Lower Platte River Hydraulic Modeling

Platte River Recovery Implementation Program

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Creighton Omer, PE, CFM

2/21/2024

AGENDA

01 Introduction/Background

02 Project Elements (SOW)

03 Schedule

04 Current Progress

05 Next Steps

01

Introduction/Background

Introduction/Background

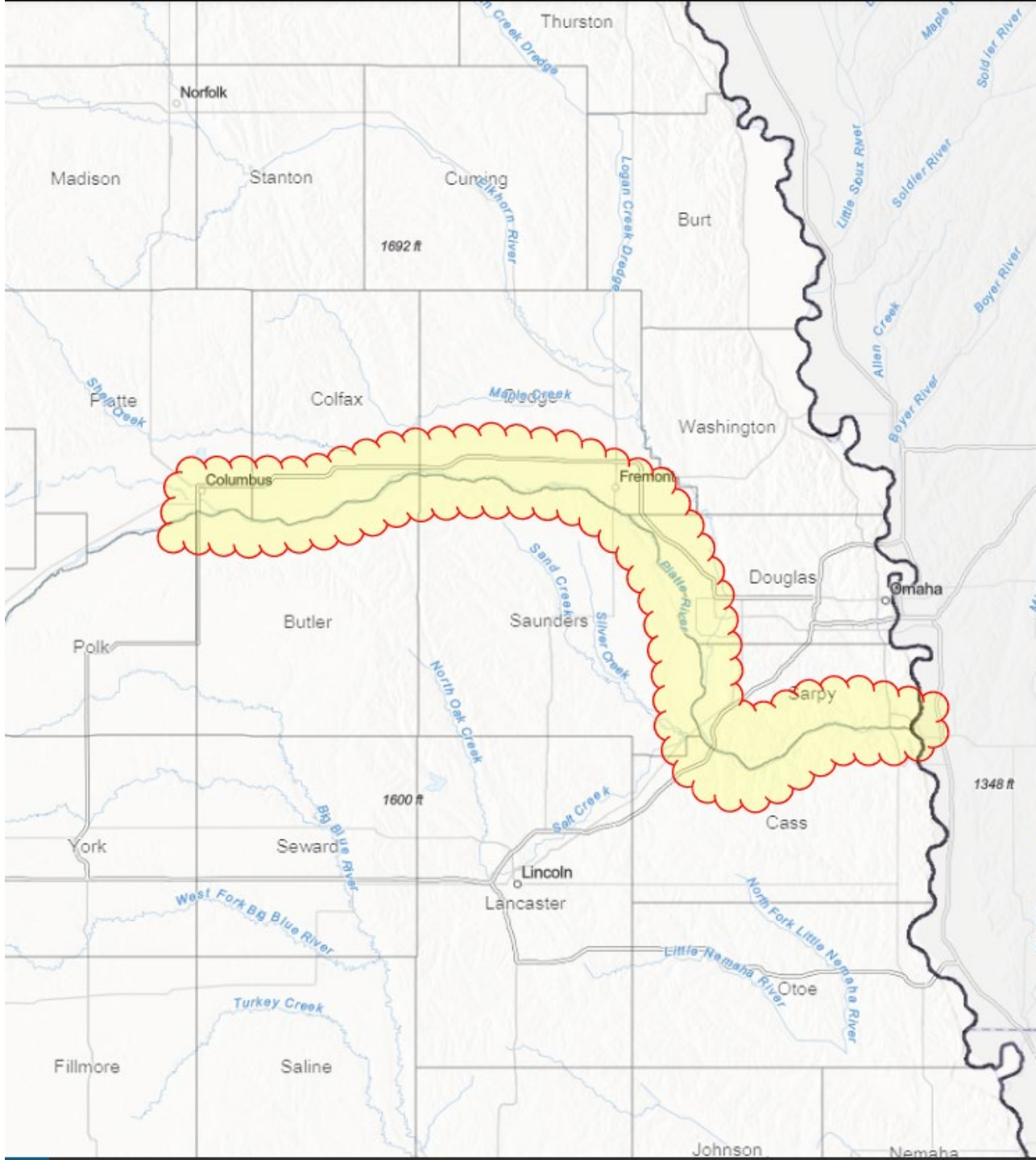
Program Objectives

- Collaboration with UNL to better understand Pallid Sturgeon Habitat
- Understand Spatial Distribution of Habitat
- Develop Hydraulic Model of Lower Platte
- Systematic Evaluation of Depth, Velocity, and Other Metrics

Introduction/Background

Accomplishing Objectives…

- Develop 2D model of Lower Platte River
- Discharges: 500 to 50,000 cfs
- HDR to Collaborate with Program and UNL to:
  - Review Hydrologic & Hydraulic Data
  - Determine Additional Data Needs
  - Develop Solution for Gaps in LiDAR (topobathy) Data
  - Select Modeling Parameters
  - Develop Modeling Scenarios



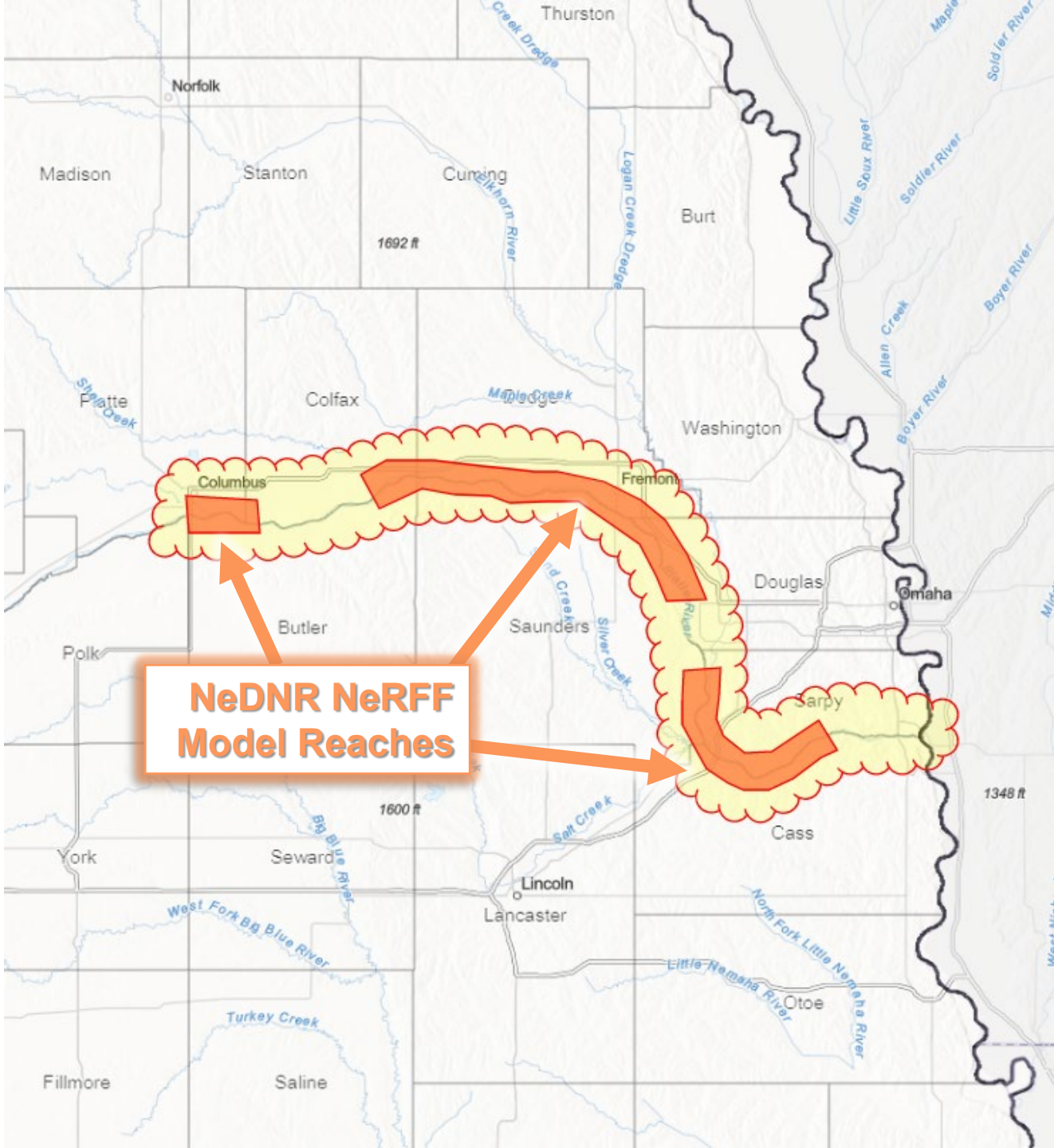
02

Project Elements

Project Elements

Scope of Work

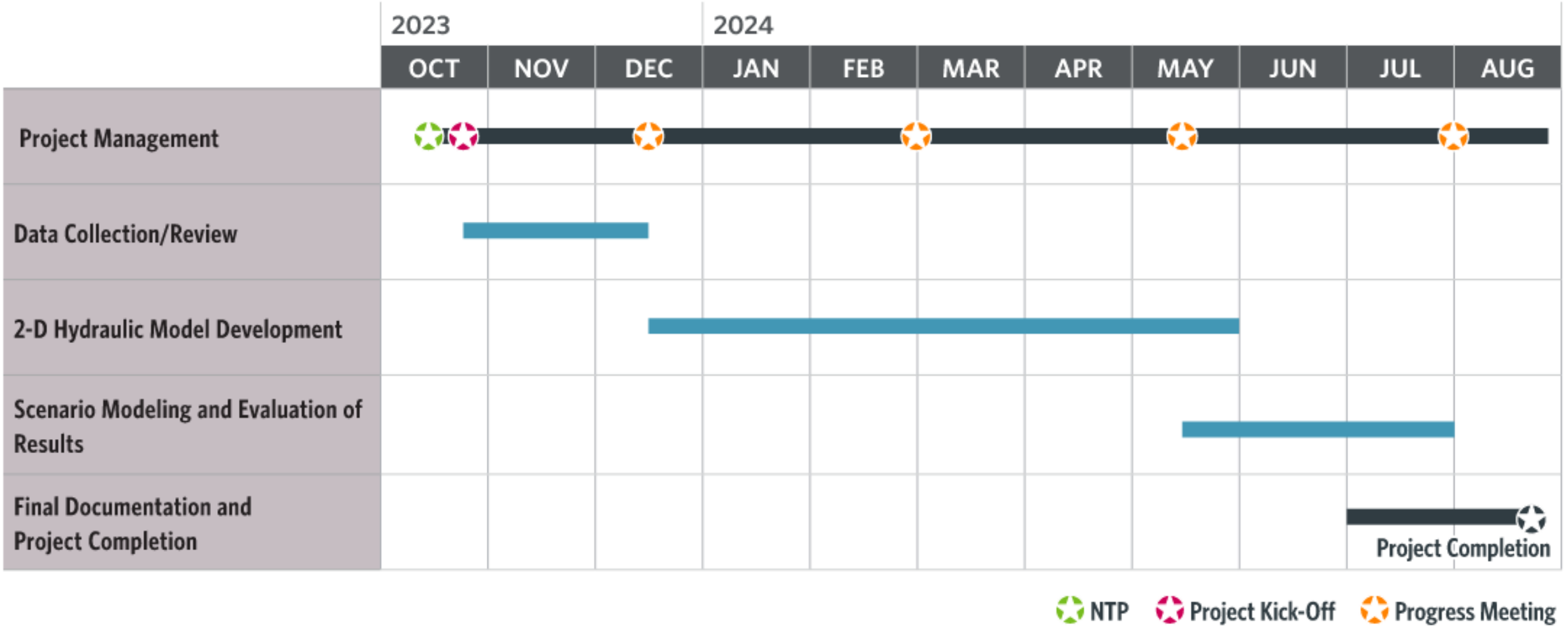
- Project Management
- Data Collection & Review
- 2D Hydraulic Model Development
- Scenario Modeling & Evaluation of Results



03

Schedule

Schedule

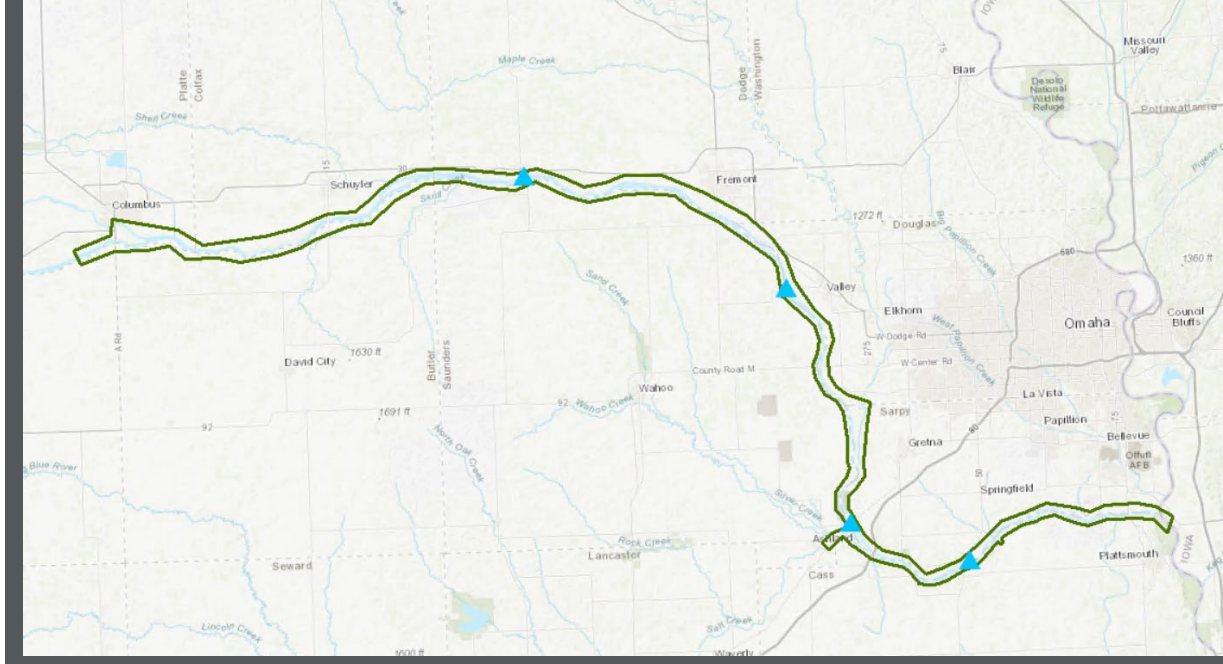

2023
2024
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
Project Management
Data Collection/Review
2-D Hydraulic Model Development
Scenario Modeling and Evaluation of Results
Final Documentation and Project Completion
Project Completion
NTP
Project Kick-Off
Progress Meeting

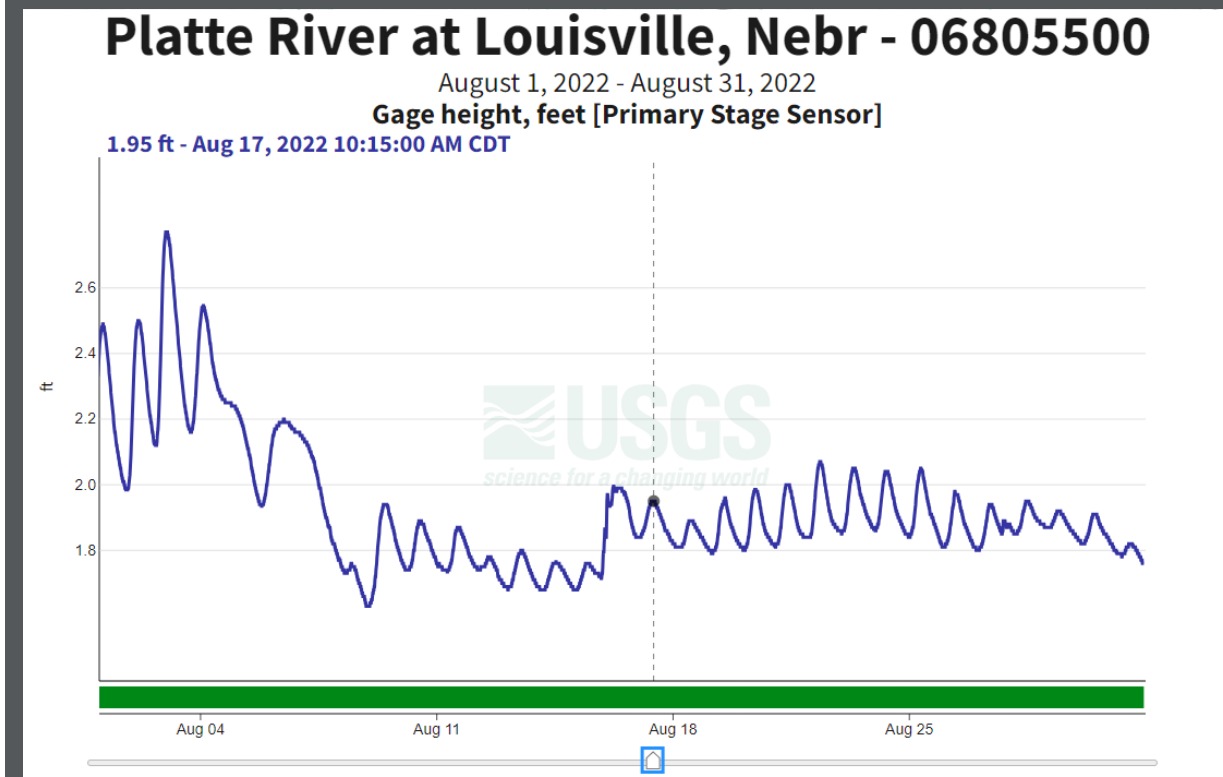
04

Current Progress

Data Collection and Review

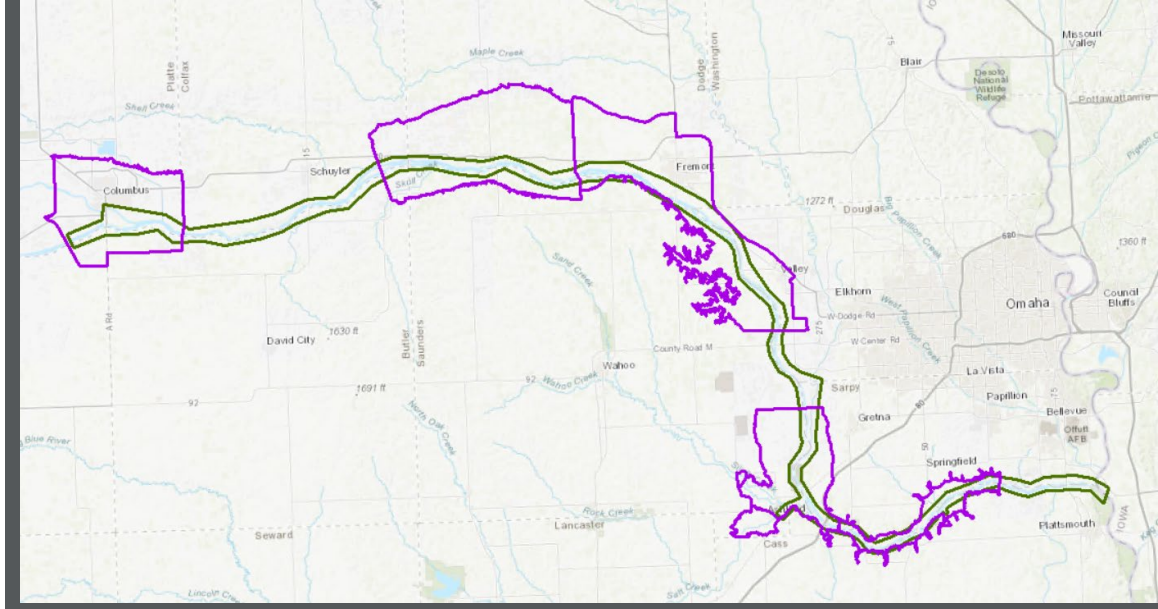
- Stream Gage Data

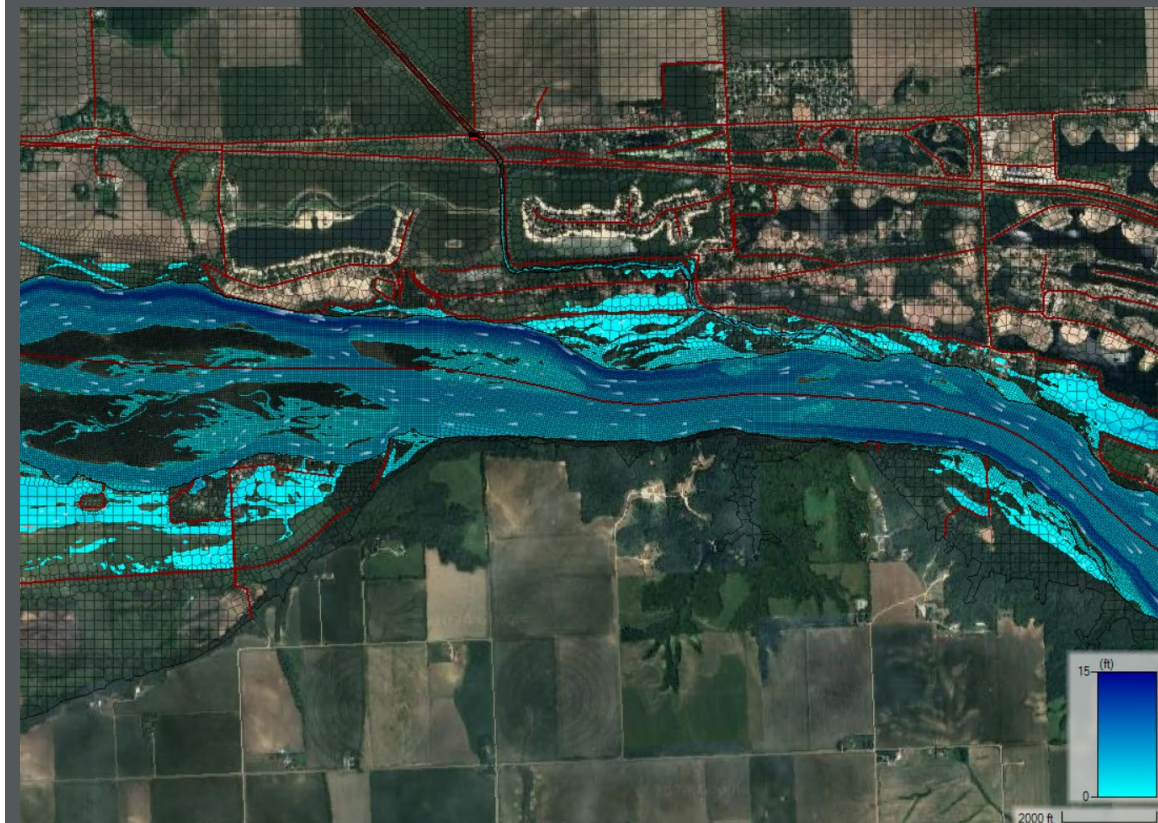




Data Collection and Review

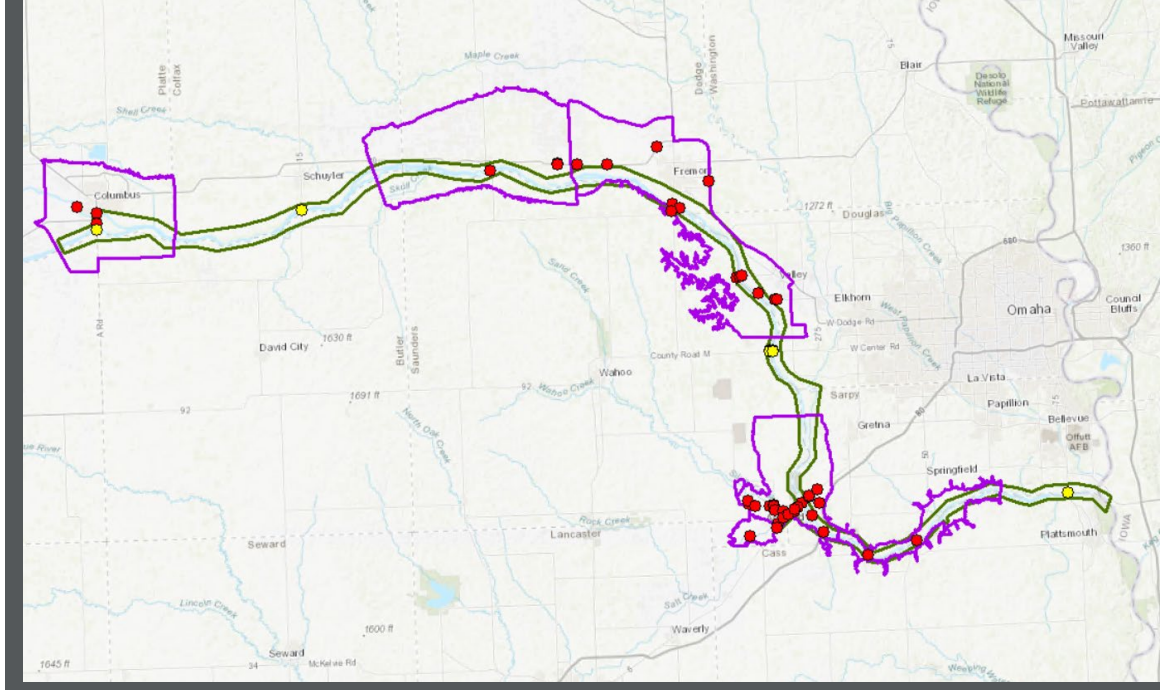
- Stream Gage Data
- Nebraska DNR 2D Hydraulic Models

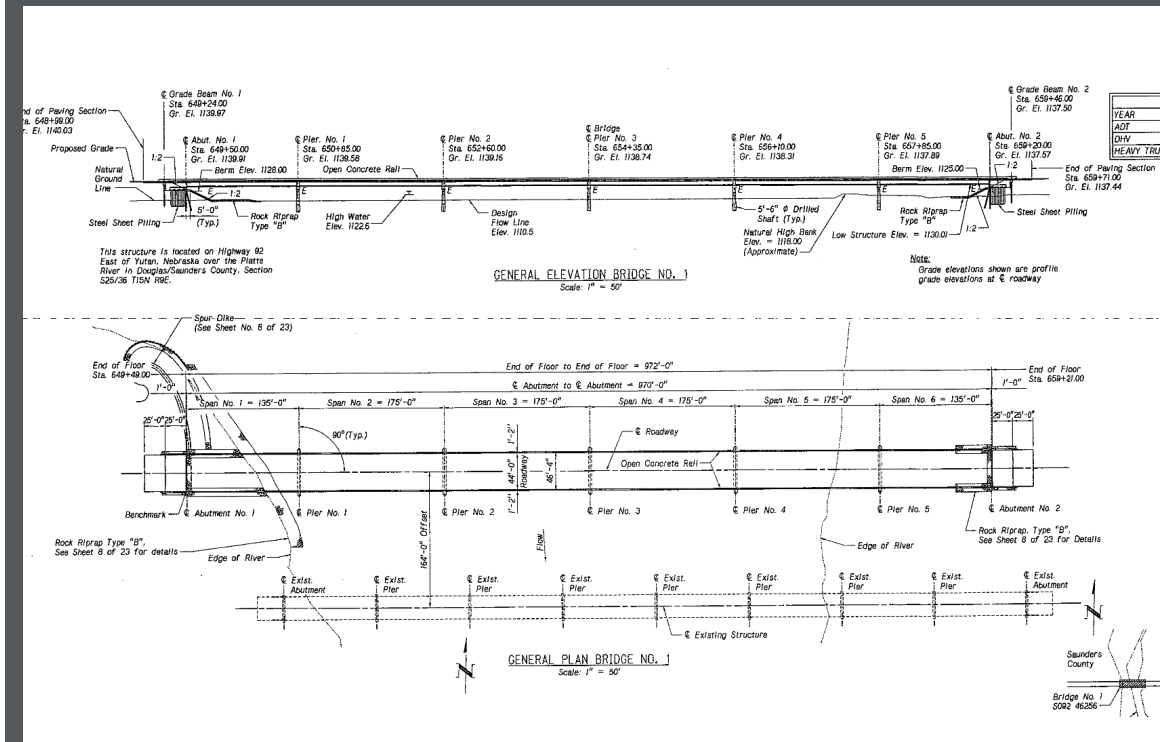




Data Collection and Review

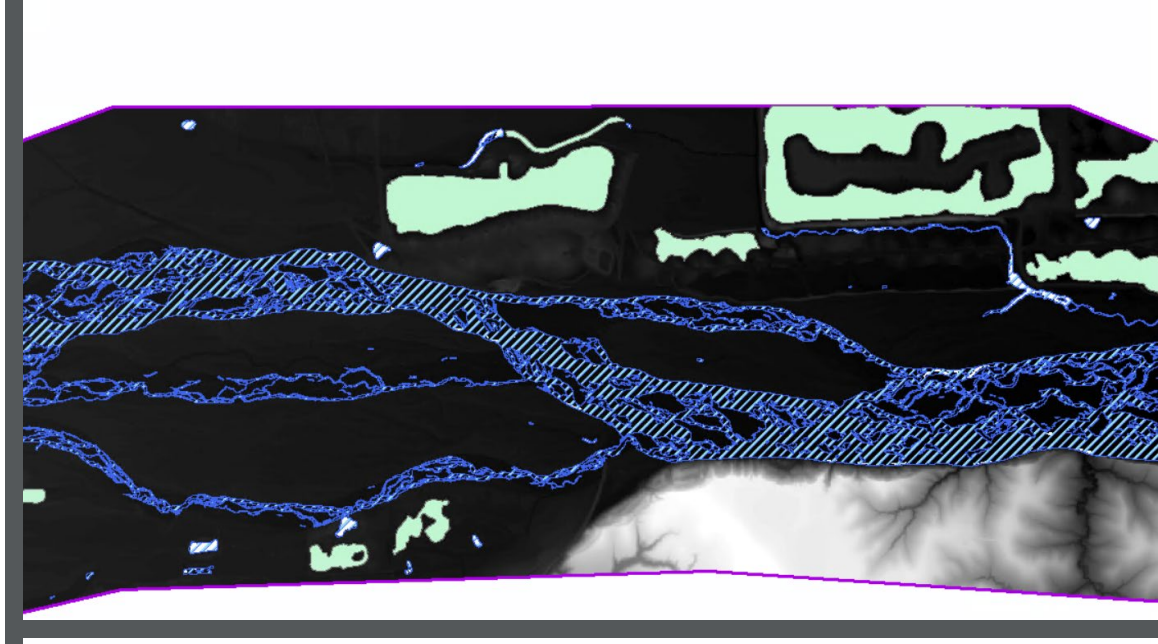
- Stream Gage Data
- Nebraska DNR 2D Hydraulic Models
- Bridge As-Builts

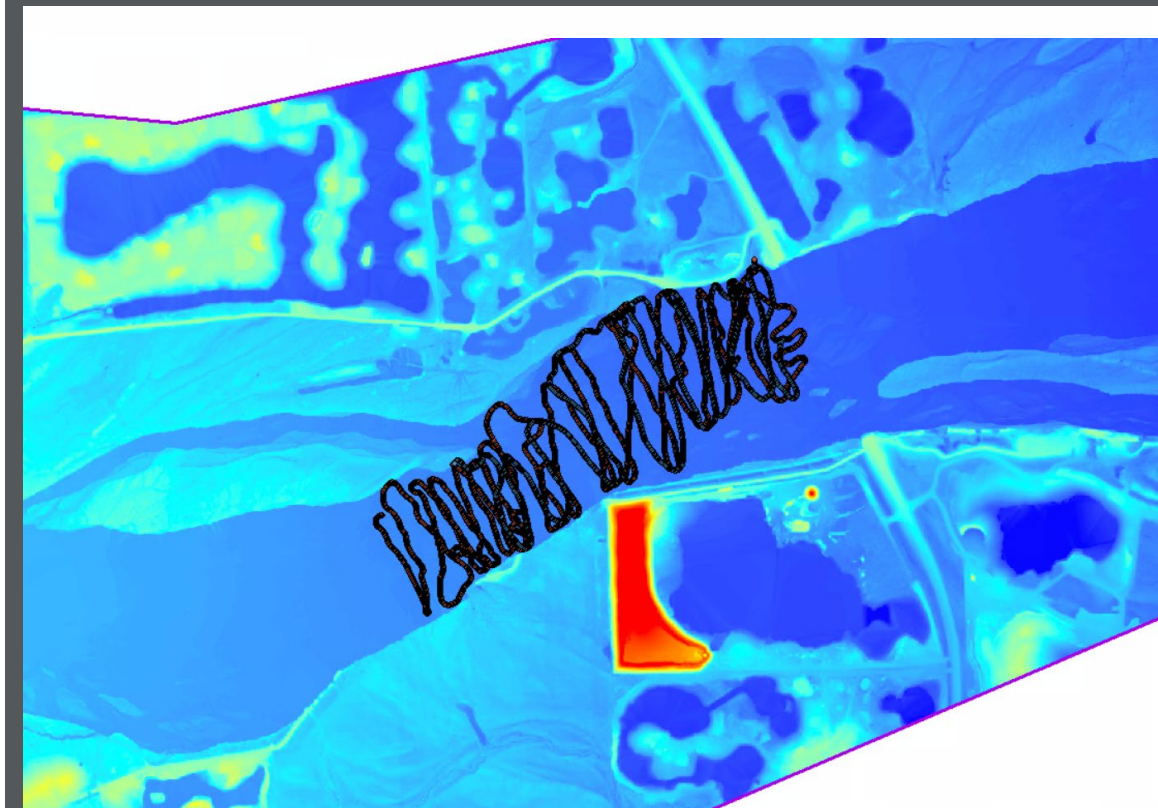




Data Collection and Review

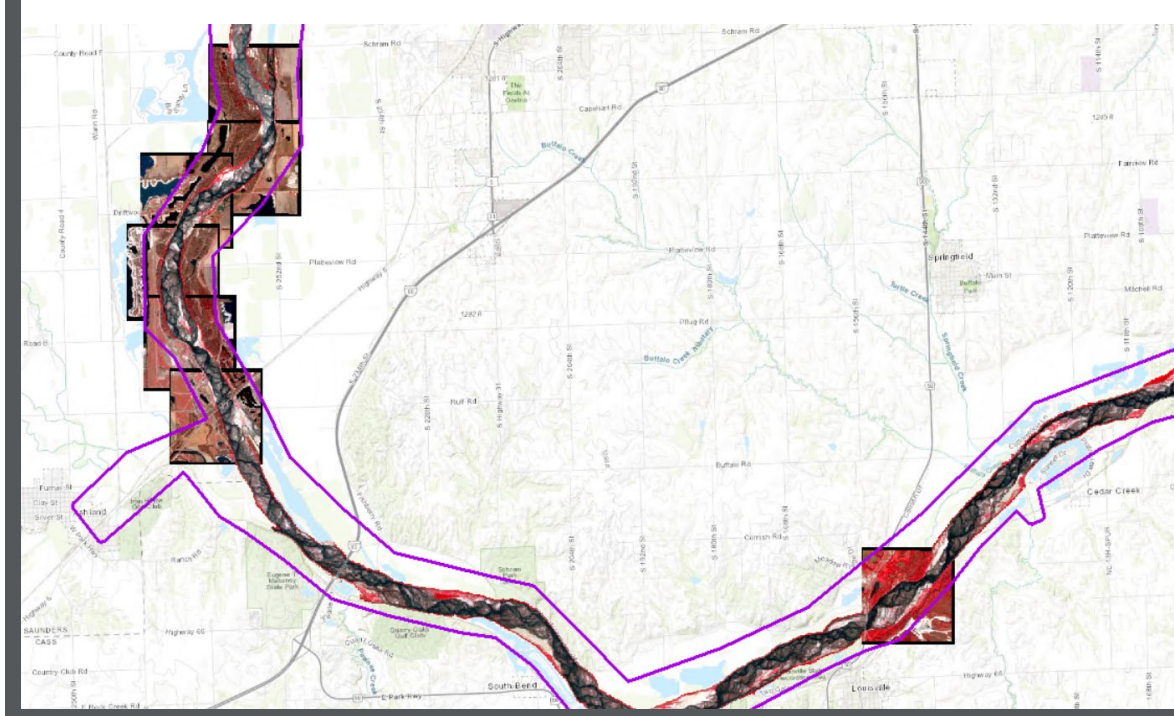
- Stream Gage Data
- Nebraska DNR 2D Hydraulic Models
- Bridge As-Builts
- PRRIP Data
  - LiDAR
  - ADCP Data

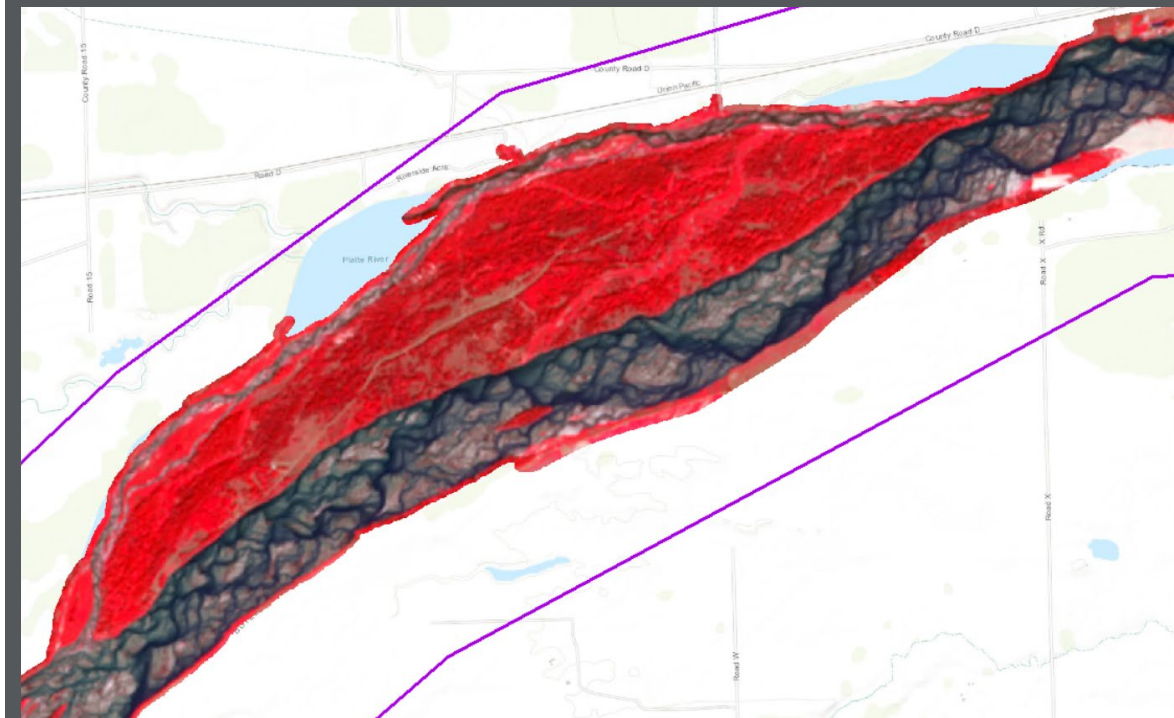




Data Collection and Review

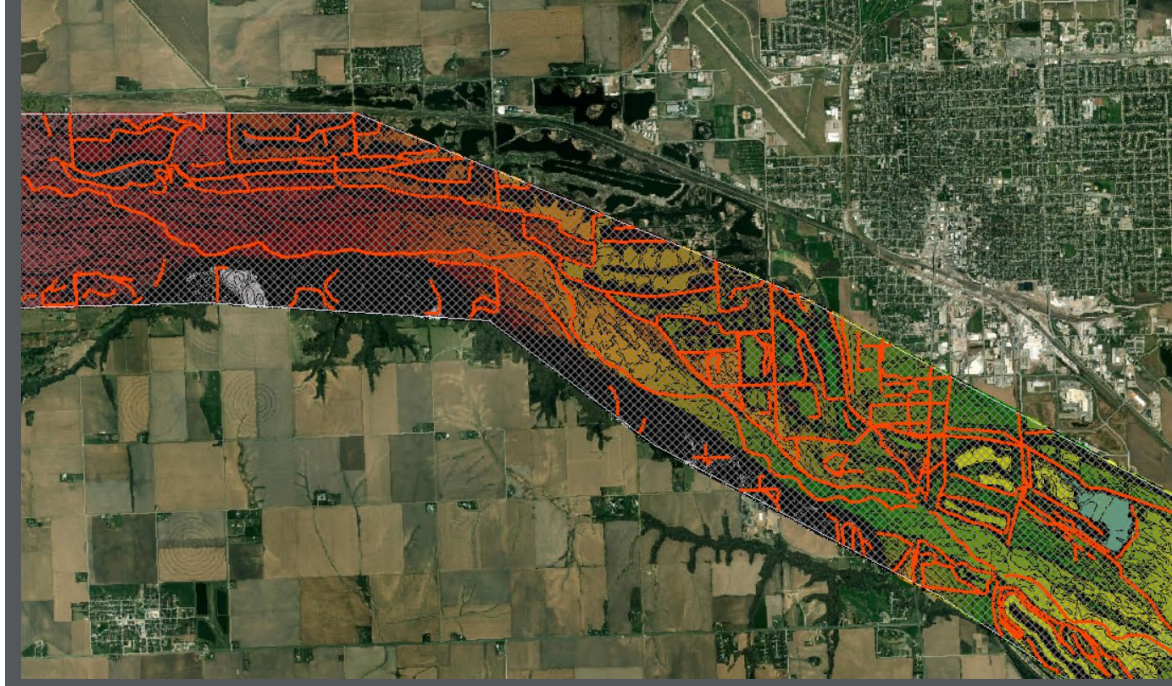
- Stream Gage Data
- Nebraska DNR 2D Hydraulic Models
- Bridge As-Builts
- PRRIP Data
  - LiDAR
  - ADCP Data
- Aerial Imagery

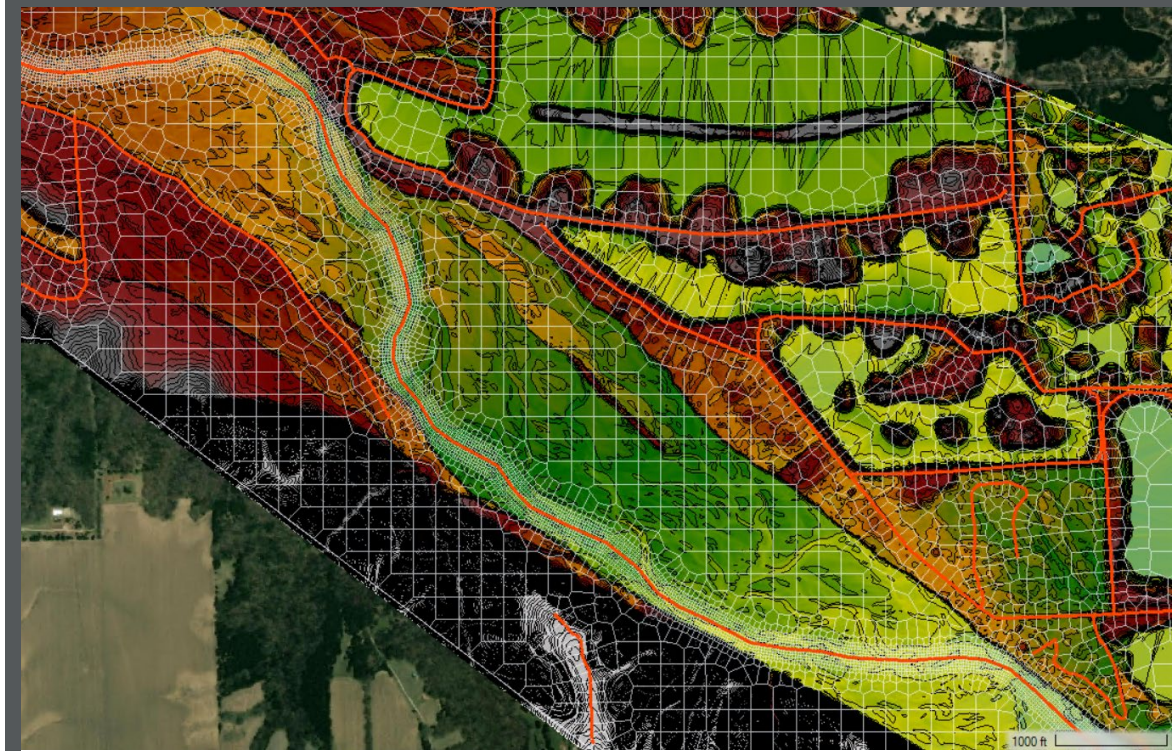




2D Hydraulic Model Development

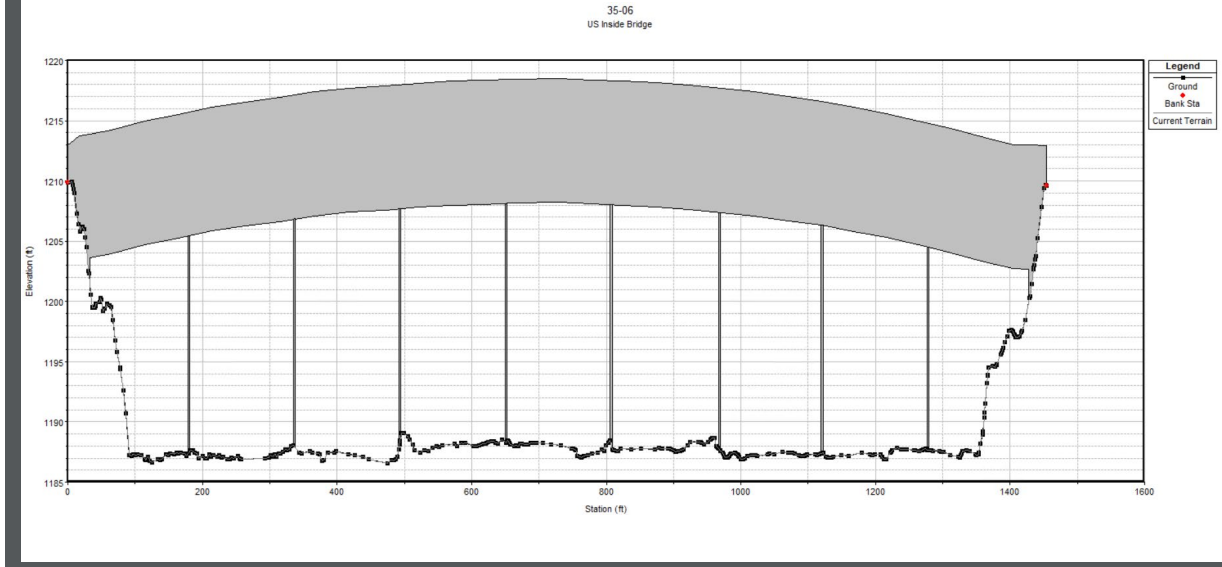
- Model Domain
- Mesh
- Breaklines

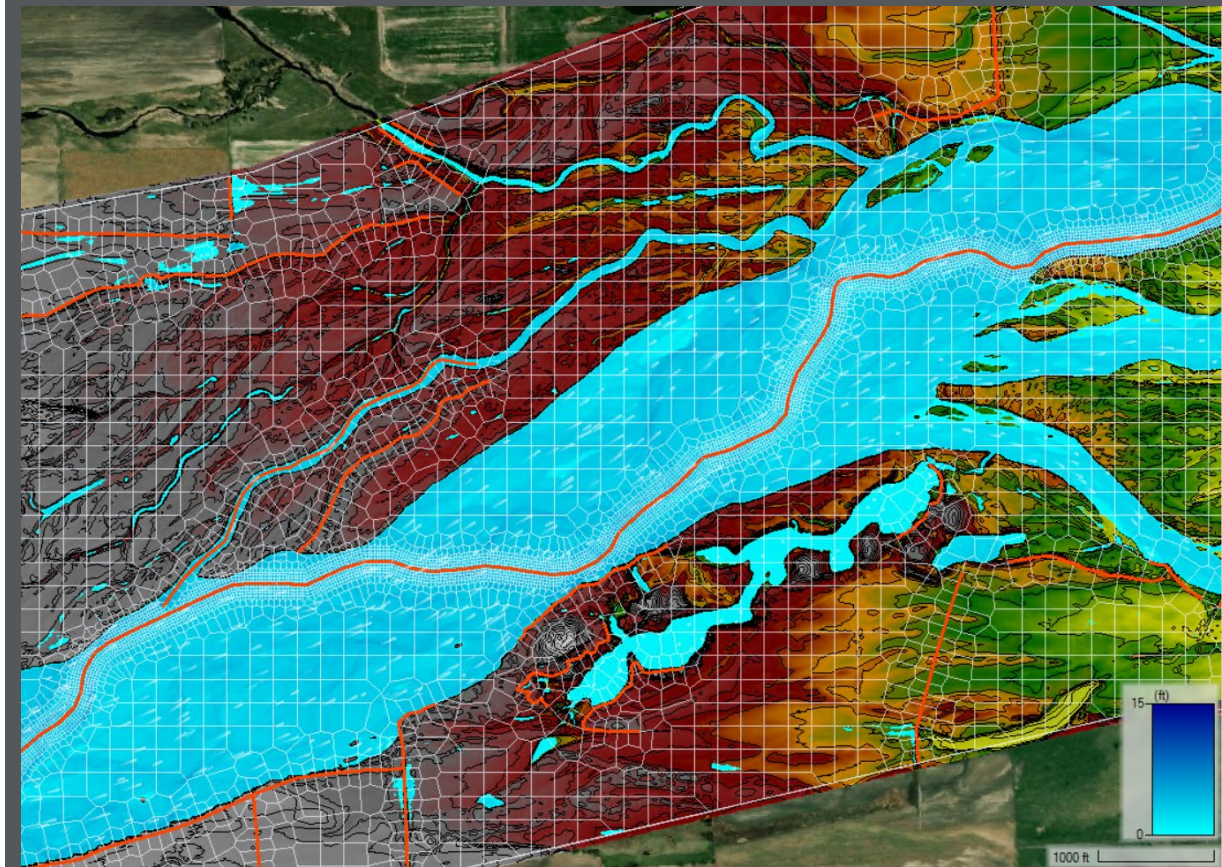




2D Hydraulic Model Development

- Model Domain
- Mesh
- Breaklines
- Structures
- Unsteady Flow Data
- Computational Sensitivity





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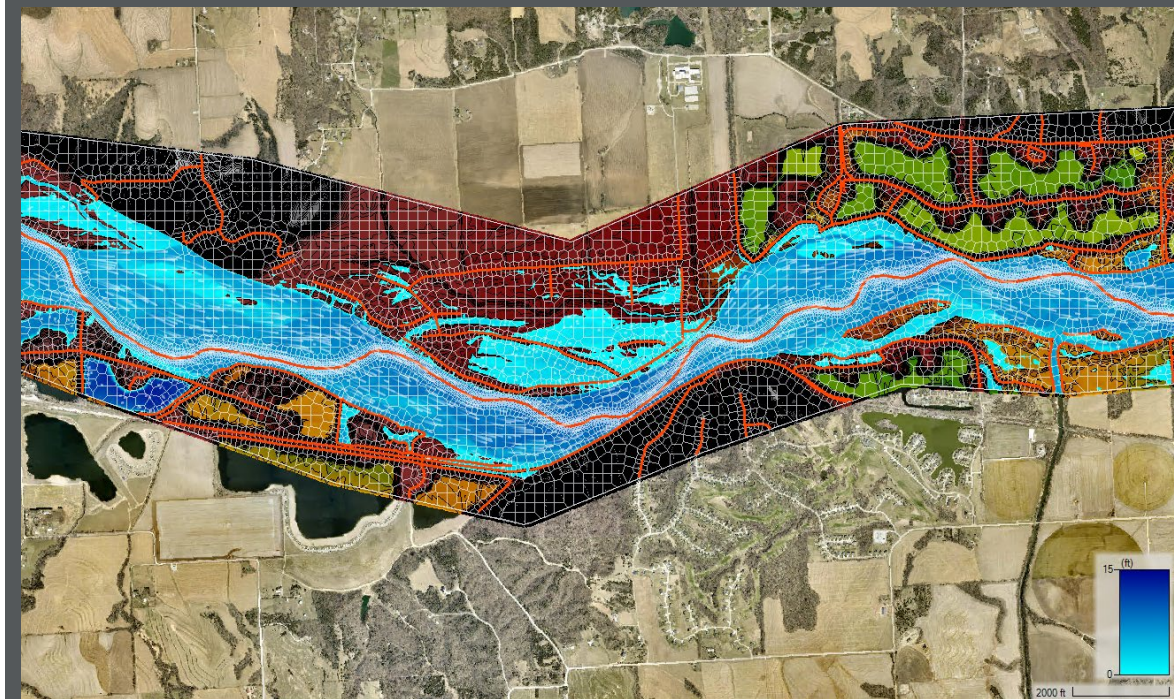
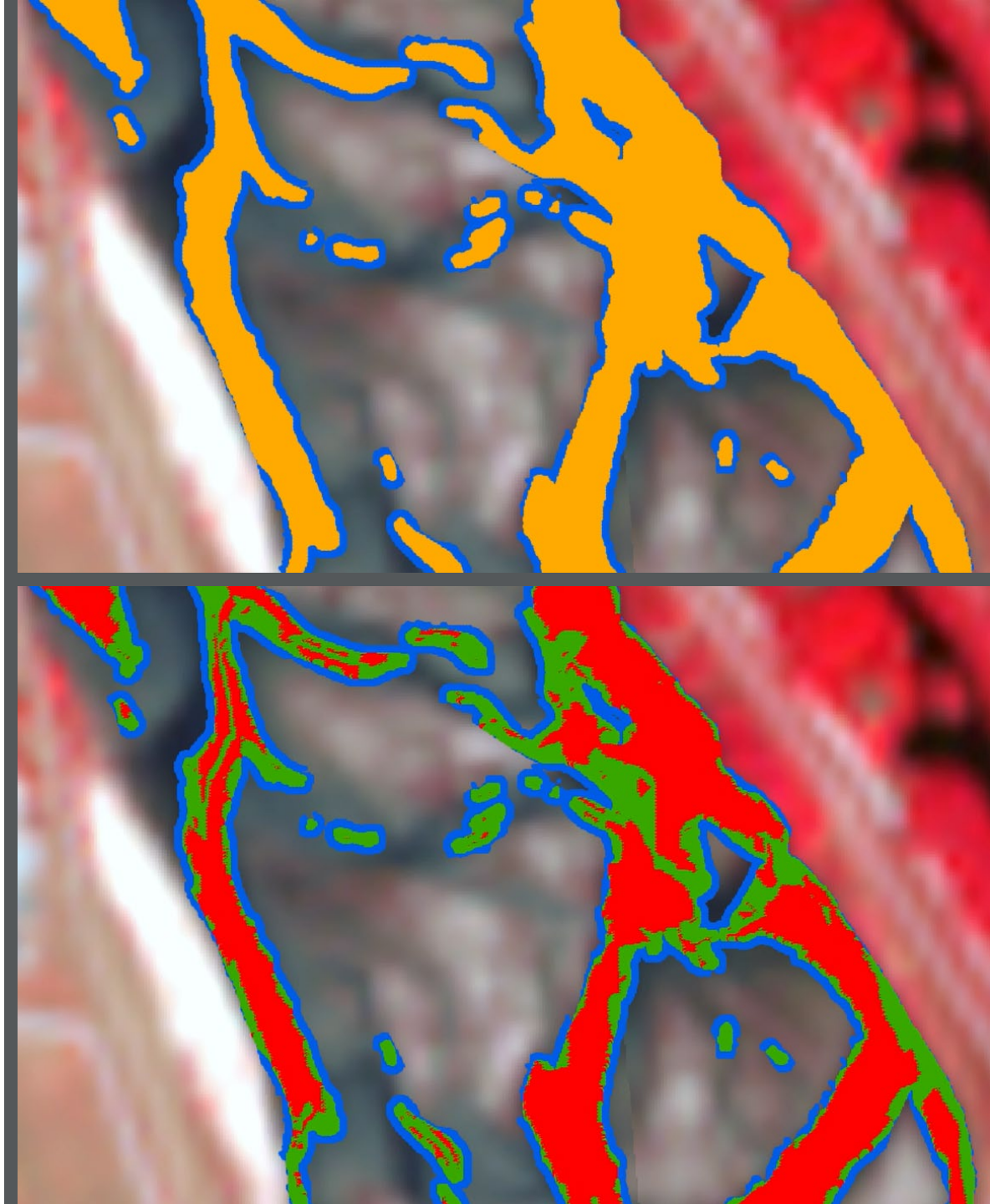


Shallow Bathymetry

- Aerial Imagery
- Pixels to Points with Color Values
- Python Script
  - Identify Nearest Neighbor Points
  - Perform Optical Band Ratio Analysis
  - Determine Color-Depth Relationship
  - Calculate Depths

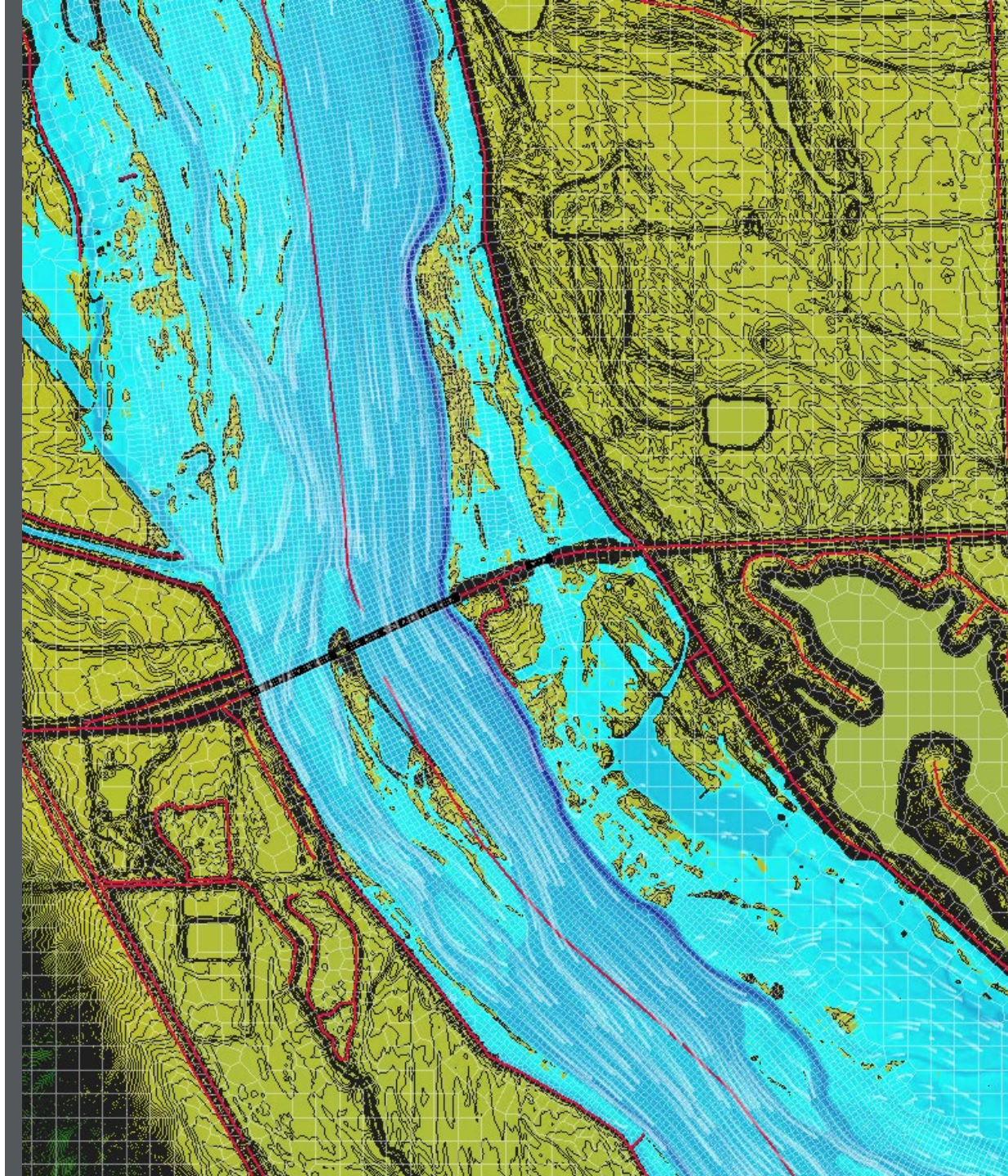


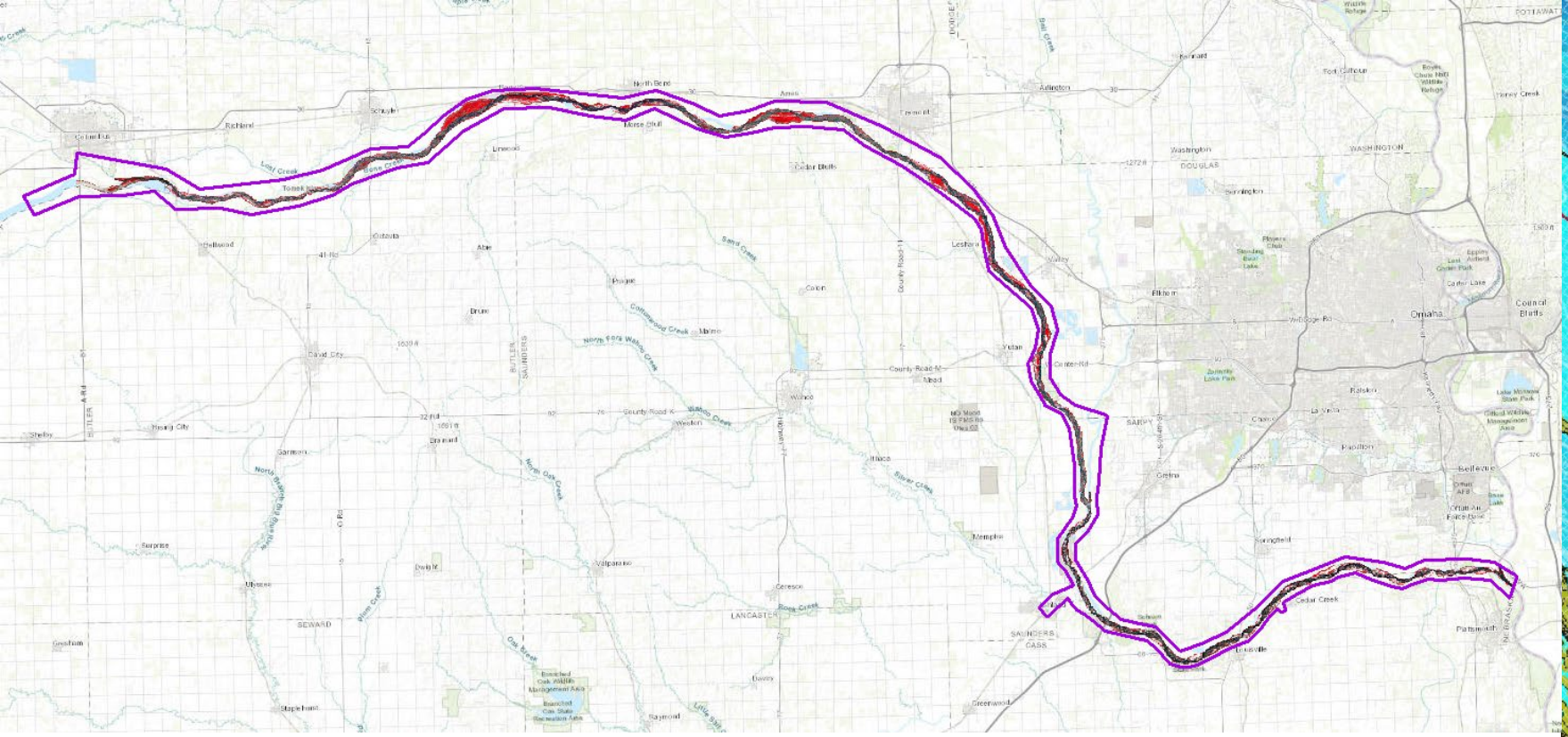
05

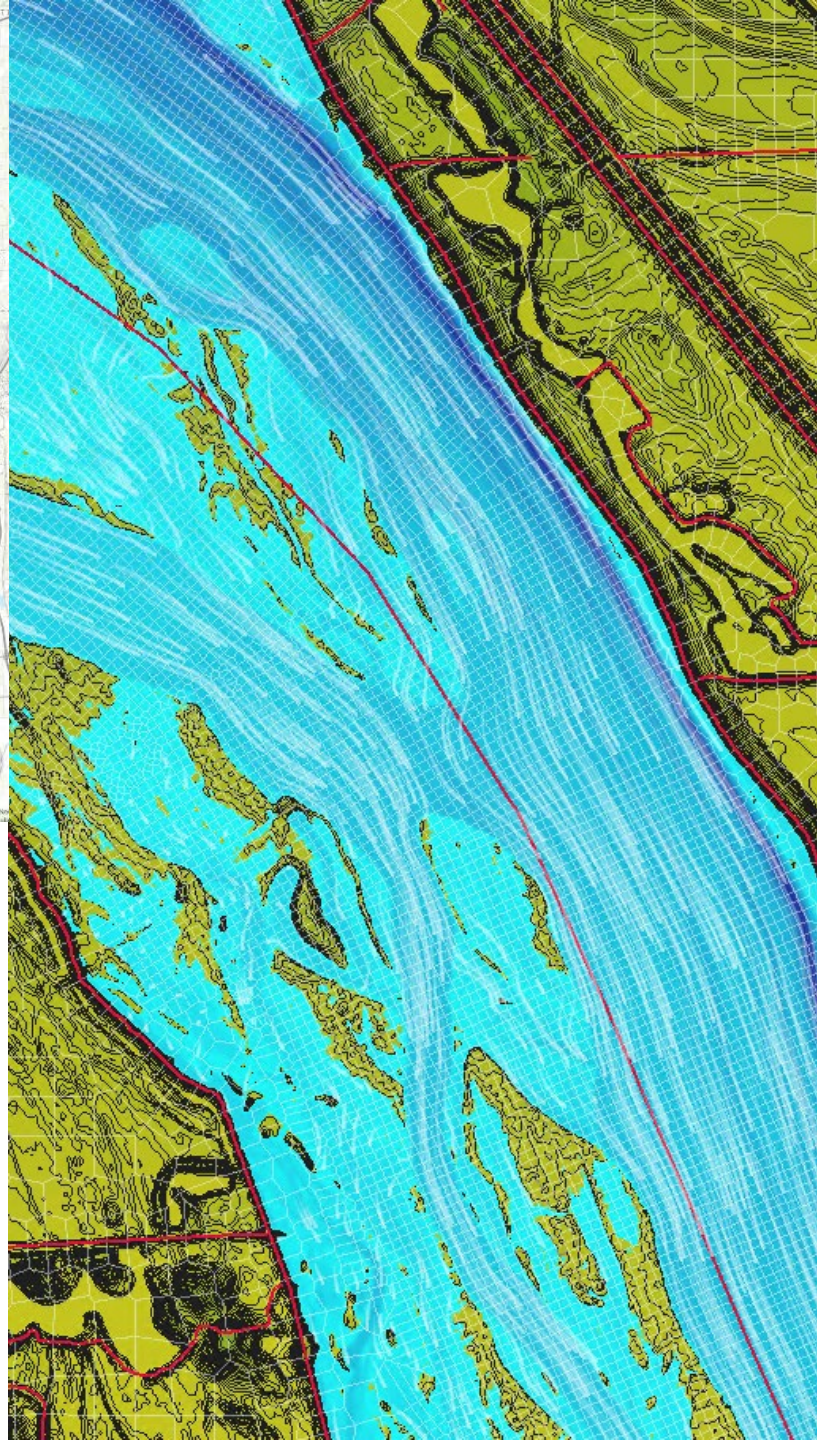
Next Steps

Next Steps

- Shallow Bathymetry (full implementation)
- ADCP Bathymetry
- Deep Bathymetry
- Model Calibration







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