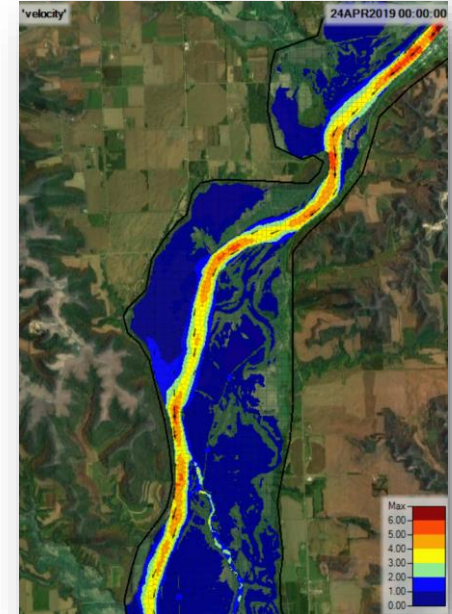# FY20 RSM IPR
2D HEC-RAS Sediment Model Testing – Chippewa River (WI)
Alex Nelson, P.E., Senior Hydraulic Engineer, St. Paul District (MVP),

BLUF: To develop a 2D sediment HEC-RAS model for the Chippewa River (WI) that builds off of the 1D sediment modeling performed in FY19 as a way to test beta versions of RAS and gain insight to the sediment delivery of to the Mississippi River navigation channel from the Chippewa River.
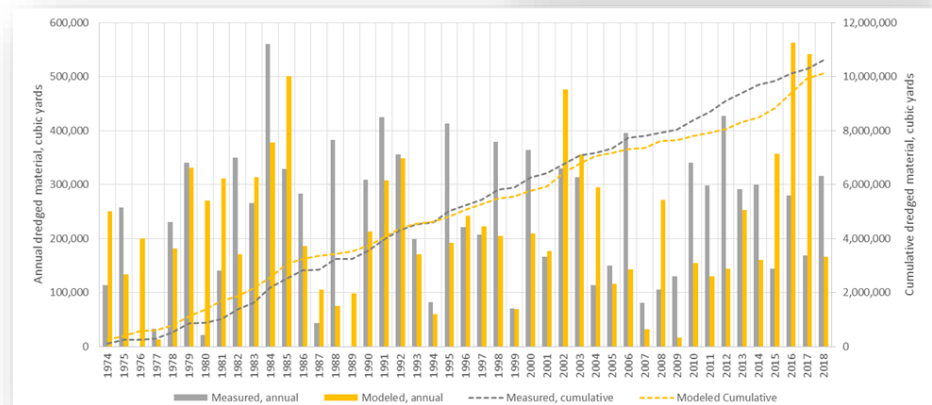

Challenge/Objectives

- Convert previous 1D model to 2D model

- Test new Beta versions of HEC-RAS 2D Sediment in development of HEC-RAS 6.0

- Gain further insight on the quantity and characteristics of sediment deposition in the area

Approach

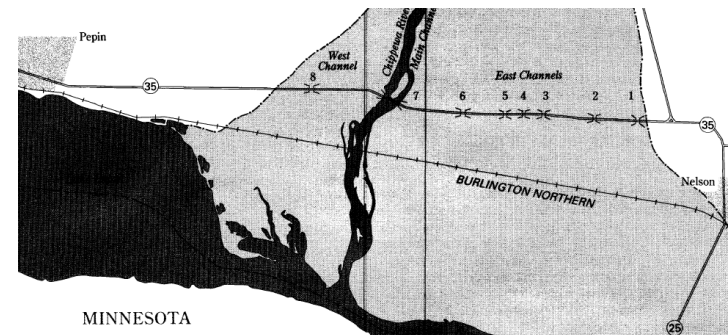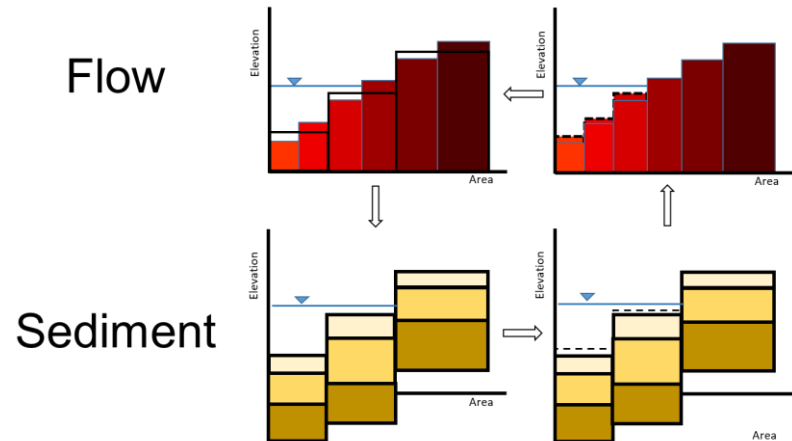- HEC-RAS 2D Sediment Transport

District/Other USACE PDT Members

- Jon Hendrickson, MVP H&H
- Zach Kimmel, MVP Project Management

Collaborators (HEC)

- Stanford Gibson
- Alex Sanchez

Leveraging/Collaborative Opportunities

- **USGS –** recent data collection
- **ERDC –** recent bedload analysis
- **MVP –** bathymetry, flow and stage collection during high water

Accomplishments/Deliverables

- Successfully converted previous 1D hydraulic model (FY19) to calibrated/validated HEC-RAS 2D hydraulic model.

- Developed test section for Chippewa River which has been used in beta testing for RAS 2D sediment
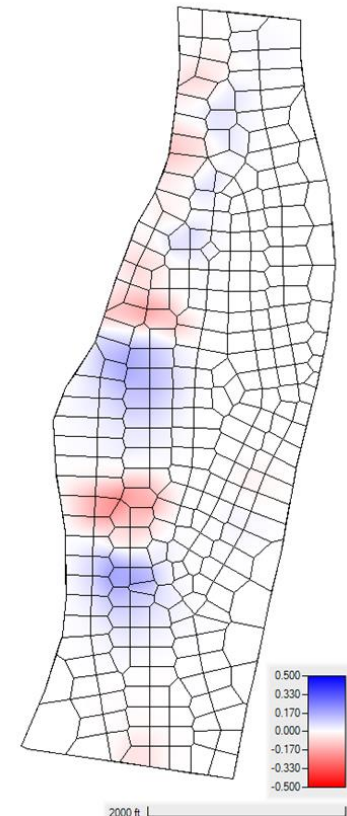
Lessons Learned

- HEC is busy! (obviously)

- Face-to-face meeting/work would have benefitted the project

Concentration
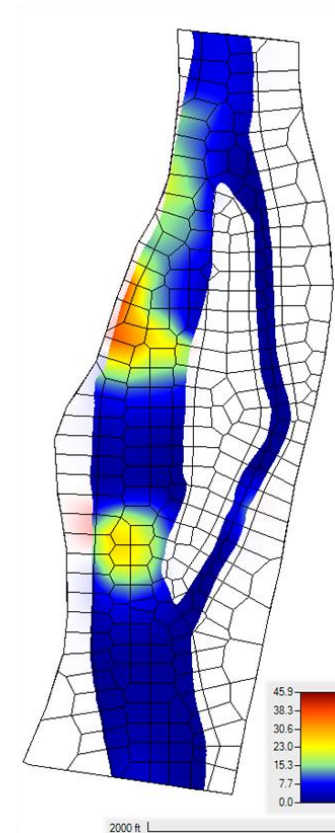
Bed Change

- 10 Grain Classes
  - FS to VCG
- Transport Function: Wu et al. (2000)

FY20 RSM IPR
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What challenges did you face to get your project to implementation and how did you move past them?

- Not being able to have face-to-face meeting to work with HEC in development of the model due to COVID restrictions

    - Able to meet regularly through virtual meetings and will continue to do so, which should be sufficient to capture most of the benefits of the face-to-face

- Not being able to collect additional field data due to COVID restrictions

    - Did not collect additional data, but luckily there is a lot to work from already

- RAS Sediment Team (Stan and Alex) have a lot on their plate between tight RAS development deadlines and other RSM work to complete

    - We shifted plans to allow for most of the work to occur in September and October

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How is this project benefiting the USACE and Nation?

- Chippewa River delivers **30%** of average annual MVP dredging despite Lower Pool 4 only being **5%** of navigation channel length with no way to predict sedimentation based on discharge or volume alone – this additional modeling will help inform channel maintenance planning!

- Opportunity to provide additional **testing and validation for HEC-RAS 2D Sediment** – this location has a wealth of hydraulic and sediment data collected through the years

St. Paul District, Average Annual Dredge Volumes, 1974-2015

Sediment-Rating Curve