0.03T)$$

Where: K is hydraulic conductivity
d_{10} is the 10th percentile sediment particle diameter
T is temperature


Hydraulic Conductivity (cm/s)
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
12/9/2006
1/28/2007
3/19/2007
5/8/2007
6/27/2007
8/16/2007
10/5/2007
11/24/2007
Zang et al. Calibration
Computed by HEC-RAS

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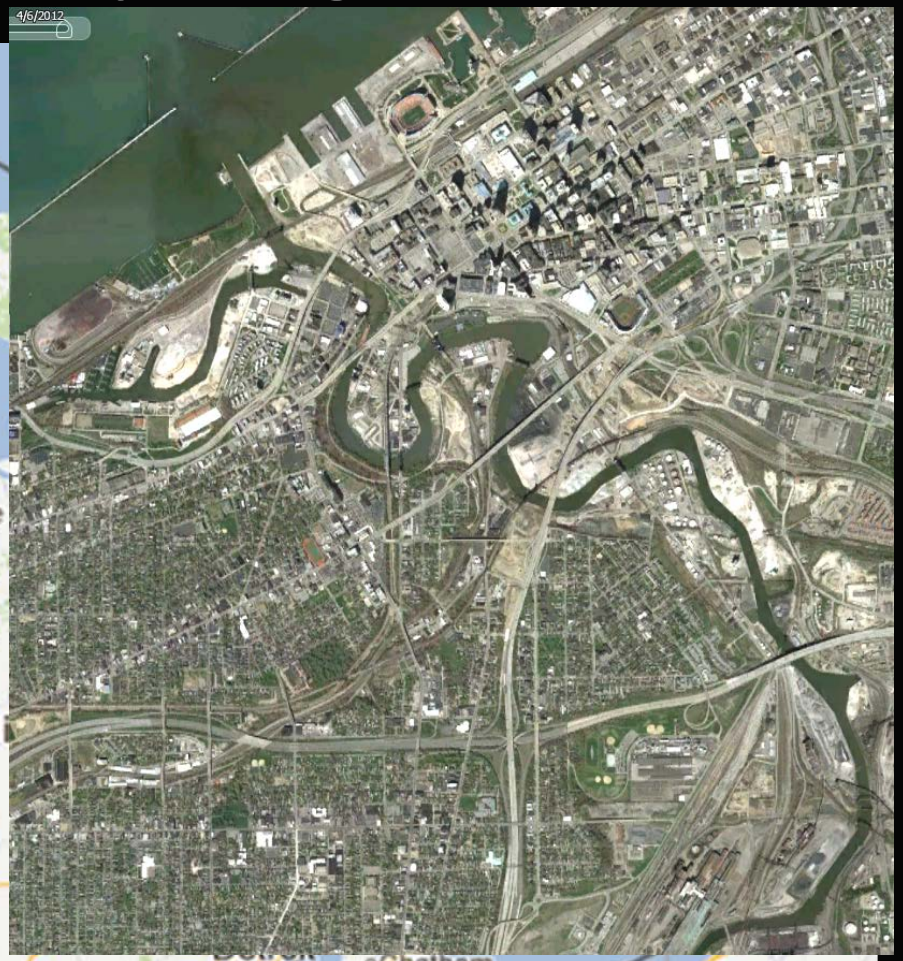
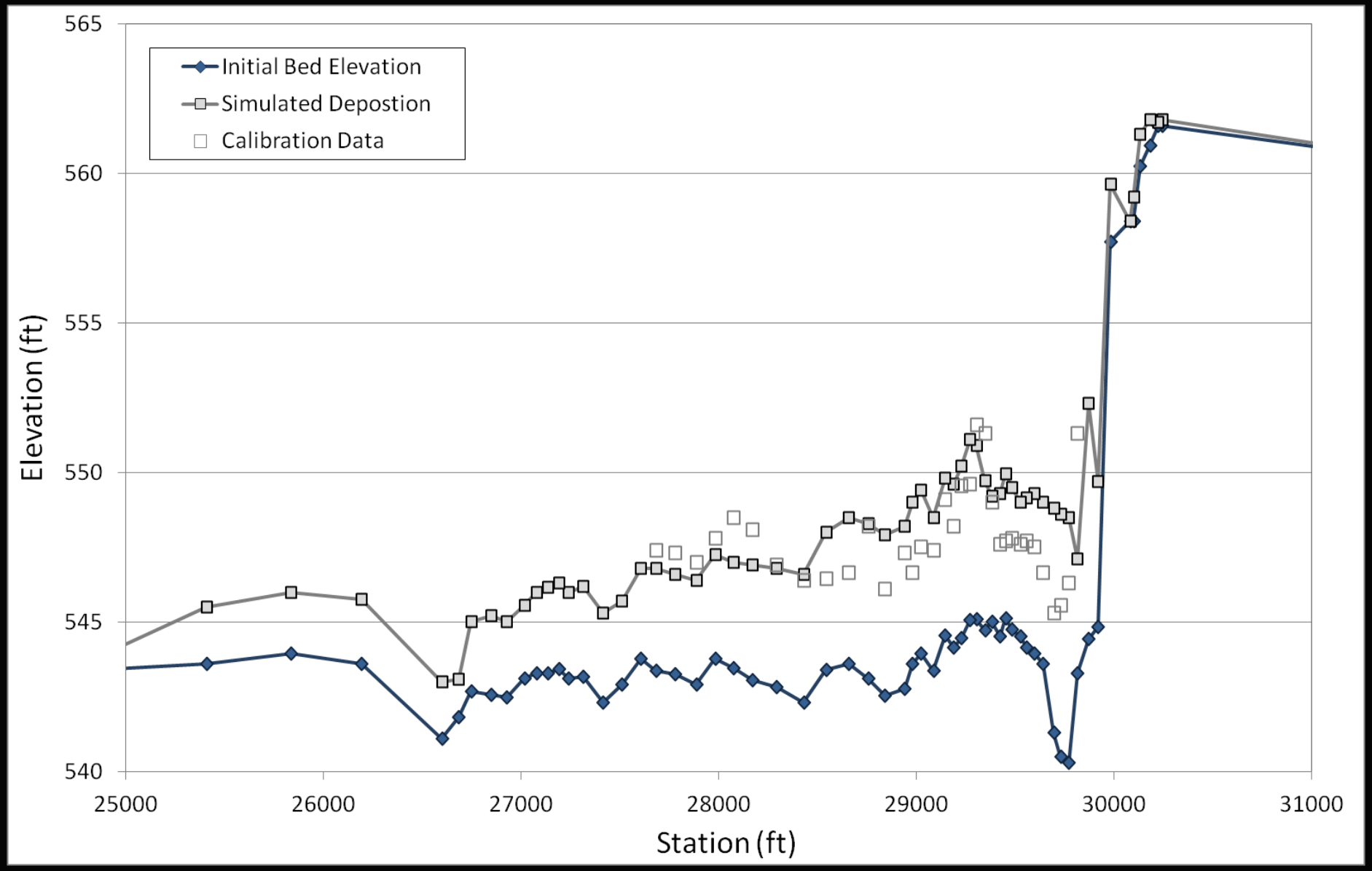
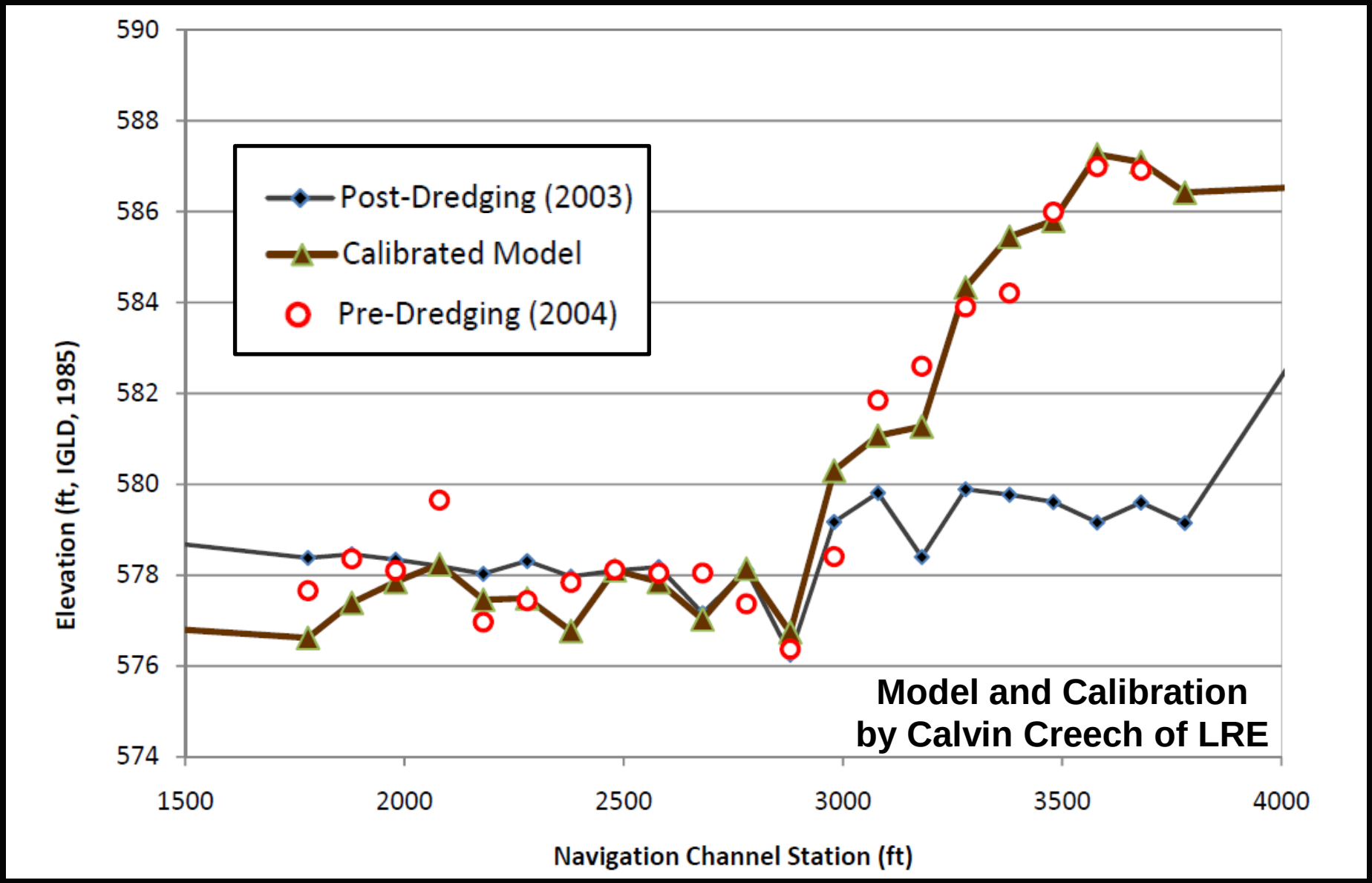
Navigation Dredging: Ontonagon and Cuyahoga Rivers



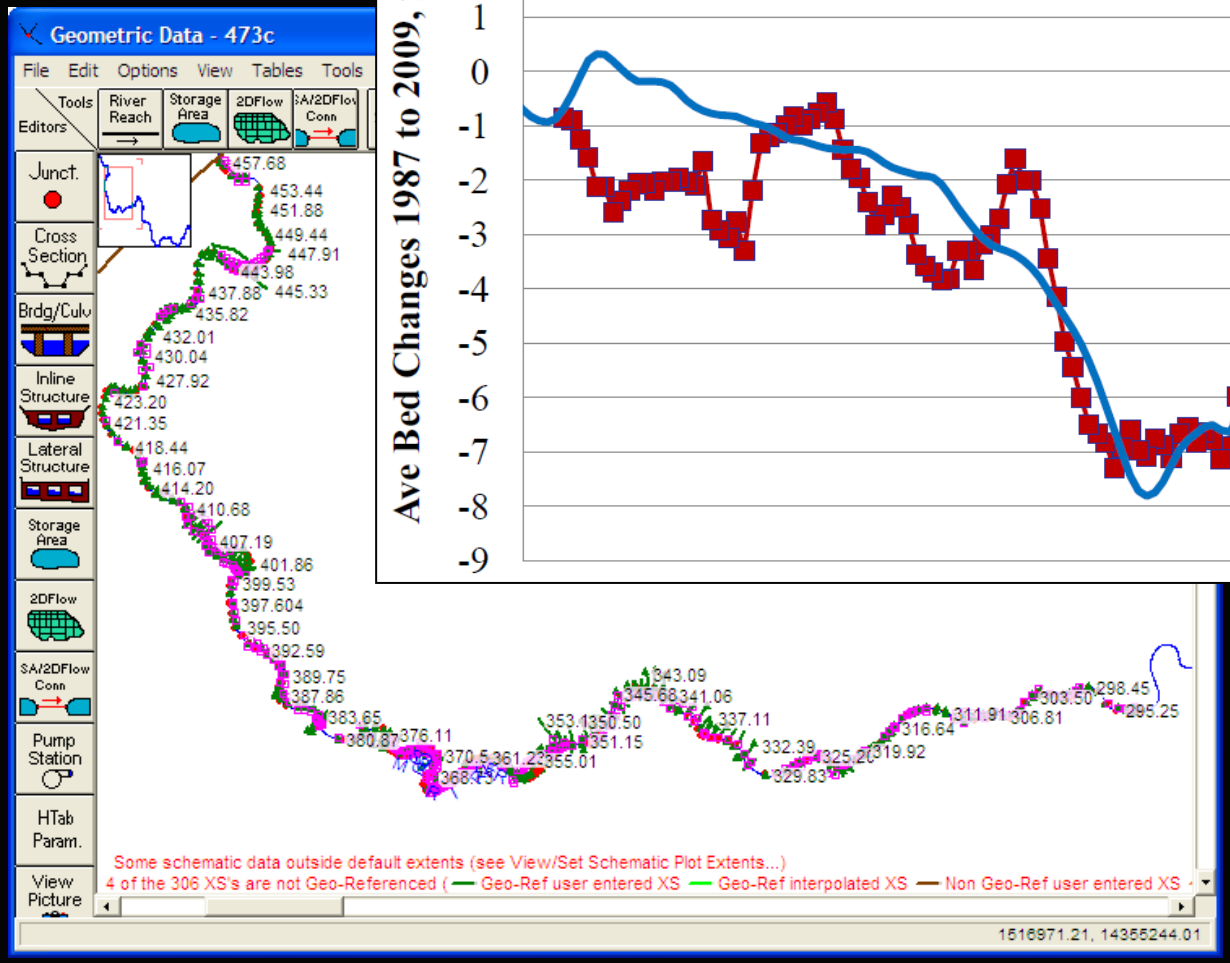
Navigation Dredging: Cuyahoga River

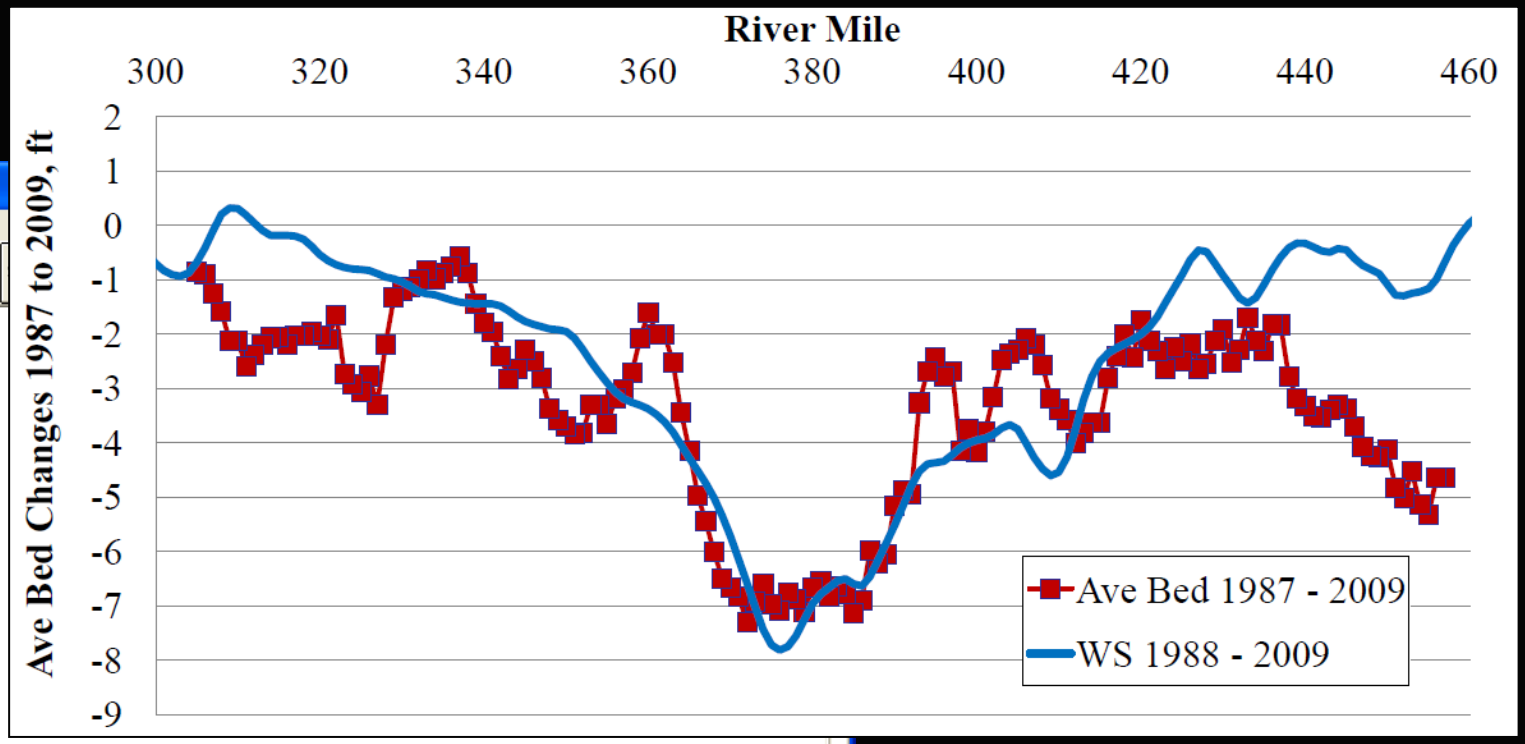


Navigation Dredging: Ontonagon River



Commercial Dredging: Missouri River Degradation Study





Model by John Shelley PhD
USACE - Kansas City District

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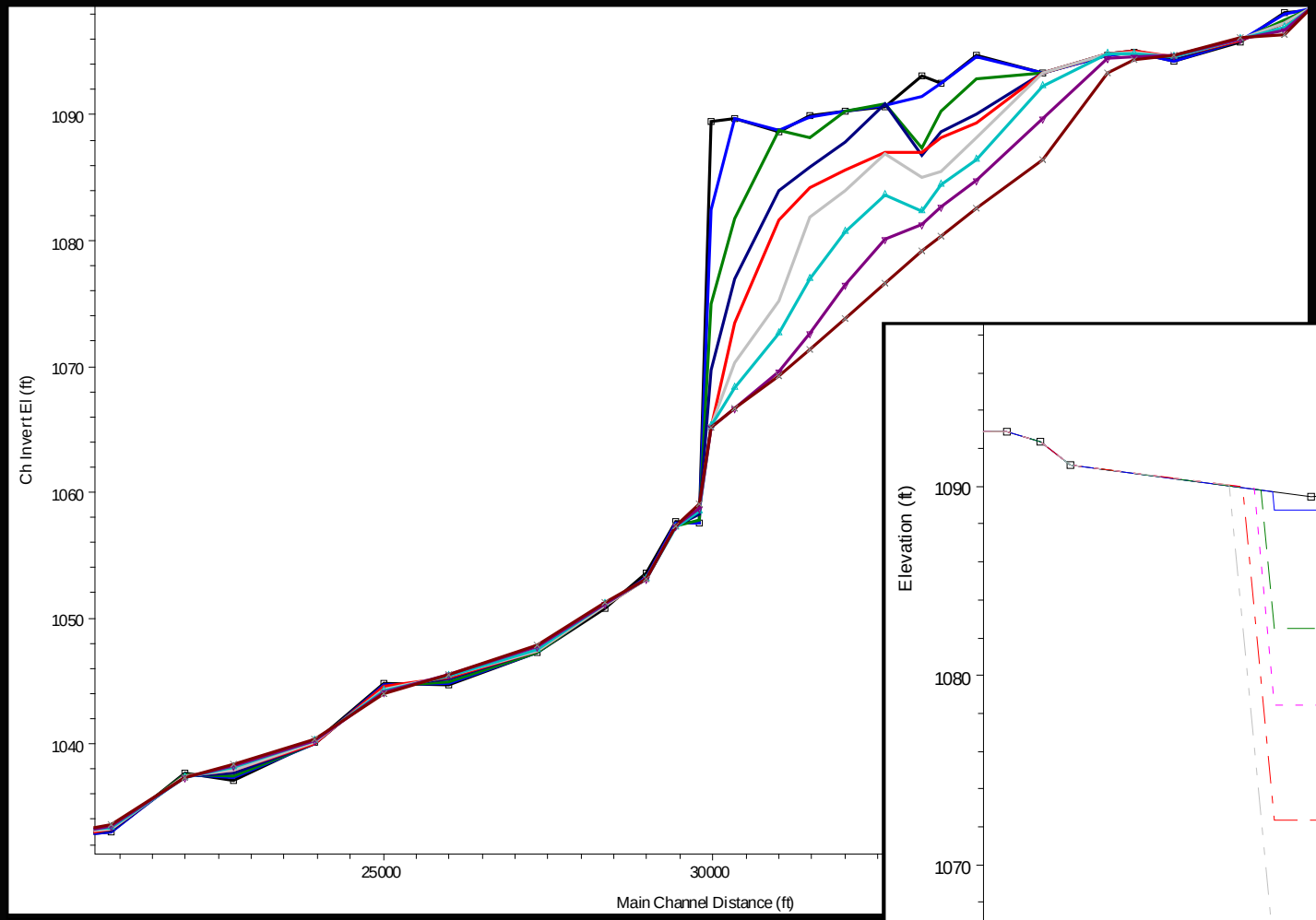
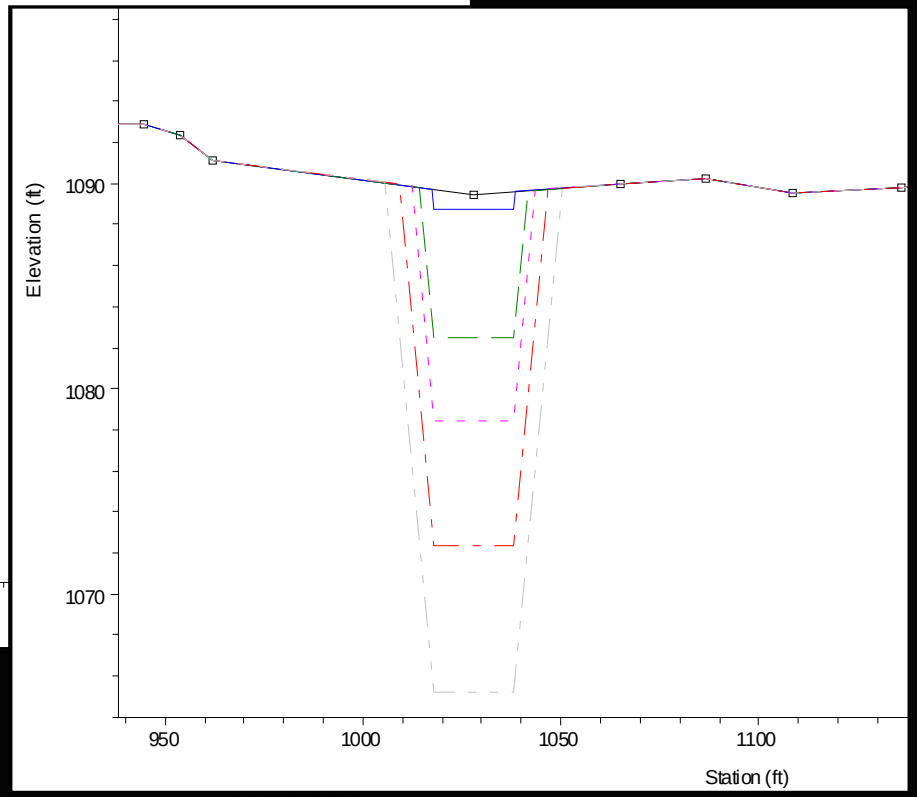
Restoration:
Dam Removal - Springville Dam

Dam Removal - Springville Dam

Restoration:
Dam Removal - Springville Dam



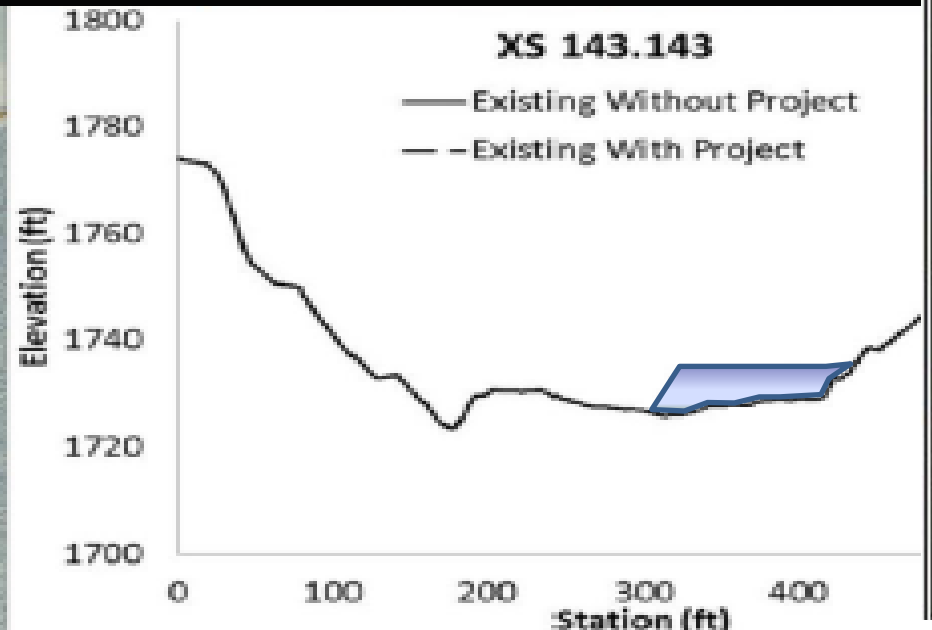


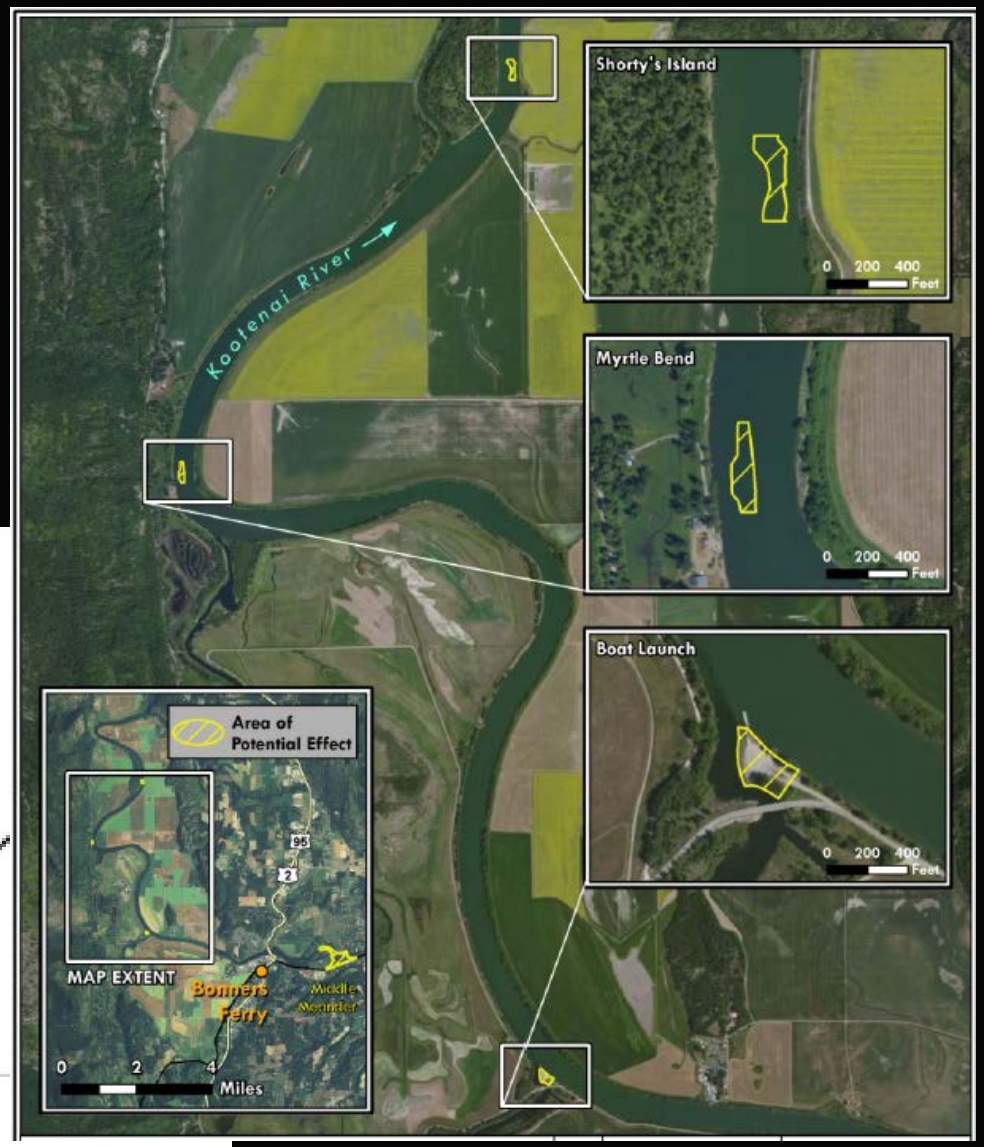
Model by Waleska Echevarria
USACE Buffalo District

Restoration: Kootenai River

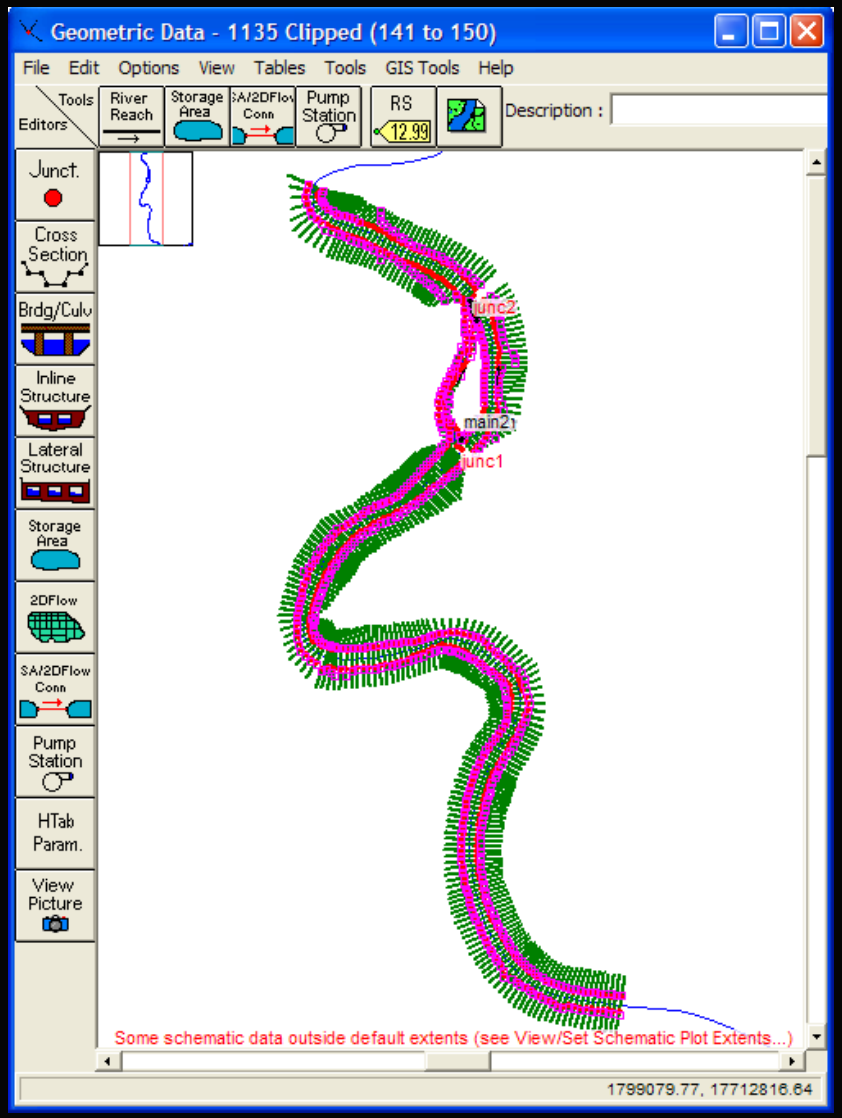
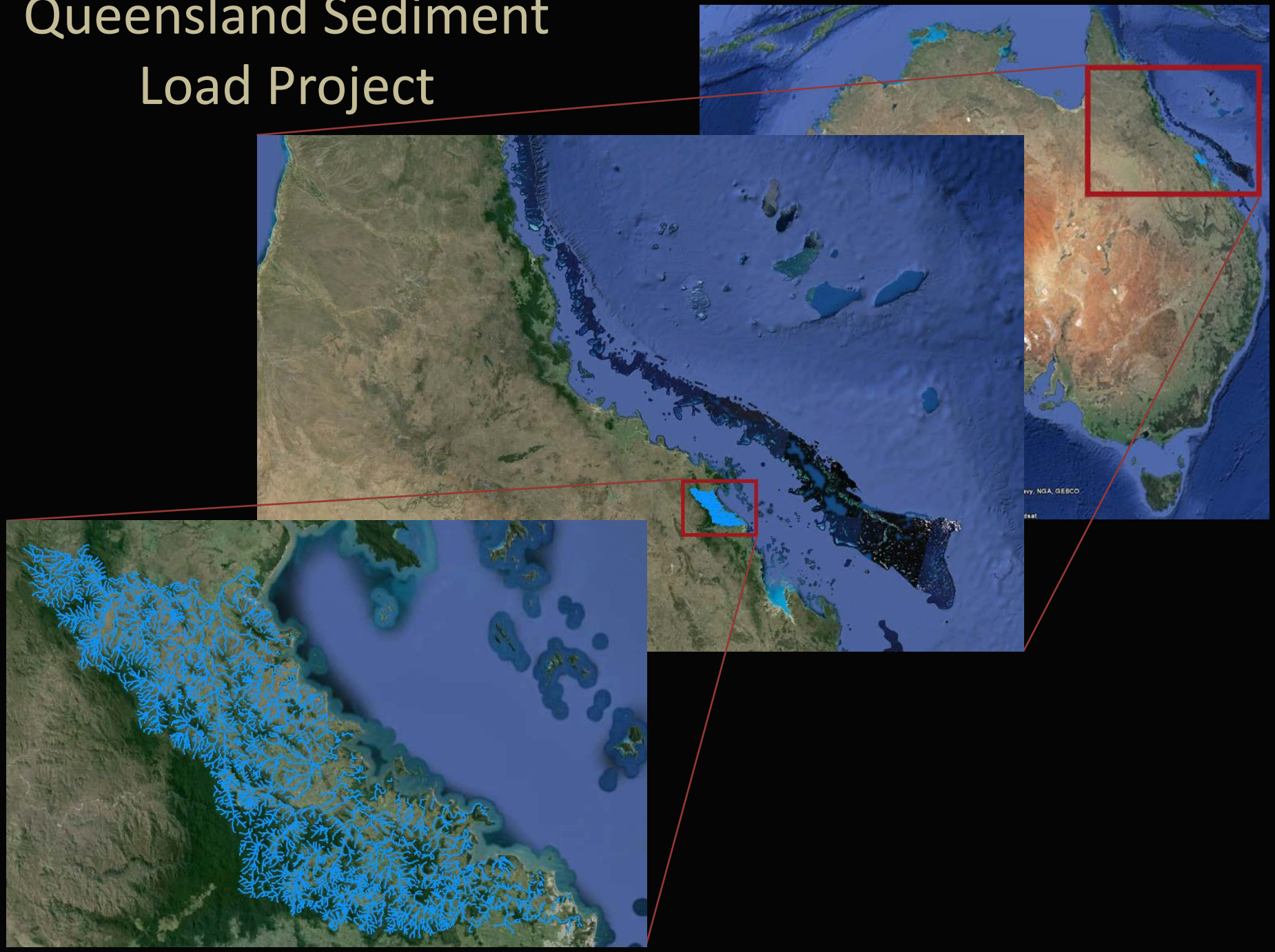
Substrate Augmentation/Channel Modification

Restoration:
Substrate Augmentation - Kootenai River





Restoration:
Substrate Augmentation - Kootenai River



Queensland Sediment Load Project