

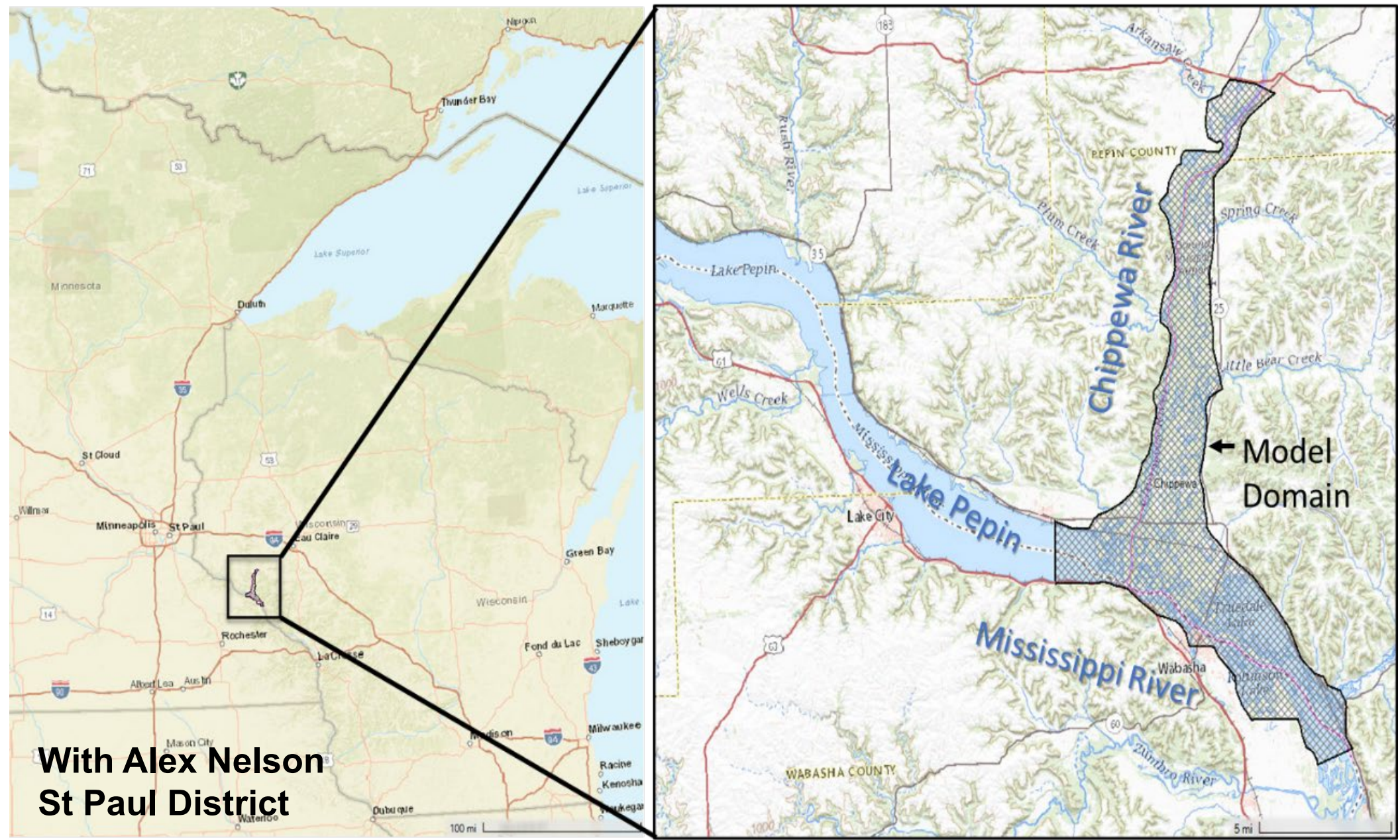
Calibrating a 2D HEC-RAS Model

Stanford Gibson, PhD.
Hydrologic Engineering Center





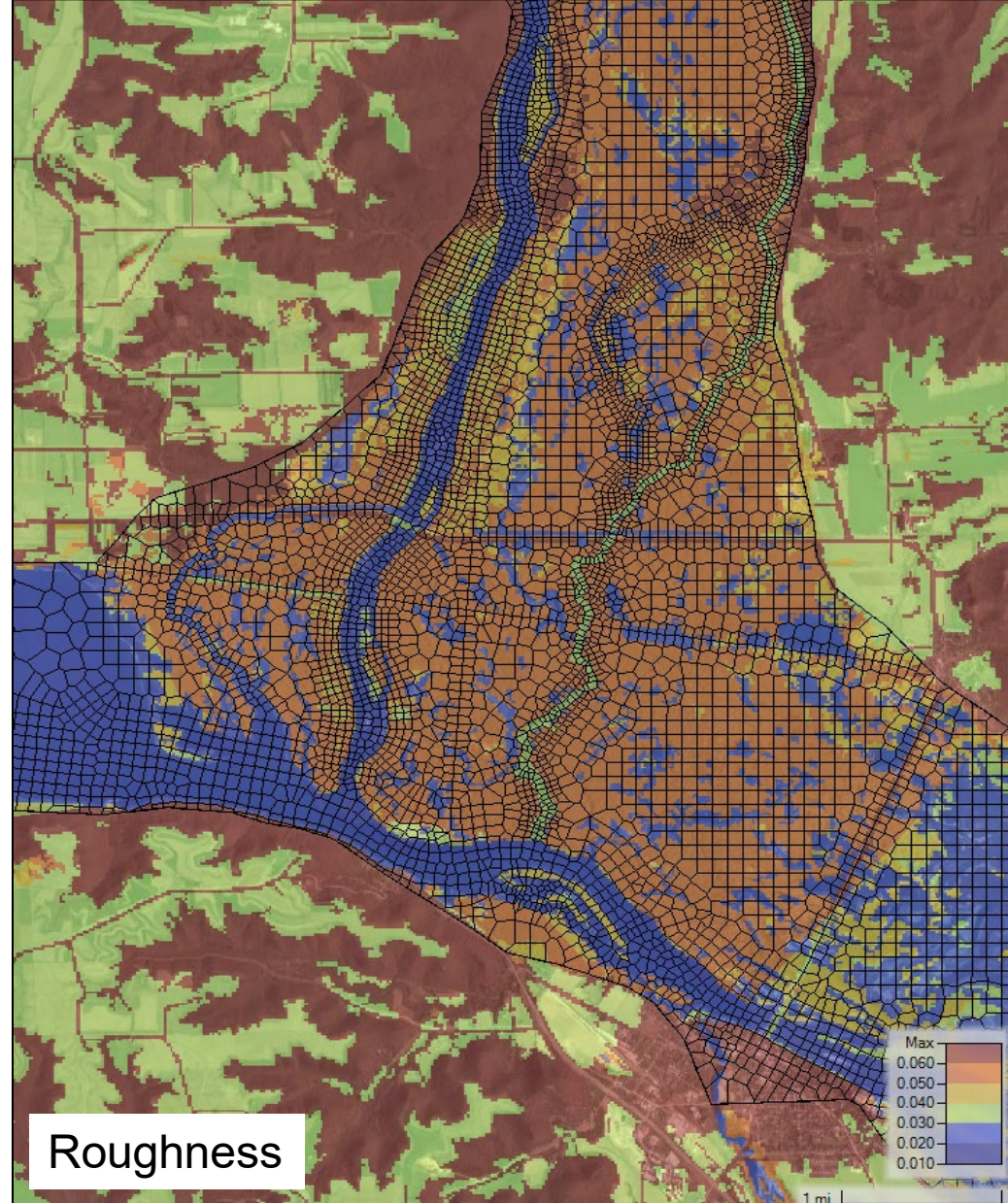
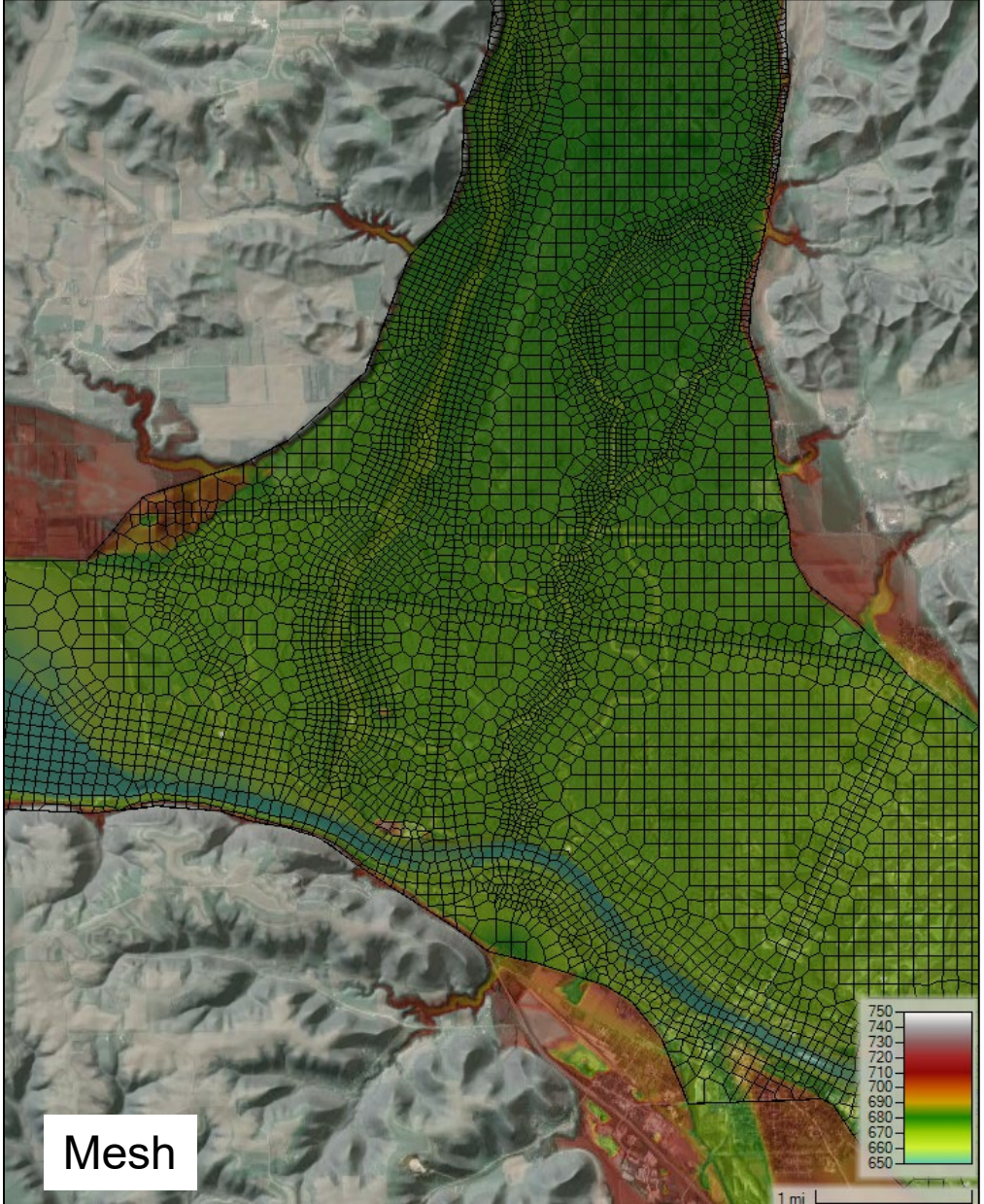
Chippewa River, Wisconsin



**With Alex Nelson
St Paul District**



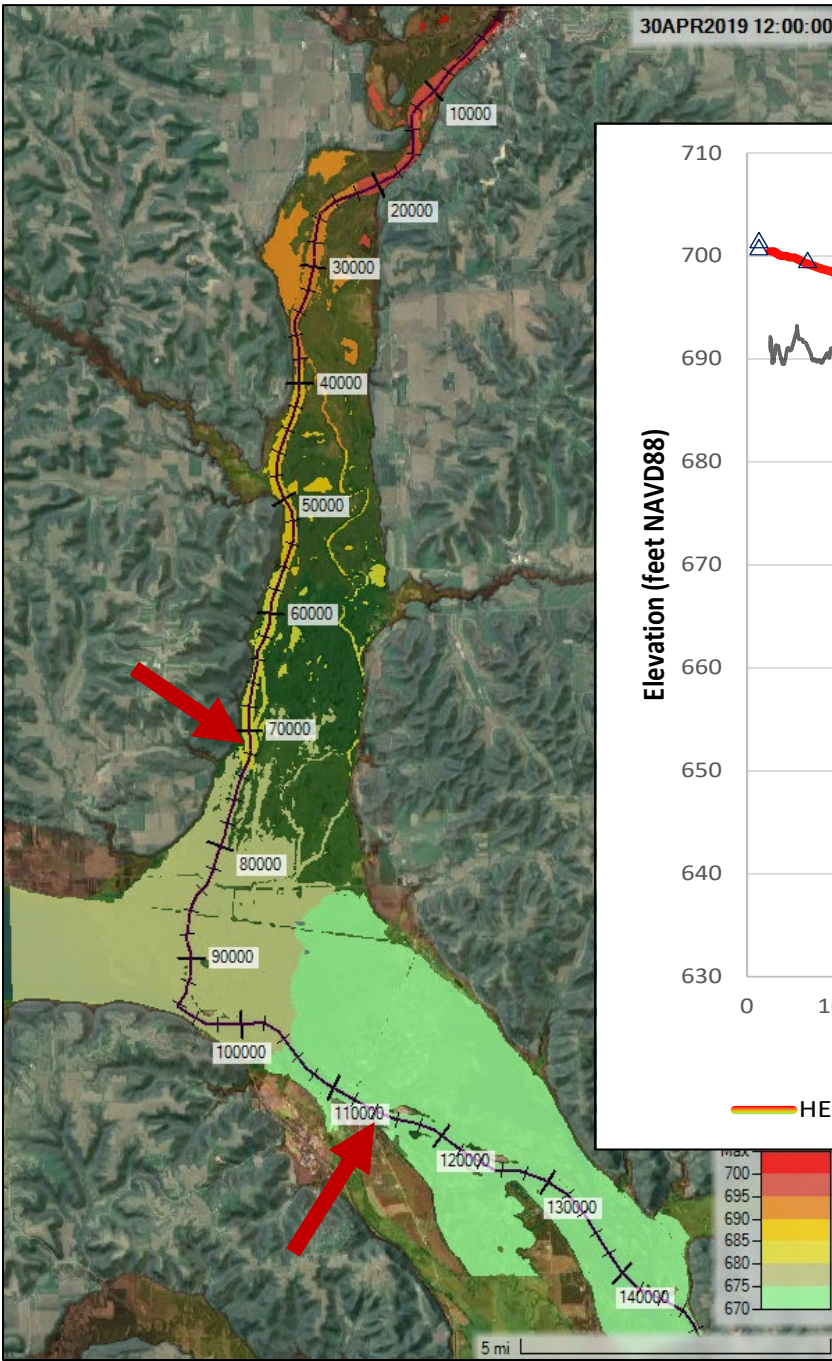
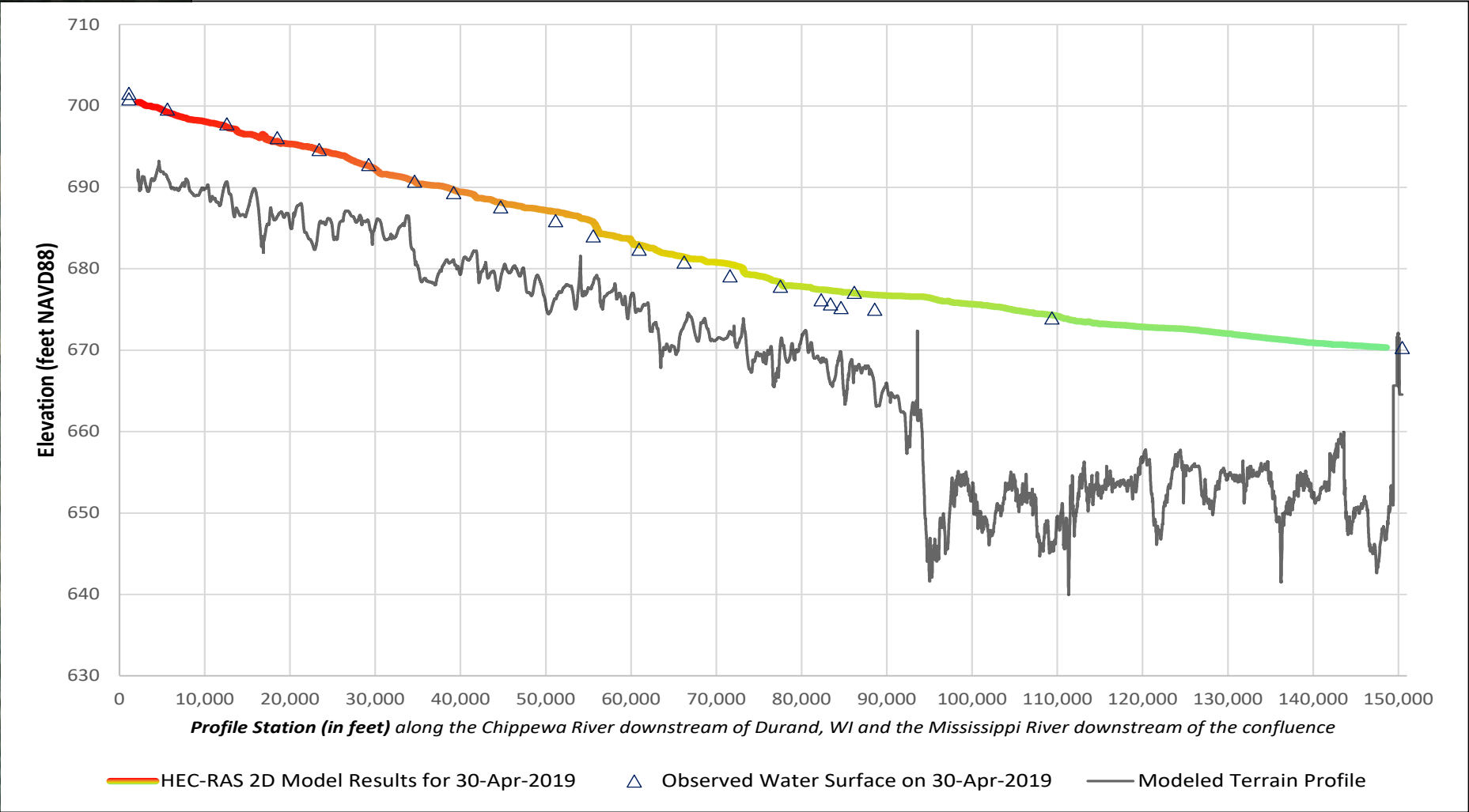
Chippewa River, Wisconsin



One-Dimensionalized Calibration



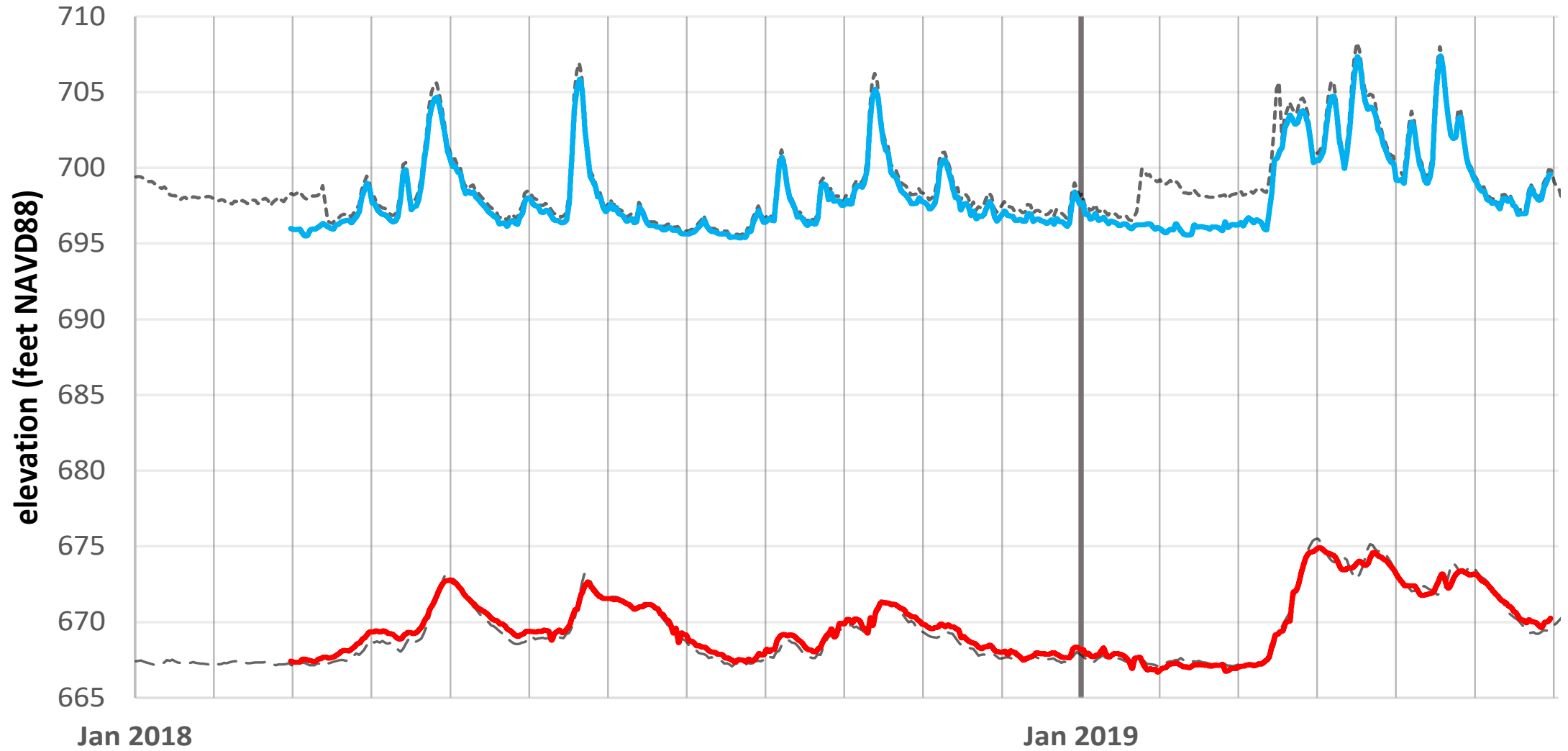
30APR2019 12:00:00



Hydraulic calibration by Alex Nelson (MVP)



2D Calibration Cont...



----- Observed - Chippewa River at Durand, WI

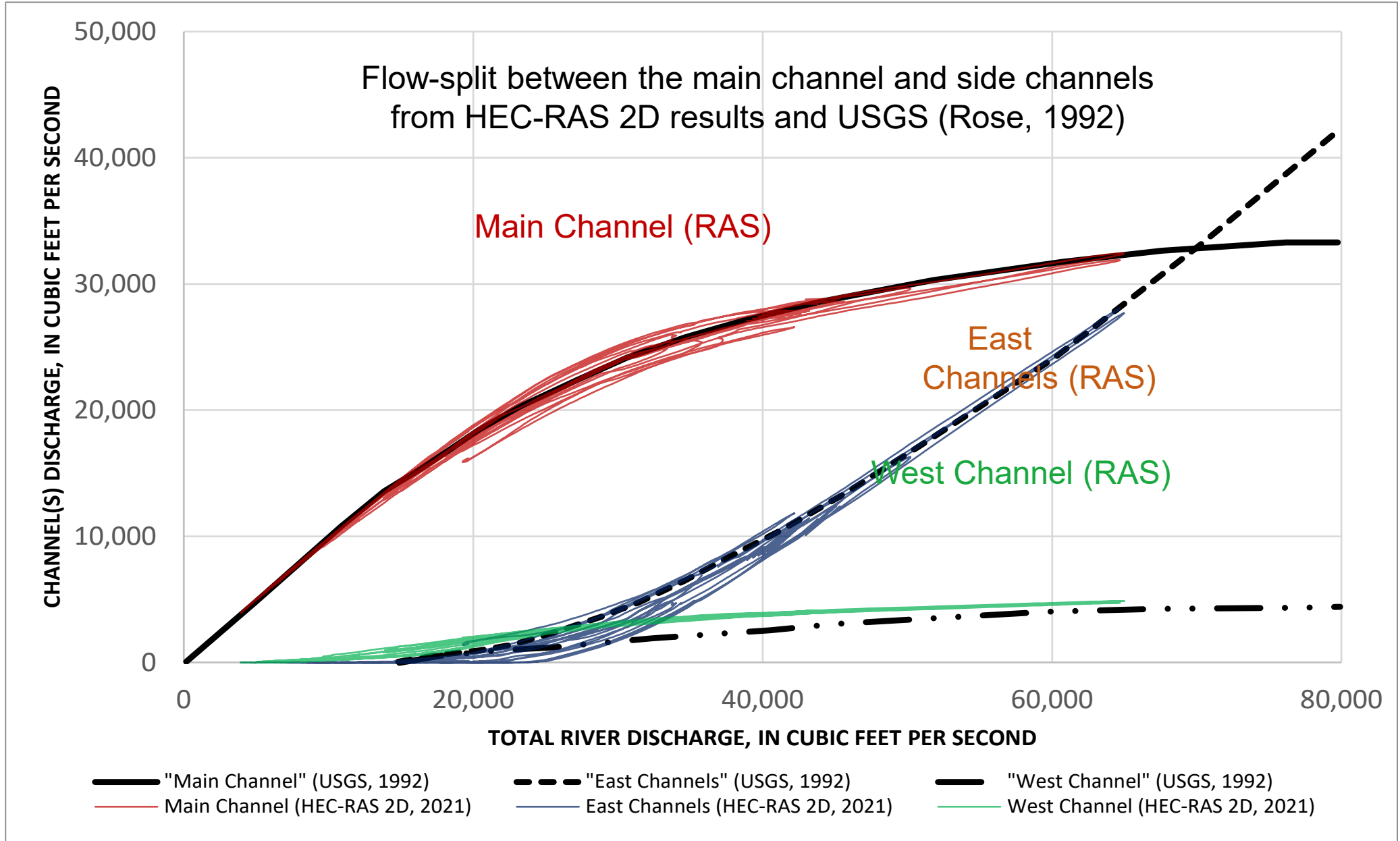
— Modeled - Chippewa R. at Durand, WI

- - - - - Observed - Mississippi River at Wabasha, MN (CP 4)

— Modeled - Mississippi R. at Wabasha, MN



2D Hydraulic Calibration Cont...



Hydraulic Calibration by Alex Nelson (MVP)

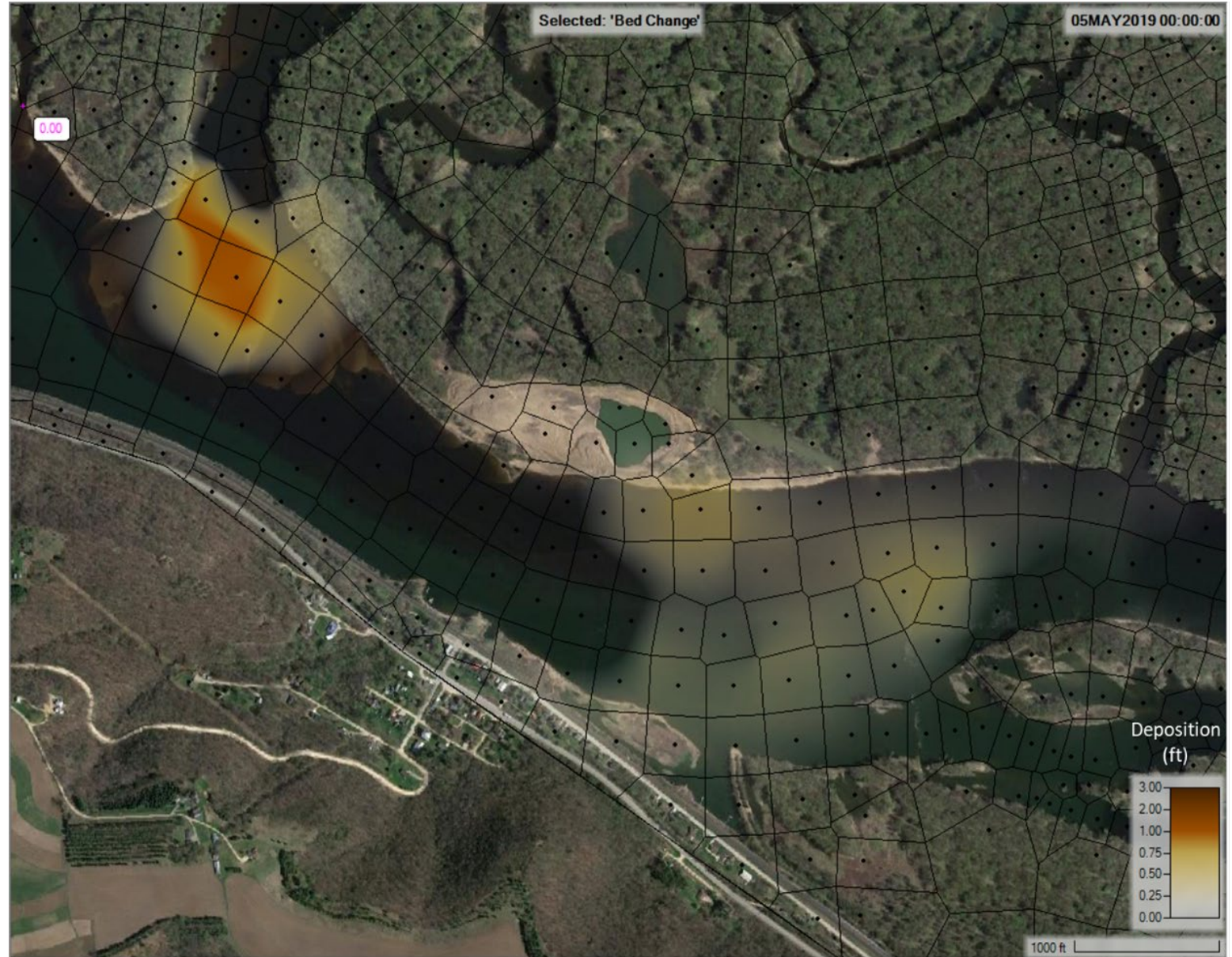


Sediment Calibration





Sediment Calibration





2D Hydraulic Calibration

RAS Mapper

File Project Tools Help Debug

Selected Layer: Initial Condition Points

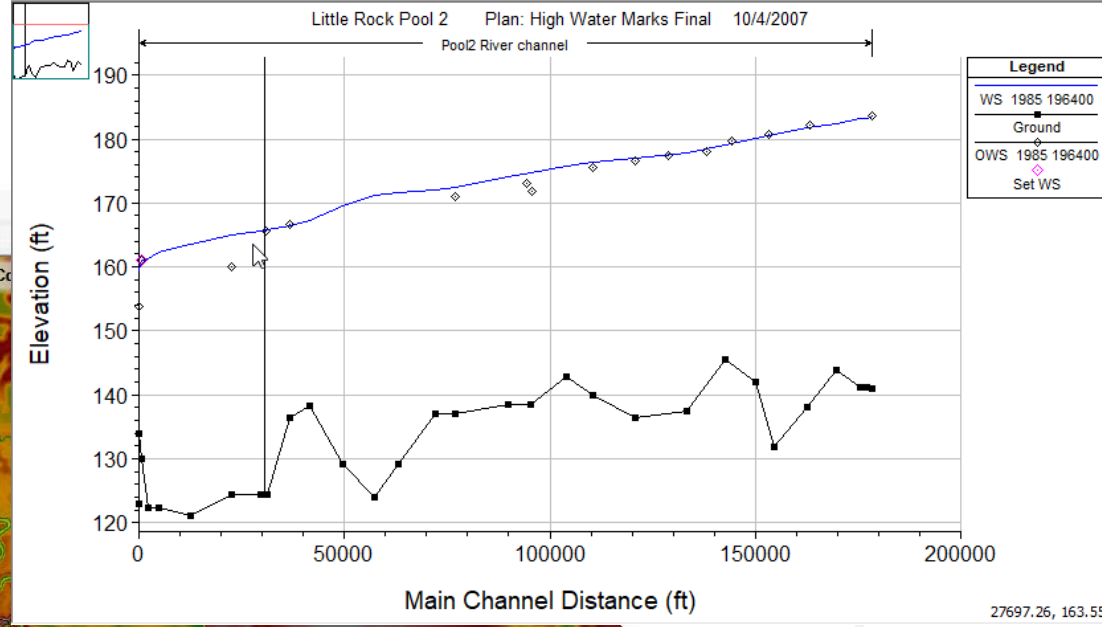
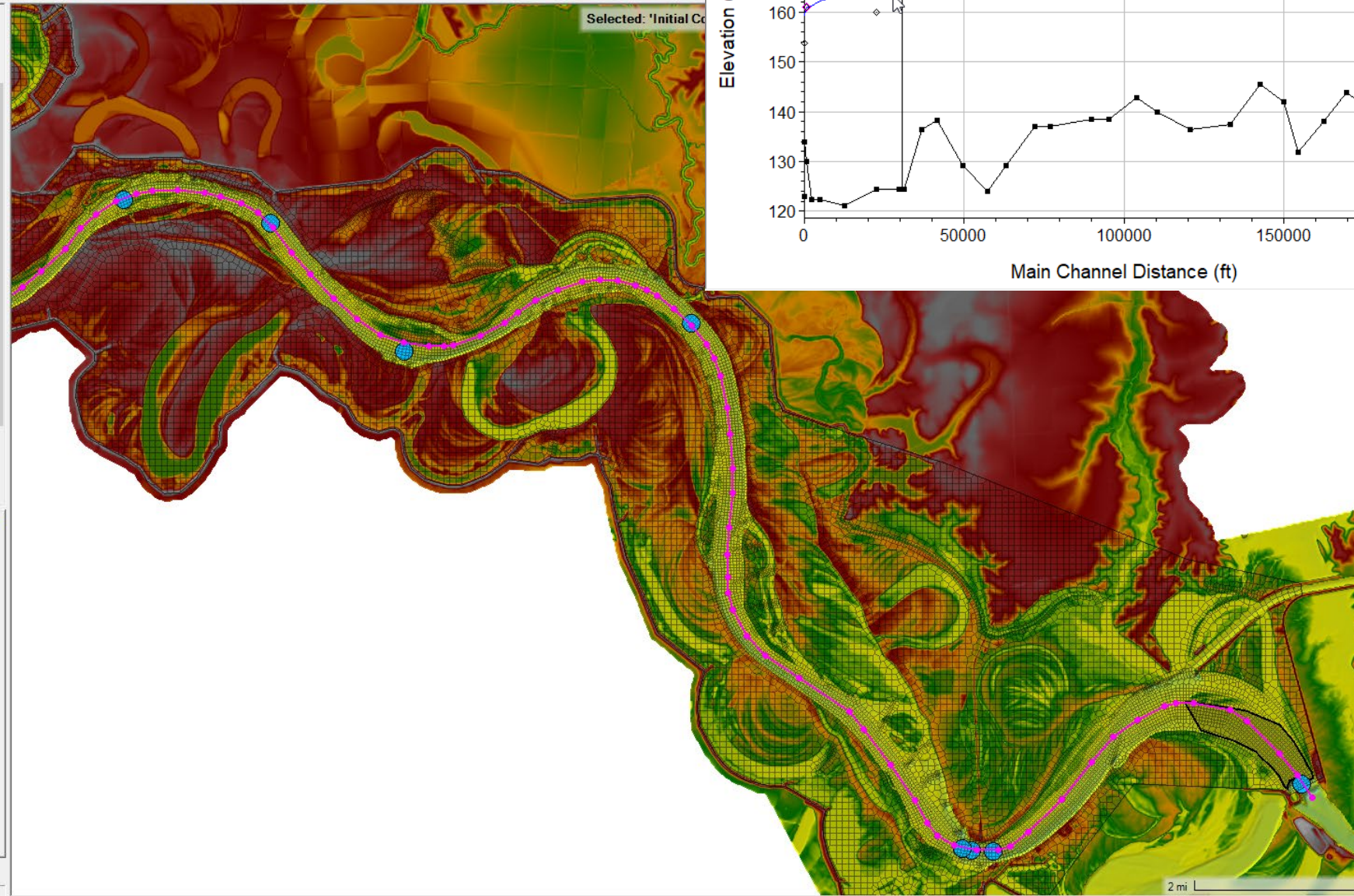
- Manning's n (16 Empty Layers)
- Add IC Points
 - Cross Sections
 - 2D Flow Areas
 - Boundary Condition Lines
 - Initial Condition Points
 - Manning's n (14 Empty Layers)
- Event Conditions
- Results
 - Refinement Regions
 - Event Conditions
 - Geometry
 - Depth (05MAY2019 06:00:00)
 - Velocity (02MAY2019 00:00:00)
 - WSE (02MAY2019 00:00:00)
 - Cumulative Max Iterations
 - 1985 (Q~200k)
 - Event Conditions
 - Geometry
 - Depth (Max)
 - Velocity (Max)
 - WSE (Max)
 - 1985 (200k) + ICPoints
 - Event Conditions
 - Geometry
 - Depth (Max)
 - Velocity (Max)
 - WSE (06JAN1985 14:00:00)
- Map Layers
 - Google Hybrid
 - Mannings_n_extended

Main Centerline

Plot Tick Marks

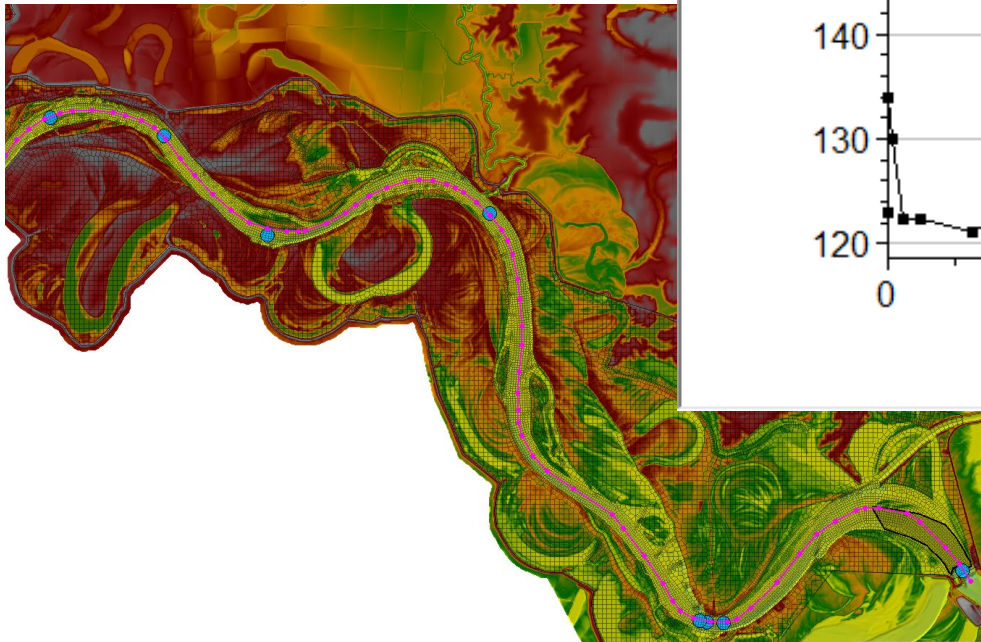
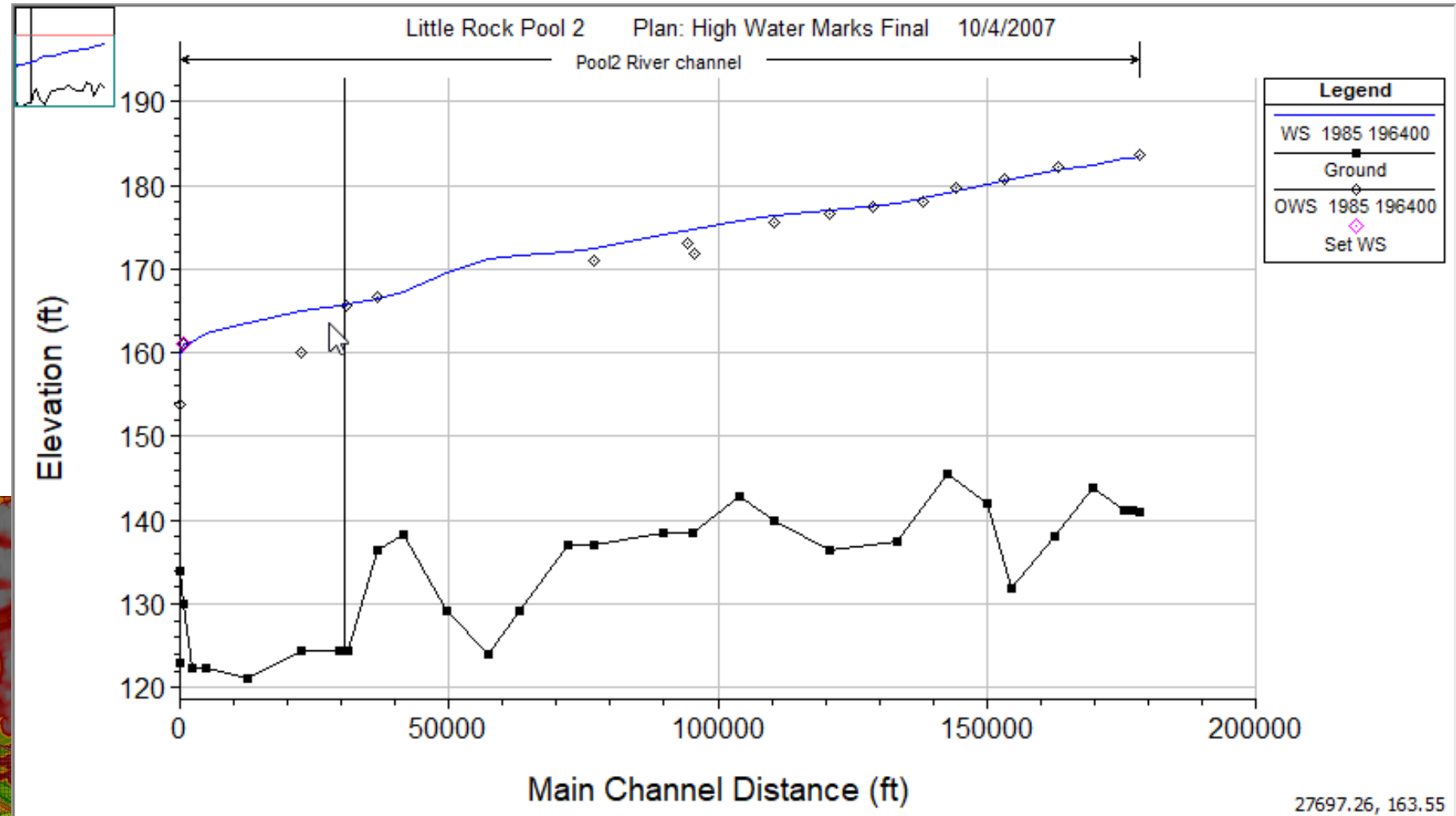
Messages Views Profile Lines Active Features Layer Values

(1412398.97, 4066797.10 1 pixel = 60.95 ft)





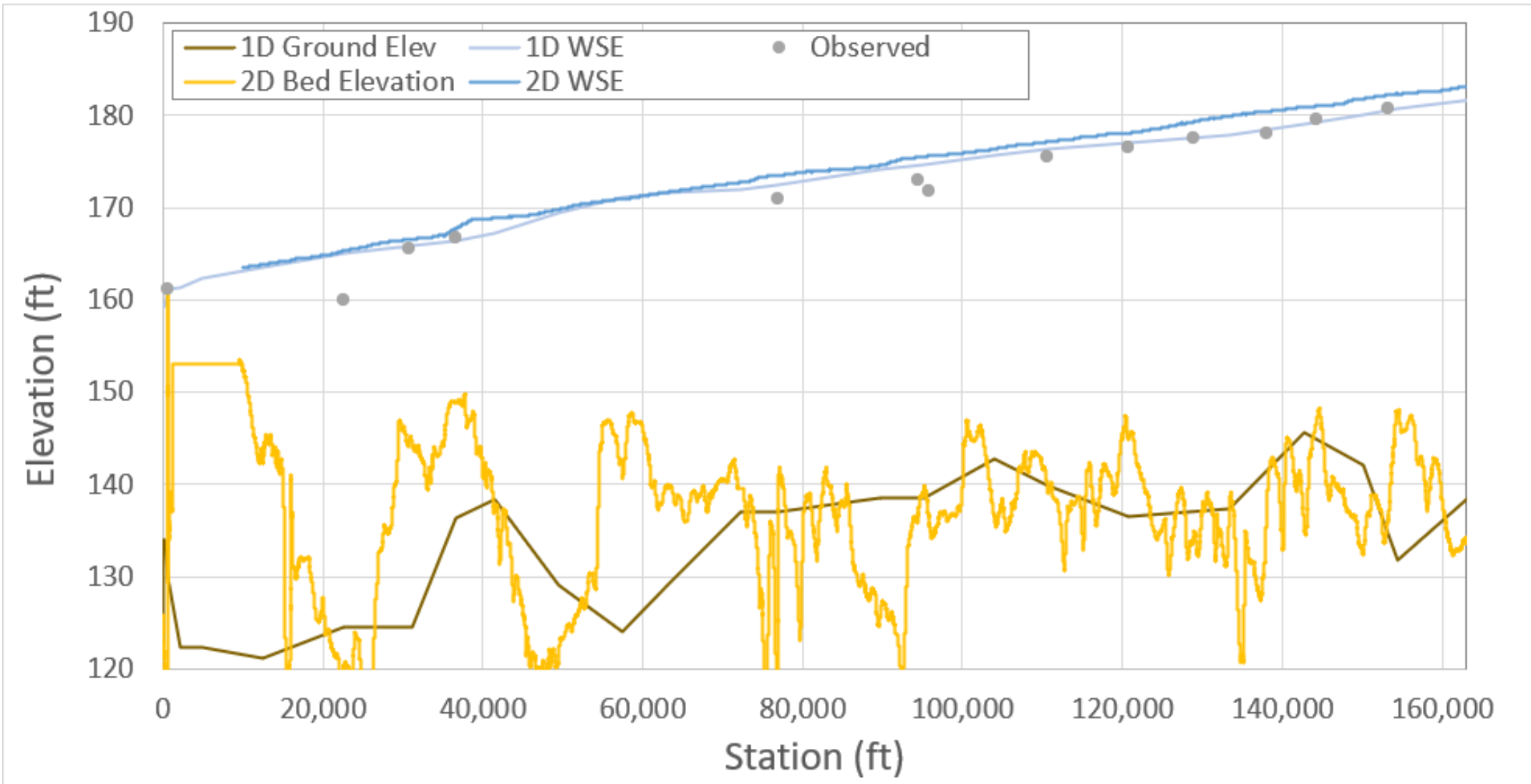
2D Hydraulic Calibration



Note: Calibrate to your final equation
 Don't calibrate to DW if you will need SWE

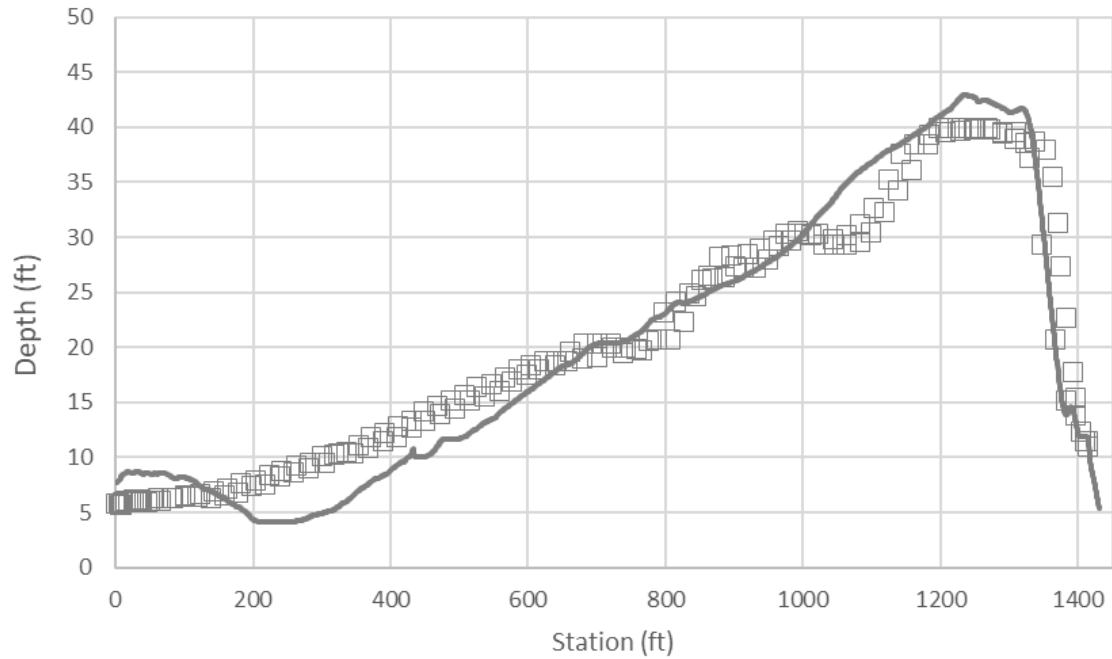
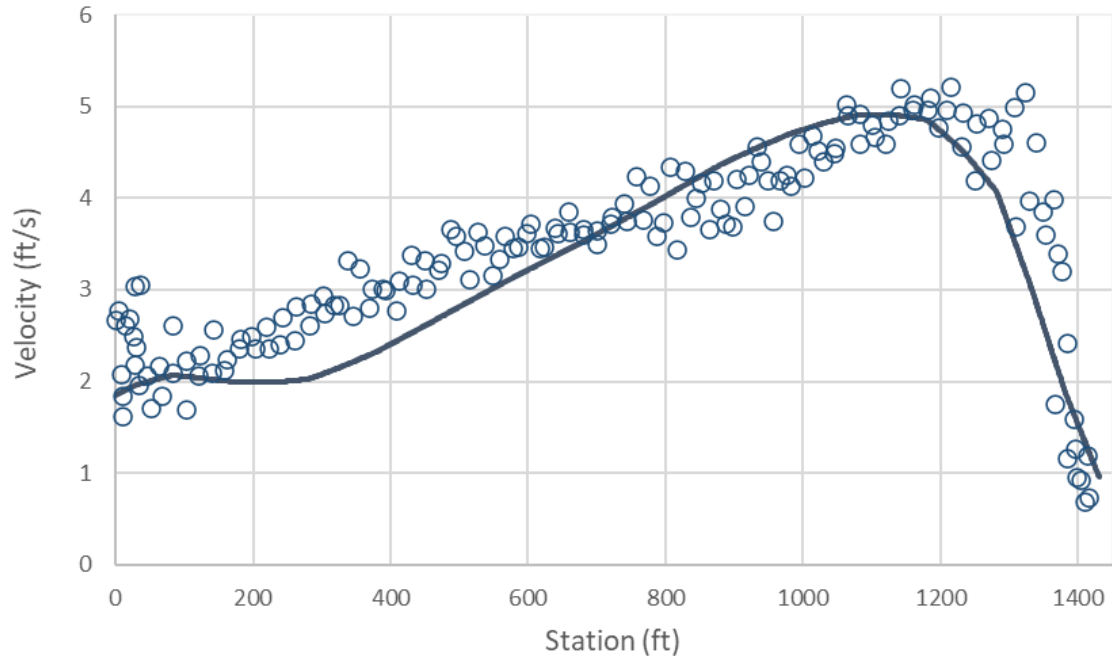


How Do You Calibrate 2D Hydraulics?

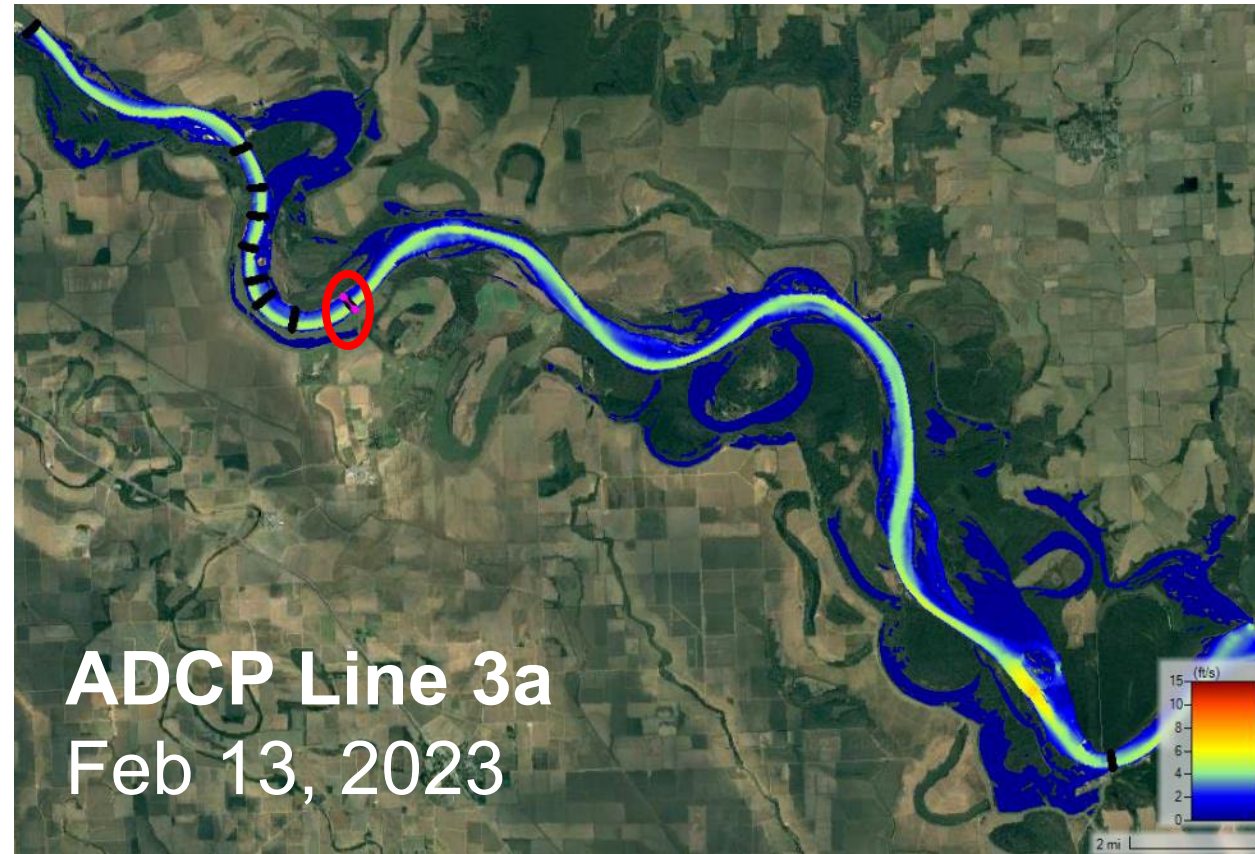


One Option is a Qusi-1D Calibration

But a Lateral Depth and Velocity Calibration Can Improve Your 2D Model Performance Substantially



ID	Date	GMT	CMT	Flow (cfs)
P_2010	2\13\2023	18:12:53	13:12:53	115835
P_2011	2\13\2023	18:16:58	13:16:58	115237.2






Calibrating a 2D HEC-RAS Model to ADCP Transects

RAS

HH&C
Science & Engineering
Technology

0:09 / 3:30

Calibrating a 2D HEC-RAS Model with ADCP Transects

 **Stanford Gibson**
5.82K subscribers

[Analytics](#) [Edit video](#)

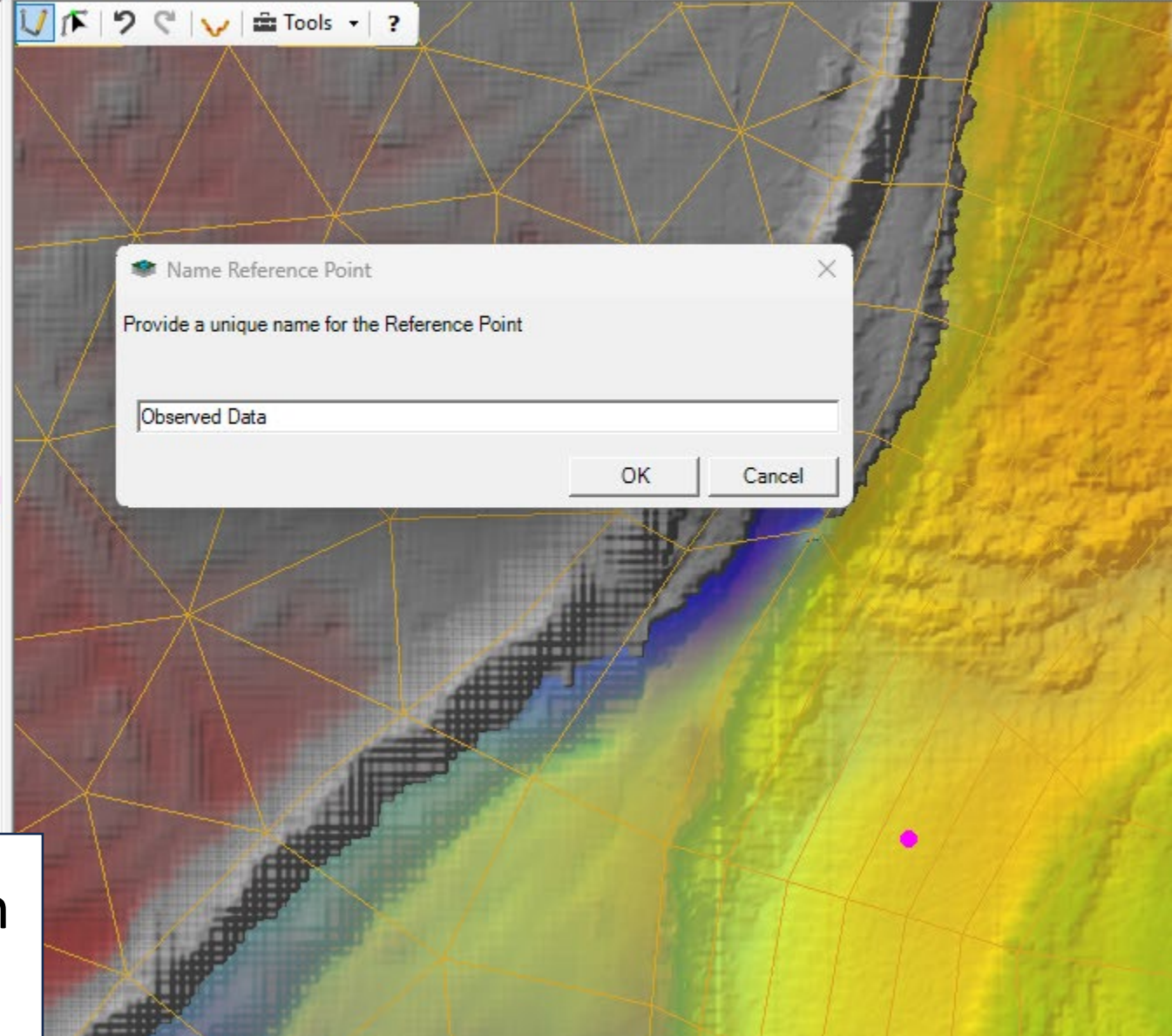
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4.1K views · 2 years ago

<https://youtu.be/IRngdzc8xKg?si=8Bezv6HLV5SBDG0->



- Features
 - Profile Lines
- Geometries
 - Import
 - Add Bridge
 - Bridge 3 Lines
 - Rivers
 - Cross Sections
 - Storage Areas
 - 2D Flow Areas
 - Bridges/Culverts
 - Inline Structures
 - Lateral Structures
 - SA/2D Connections
 - Pump Stations
 - Boundary Condition Lines
 - Initial Condition Points
 - Reference Points
 - Reference Lines
 - Reference Areas
 - Pipe Networks (Beta)
 - Manning's n
 - Infiltration
 - Percent Impervious
 - Errors
- Plans
- Event Conditions
- Results
 - 80k
 - Event Conditions



Name Reference Point

Provide a unique name for the Reference Point

OK Cancel

Associate observed data with reference points and lines



Unsteady Flow Data - 80k

File Options Help

Description:

Boundary Conditions | Initial Conditions | Meteorological Data | **Observed Data**

Set/Edit Observed Data RS Locations

Observed Stages

Observed Flows

Observed Rating C

High Water Marks

Observed Data Time Series: Observed Stage

Detailed | Table

Observed Location:

Source:

DSS Data

Filename:

Path:

- BC Line: DS BC
- Ref Line: Approach_Ch
- Ref Line: Approach_ROB
- Ref Line: Approach_LOB
- Ref Line: Bridge_Ch
- Ref Point: Pier 1
- Ref Point: Pier 2
- Ref Point: Observed Data**

Define observed stage, flows, rating curves and high water marks



File Type Options

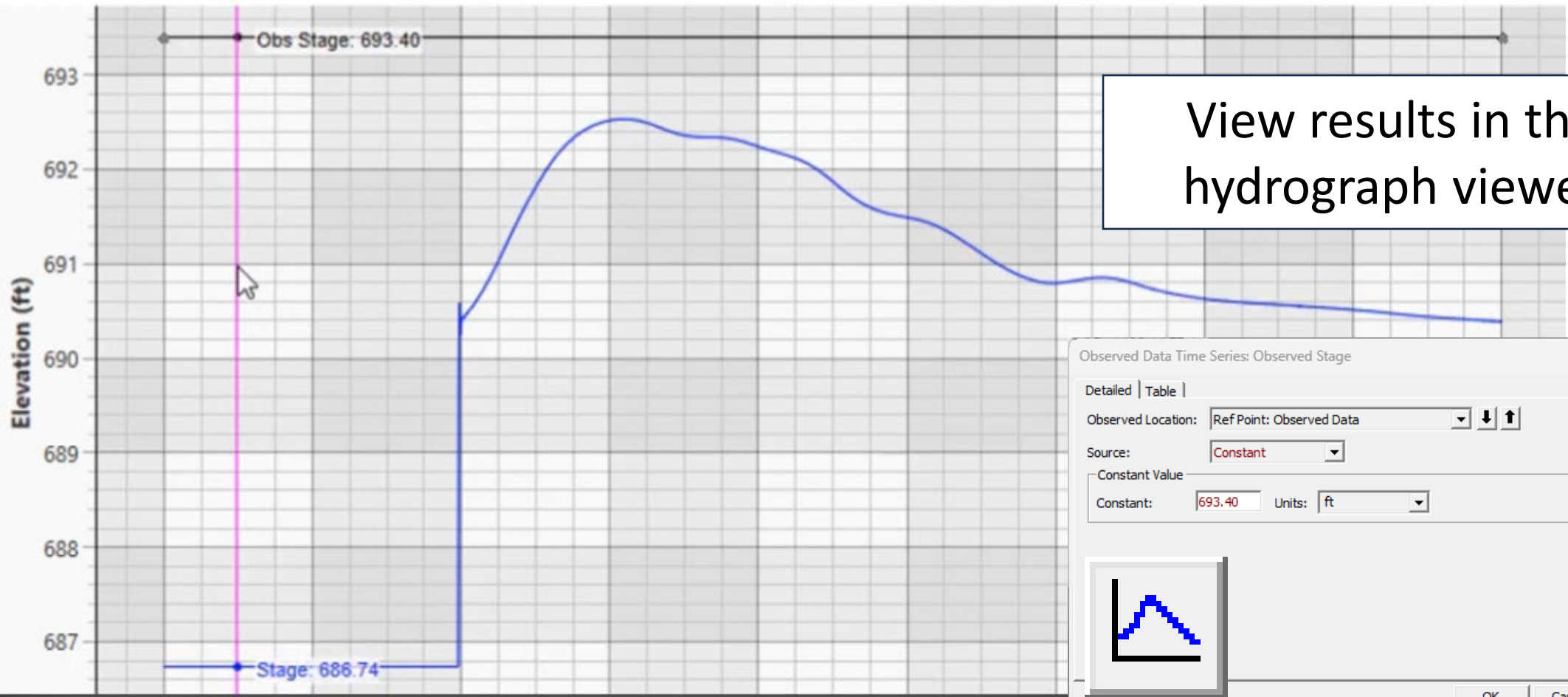
Ref Point:: HWM (OBS)

Time Series	Maximum	Time at Max	Volume ac-ft
Stage	692.53	13Dec2021	1219
Obs Stage	693.4	12Dec2021	2400

Plot Stage
 Plot Flow
 Obs Stage
 Obs Flow
 Use Ref Stage

Time Series
 Rating Curve

Plan: Demo Ref Point:: HWM



View results in the hydrograph viewer

Observed Data Time Series: Observed Stage

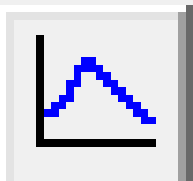
Detailed | Table |

Observed Location: Ref Point: Observed Data

Source: Constant

Constant Value

Constant: 693.40 Units: ft



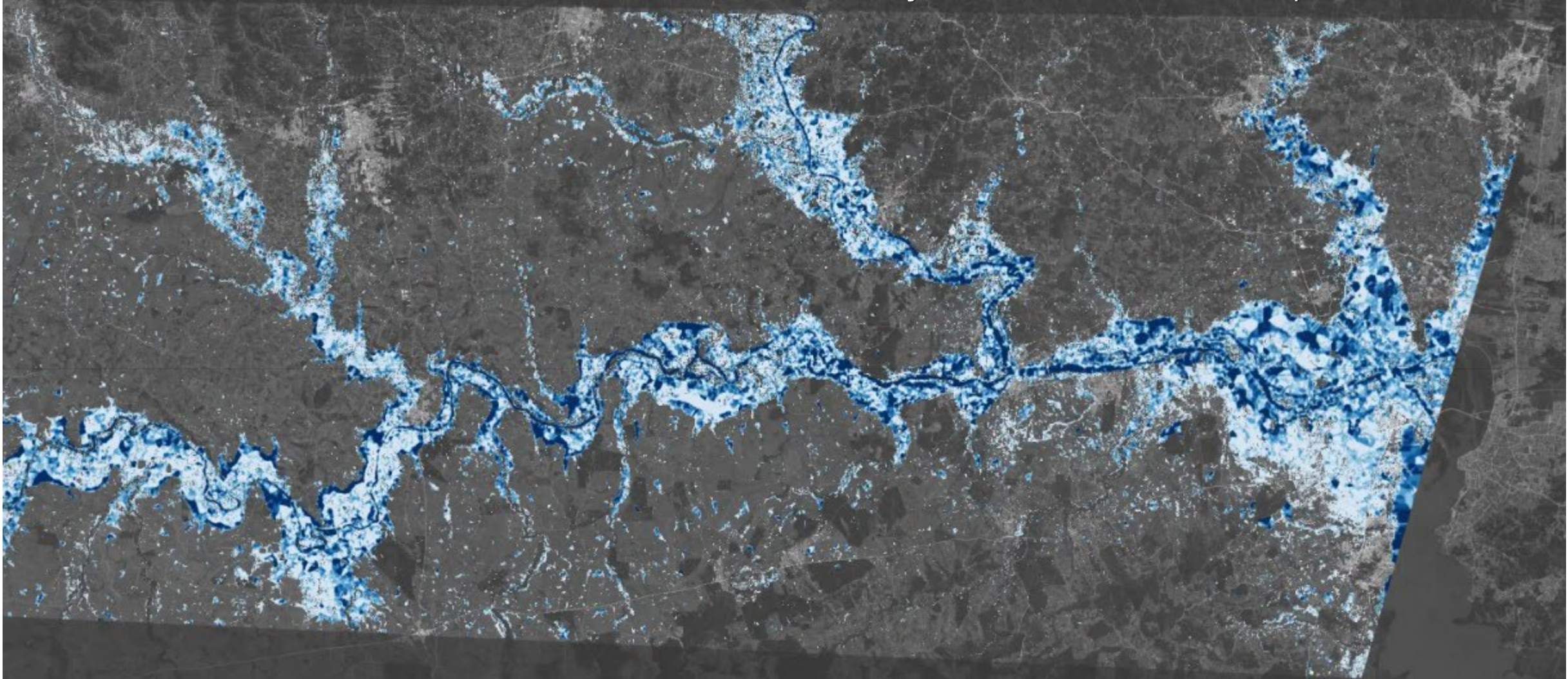
OK Cancel



Something We're Exploring: SWOT Data

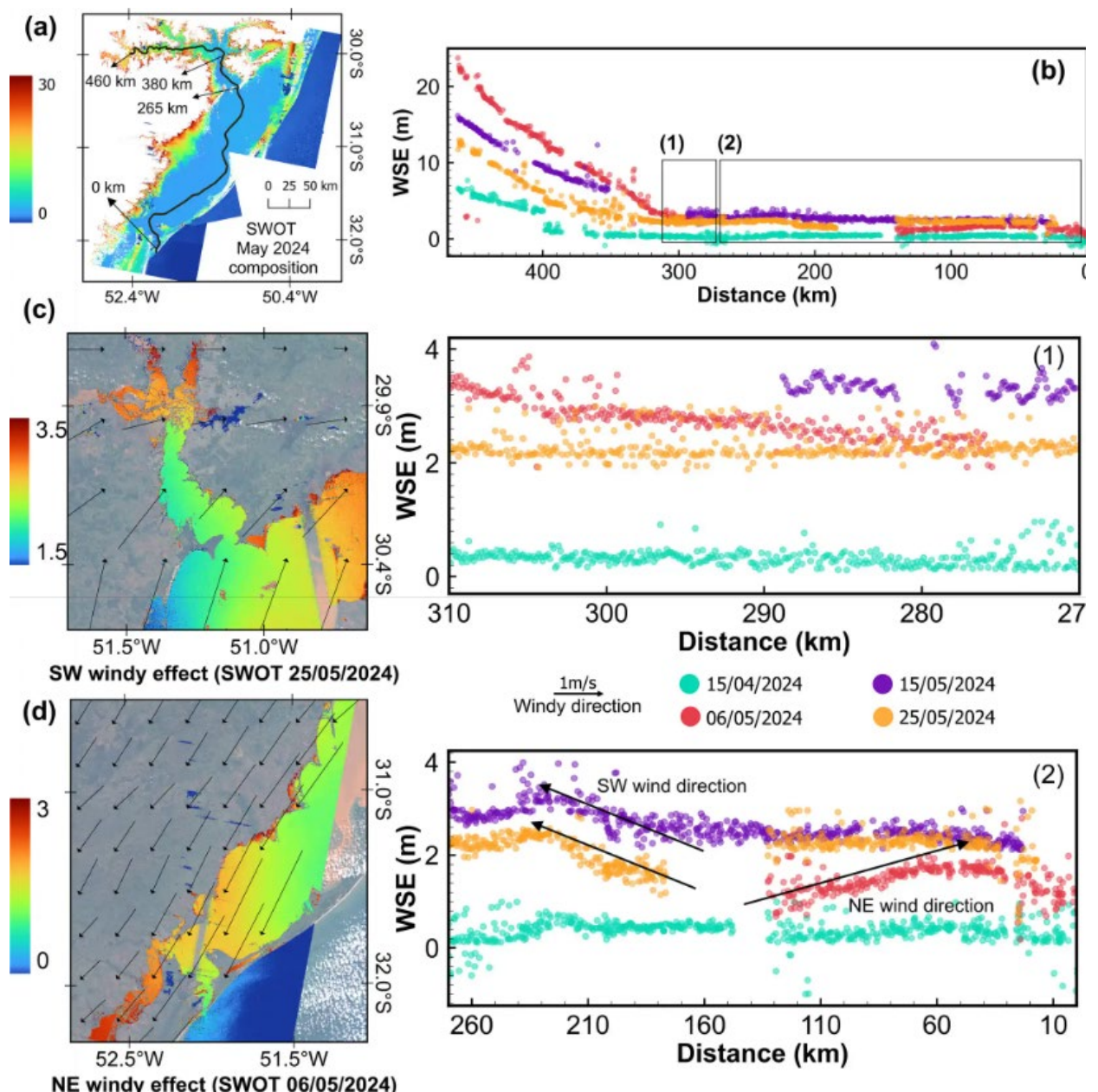


SWOT flies a **21-day repeat orbit**. Because the swaths overlap, the mission's **average revisit time over most of the globe is about 11 days**. 100m and 250m resolution products





Something We're Exploring: SWOT Data





Download RAS2025 for Tomorrow



The banner features a dark blue background. At the top center is a logo consisting of two blue triangles forming a mountain range with a white winding path. Below this, the text "RAS 2025" is displayed in a large, bold, blue font, with "ALPHA" in a smaller, lighter blue font underneath. At the bottom center is a prominent blue button with a white download icon and the word "Download". Below the button are three links: "Getting Started", "Announcements", and "YouTube", all in a light blue font.

<https://www.hec.usace.army.mil/software/hec-ras/2025/>