

Monitoring Plan for No Augmentation

Ed Weschler



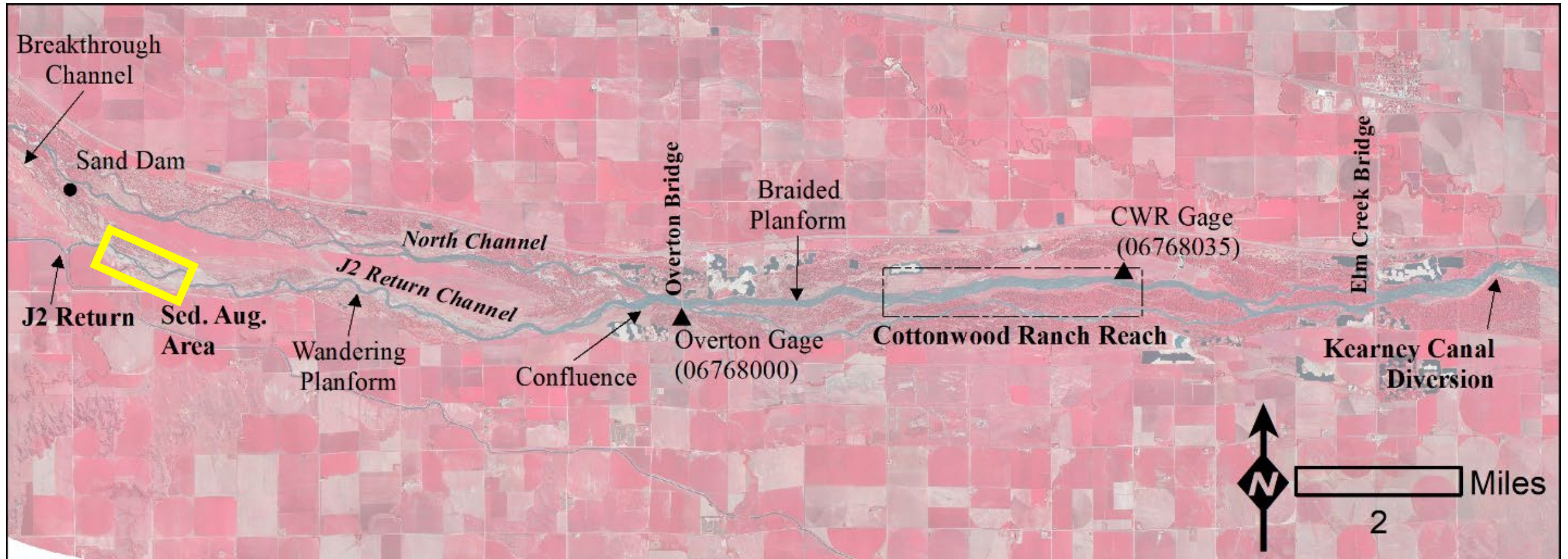
Purpose & Timeline

- Learn how the channel behaves without annual mechanical input
- May – TAC input on monitoring plan outline (1st Draft)
- July – ISAC input on monitoring plan (2nd Draft)
- September – Present final monitoring plan to GC

Outline

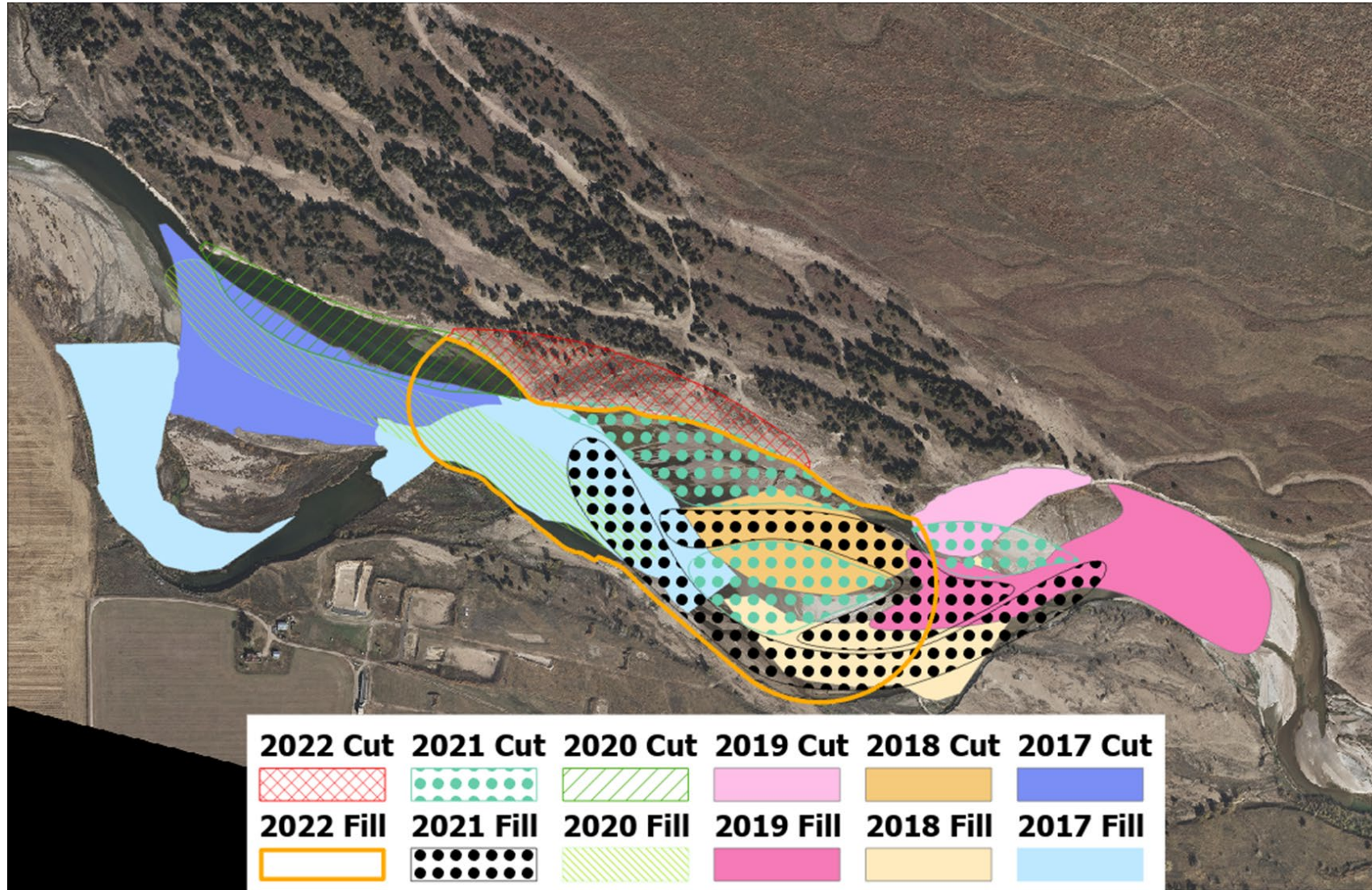


Setting Up the Problem



Background

- 6 full scale projects
 - 2017-2022
 - ~261,000 Cubic Yards of material
- Augmentation was put on hold in 2023
 - This “No-Augmentation” will continue until 2027, conditional on monitoring results.



An aerial photograph showing a river restoration project. A yellow excavator is positioned on a sandbar in the middle of a river, working on the shoreline. The river water is a greenish-brown color. The surrounding landscape is dry and grassy, with some trees in the background. A semi-transparent white box with a black border is overlaid on the image, containing the title text.

Analysis of Augmentation 2017-2022

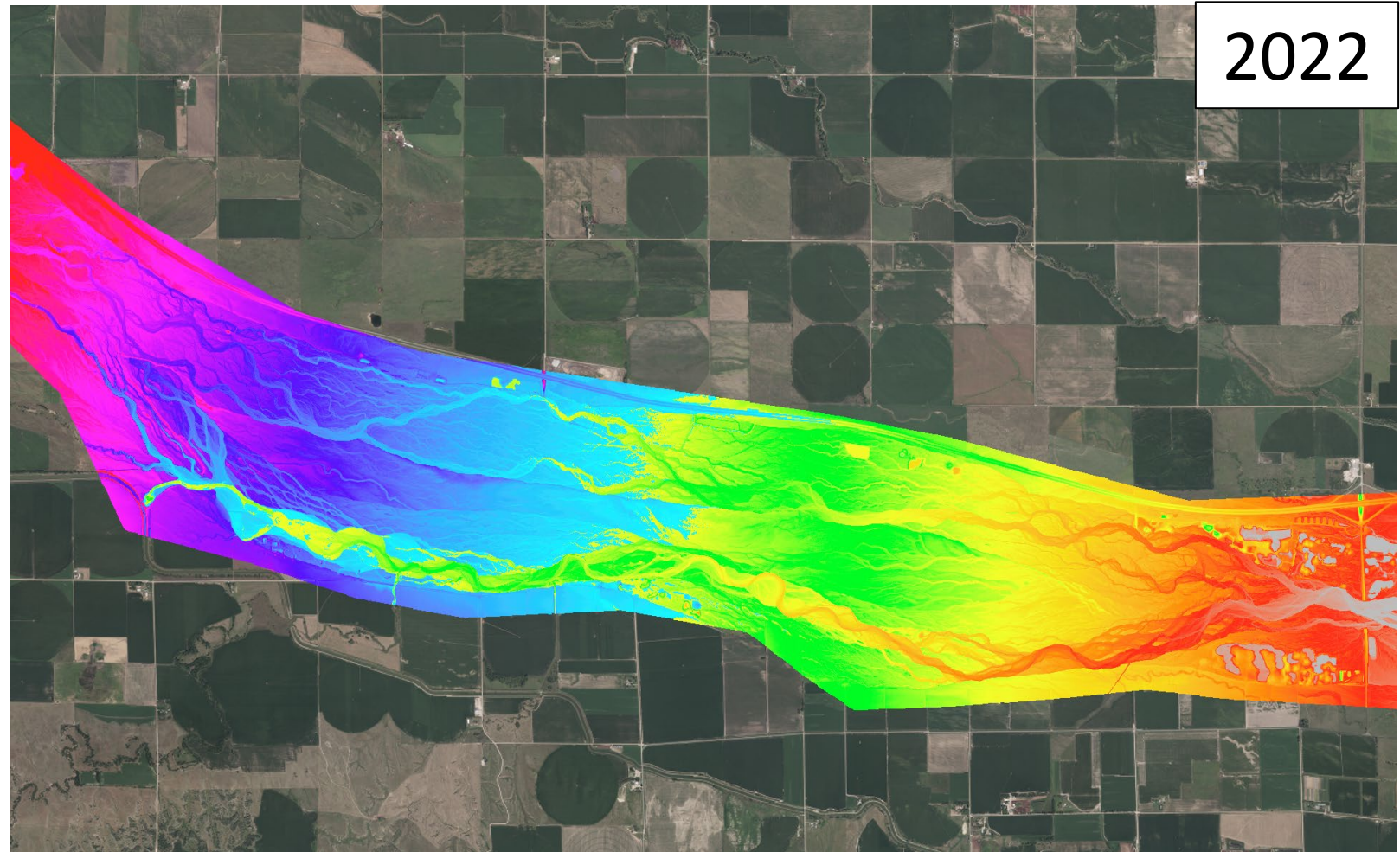
Data Collected

- Annual Aerial Imagery



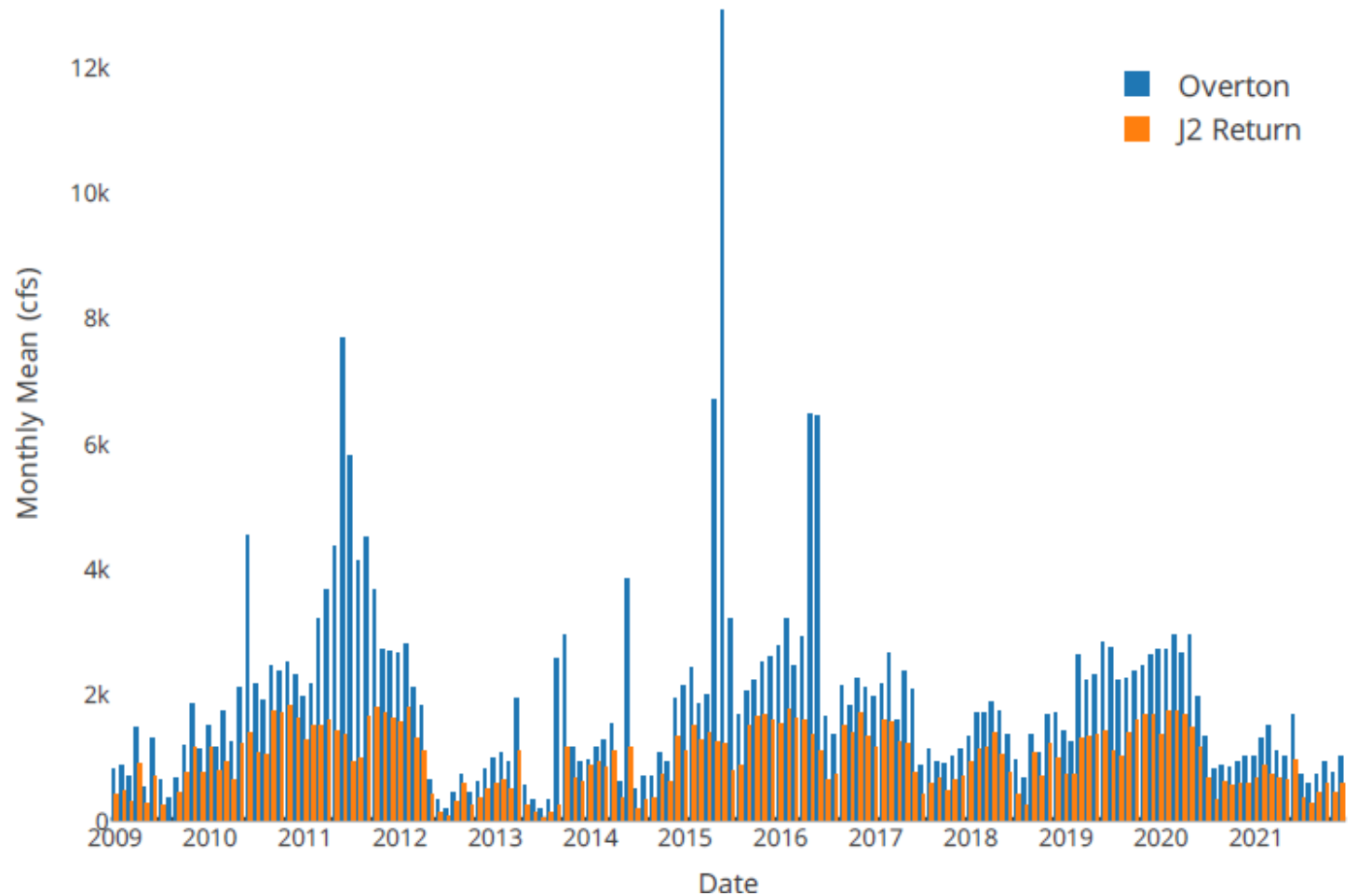
Data Collected

- Annual Aerial Imagery
- Annual Topobathymetric LiDAR



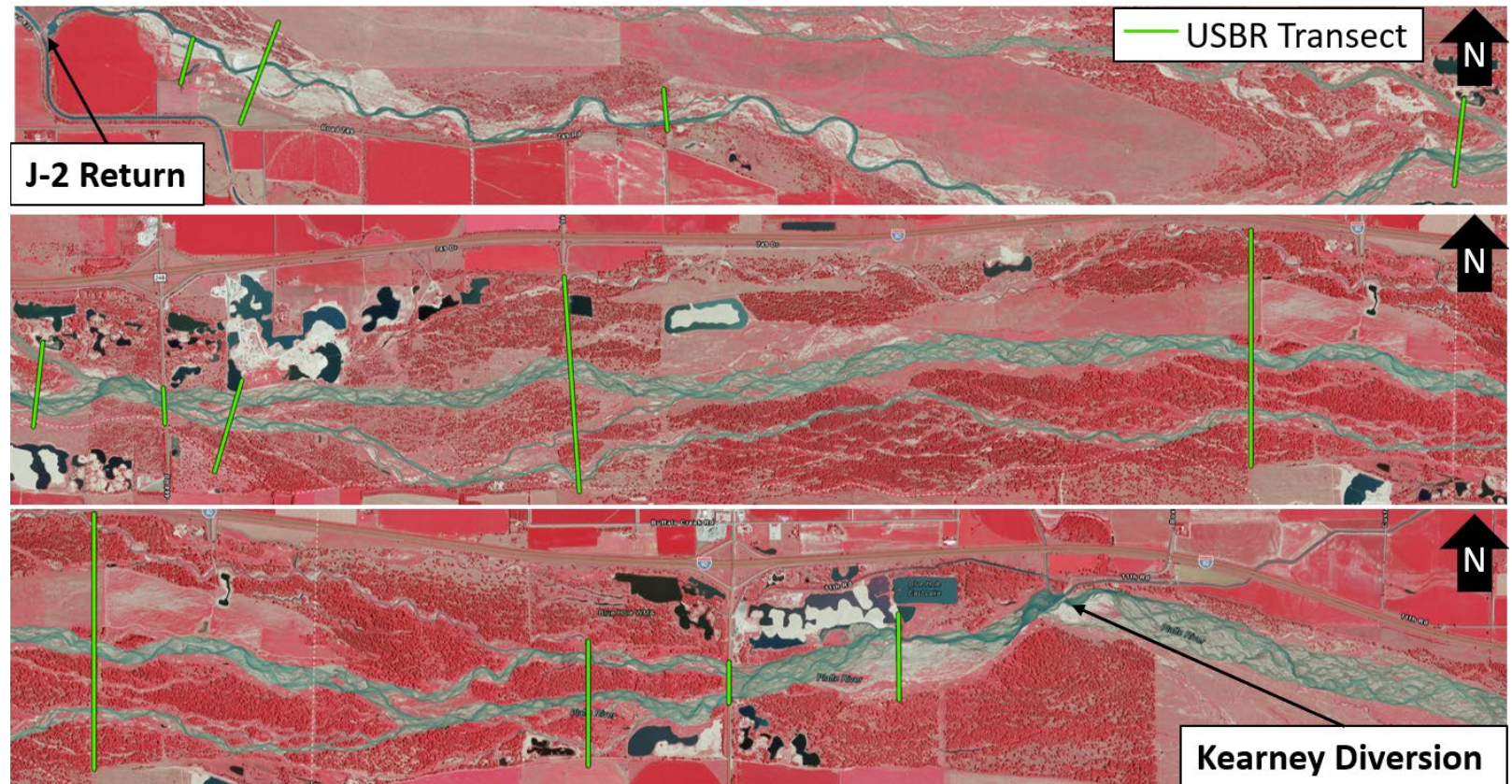
Data Collected

- Annual Aerial Imagery
- Annual Topobathymetric LiDAR
- Stream Gage Records



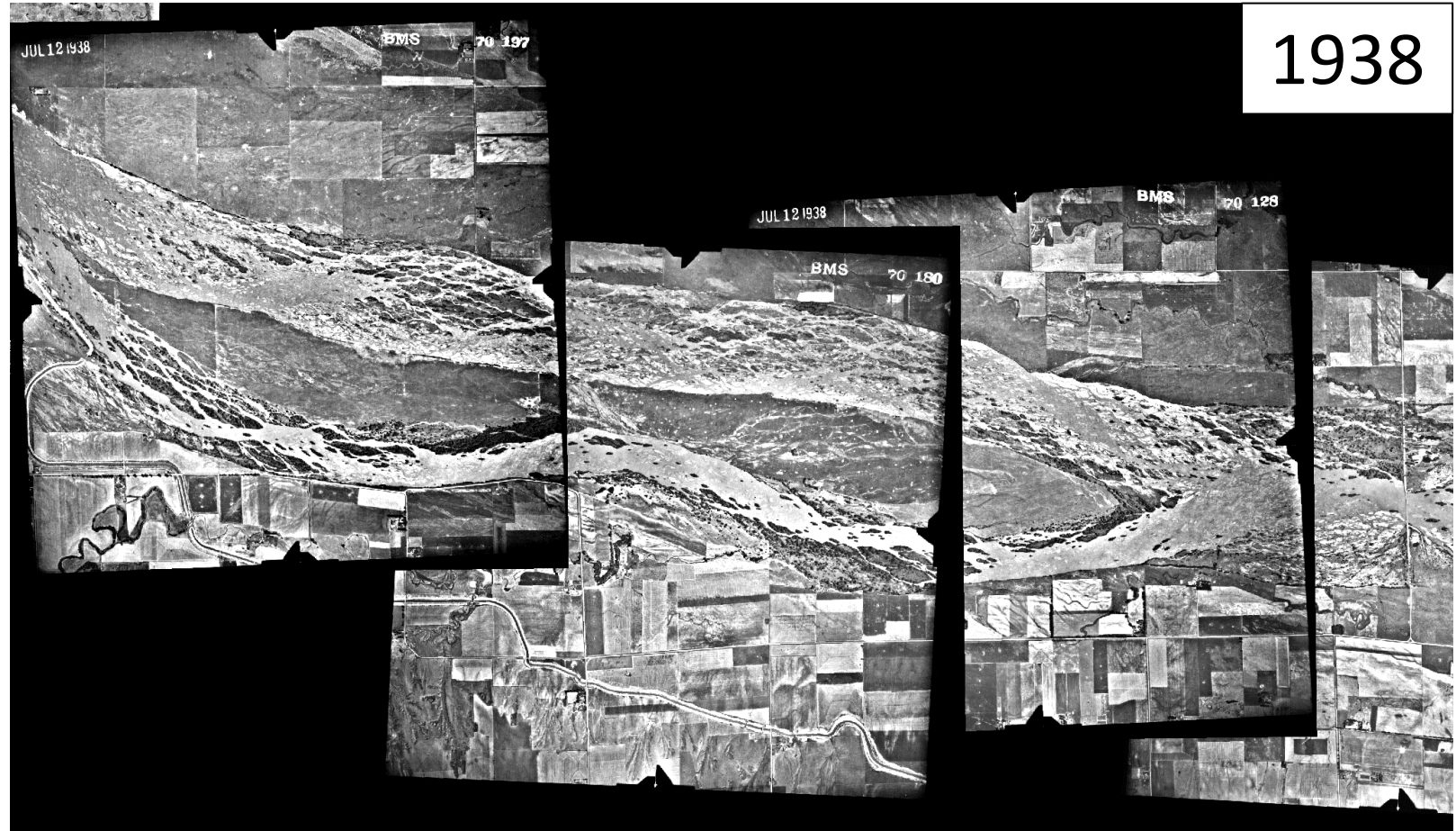
Data Collected

- Annual Aerial Imagery
- Annual Topobathymetric LiDAR
- Stream Gage Records
- Historical Transects



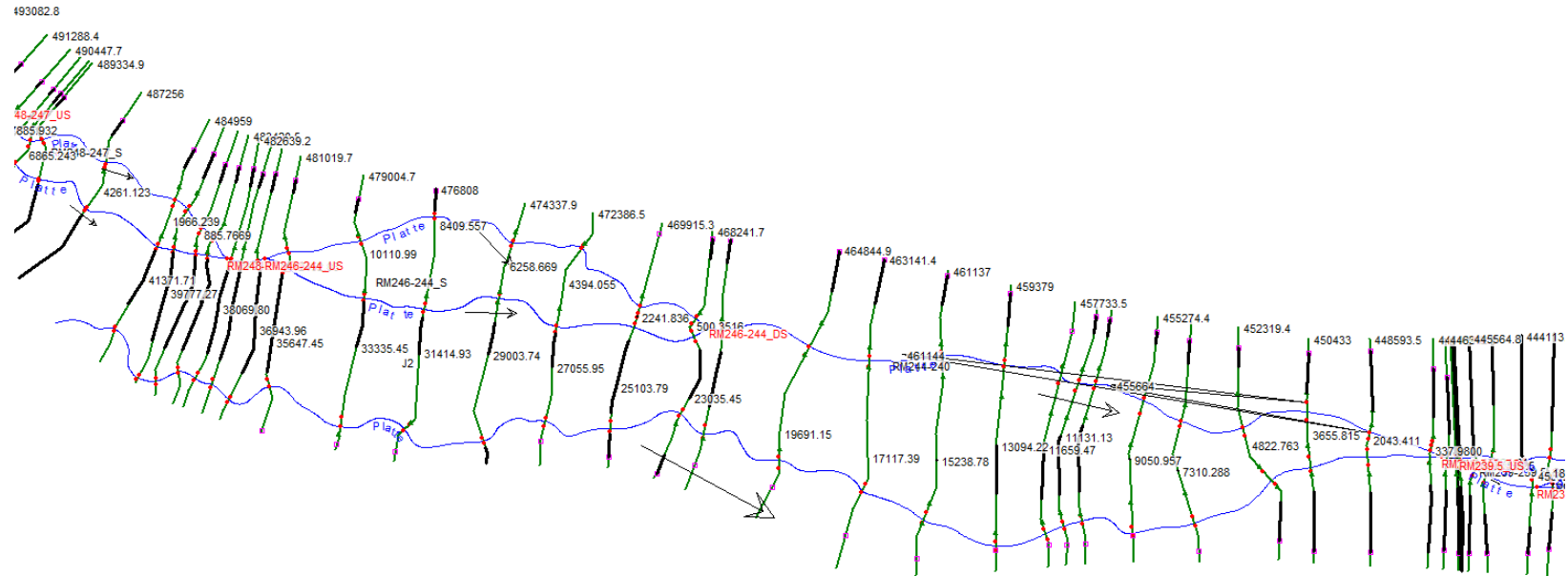
Data Collected

- Annual Aerial Imagery
- Annual Topobathymetric LiDAR
- Stream Gage Records
- Historical Transects
- Historical Aerial Imagery



Data Collected

- Annual Aerial Imagery
- Annual Topobathymetric LiDAR
- Stream Gage Records
- Historical Transects
- Historical Aerial Imagery
- 2009 1D HEC-RAS Model



Key Findings (2017-2022)

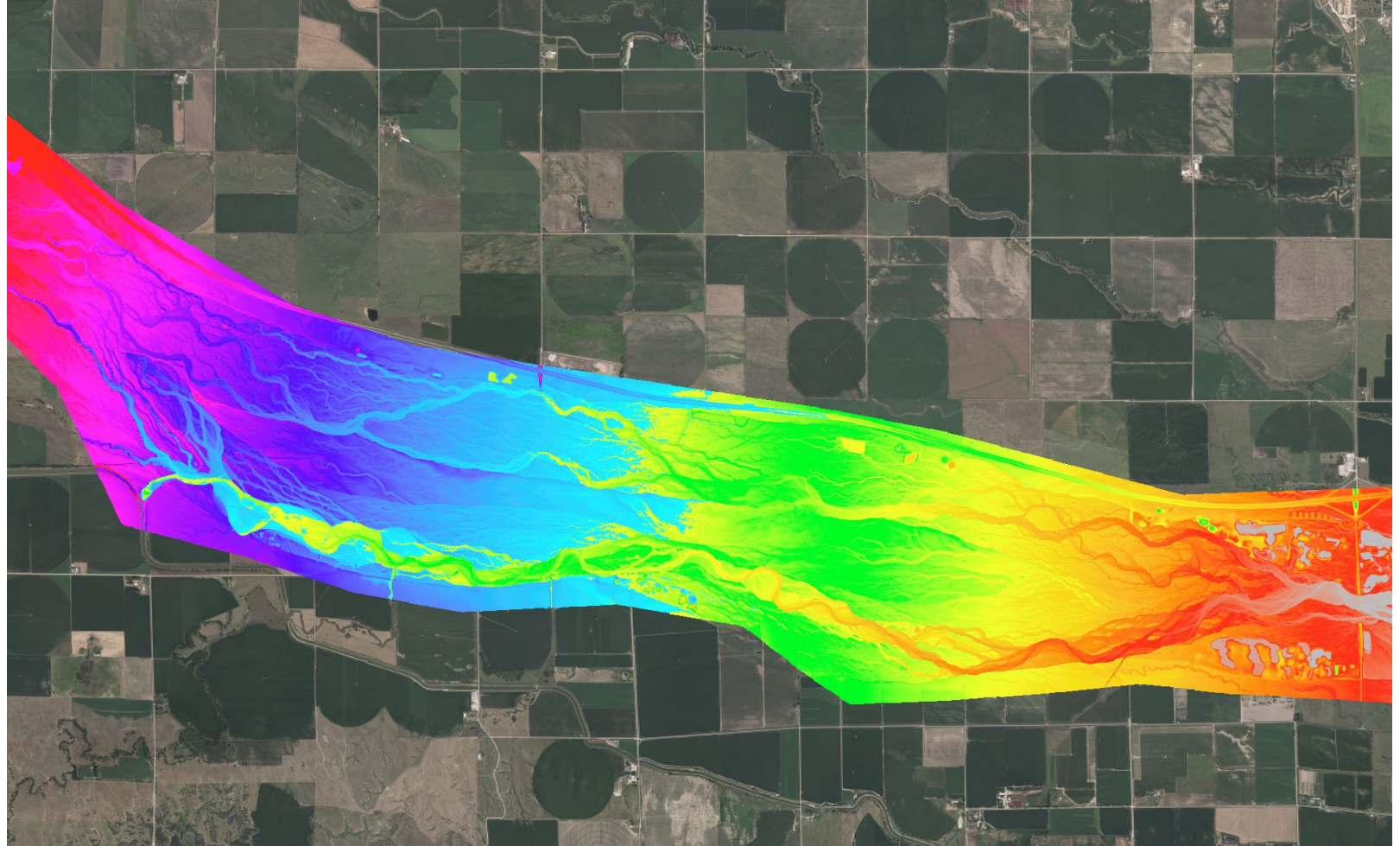
- Incision has progressed more slowly than predicted
- Average bed erosion reduced by 20-40k CY/year during augmentation
- Augmentation effects weren't detectable downstream of Overton Bridge
- Planform change continued to progress, notably around station 70K

Study Questions

- How much will bed erosion and incision change compared to 2017-2022?
- How will planform change progress without augmentation?
- How does sediment volume change vary with flow magnitude?
- Can we calculate the sediment deficit on an annual basis using our volume change analysis?

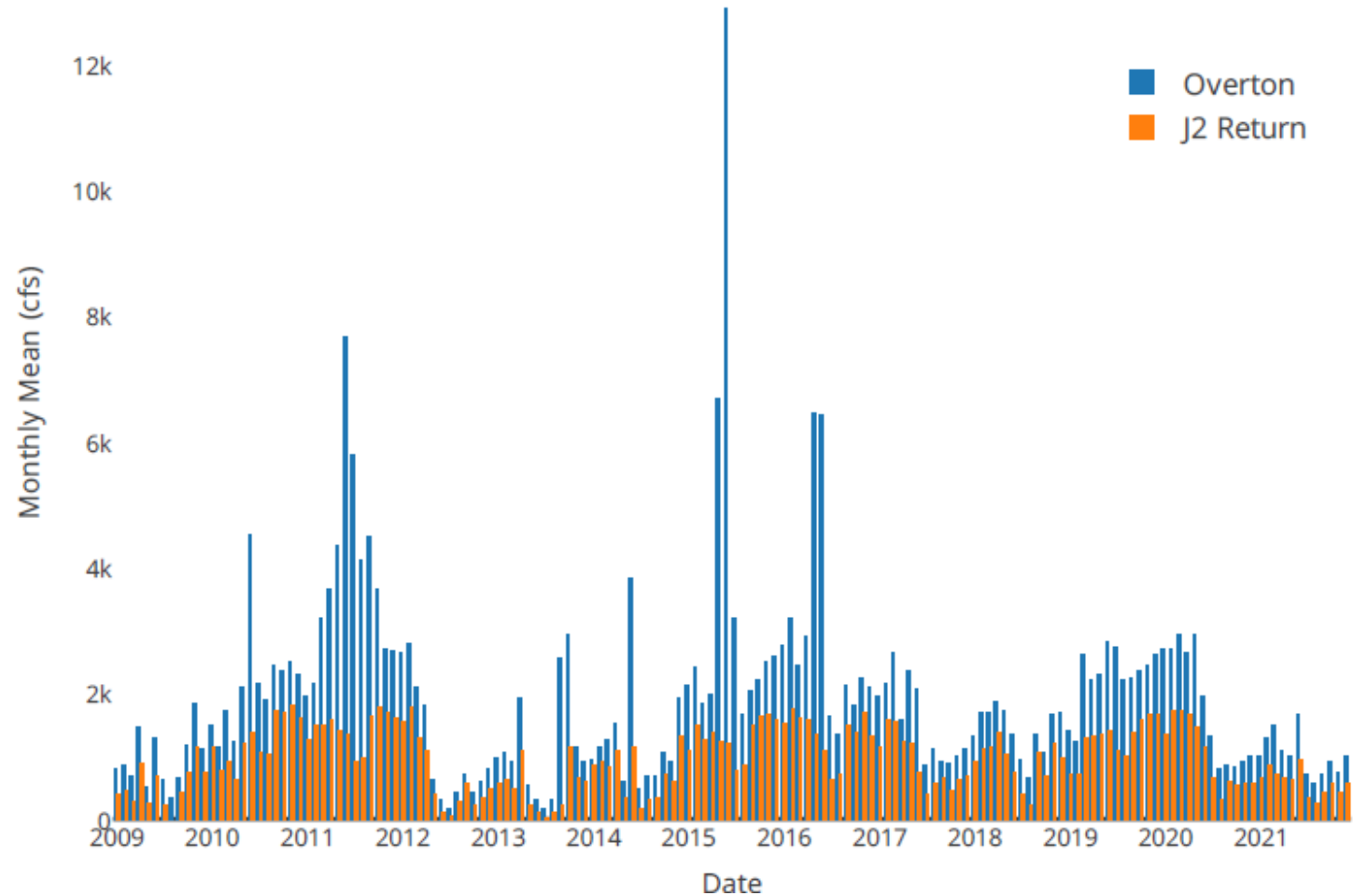
Data Collection – Continued Efforts

- Annual
Topobathymetric
LiDAR & Imagery



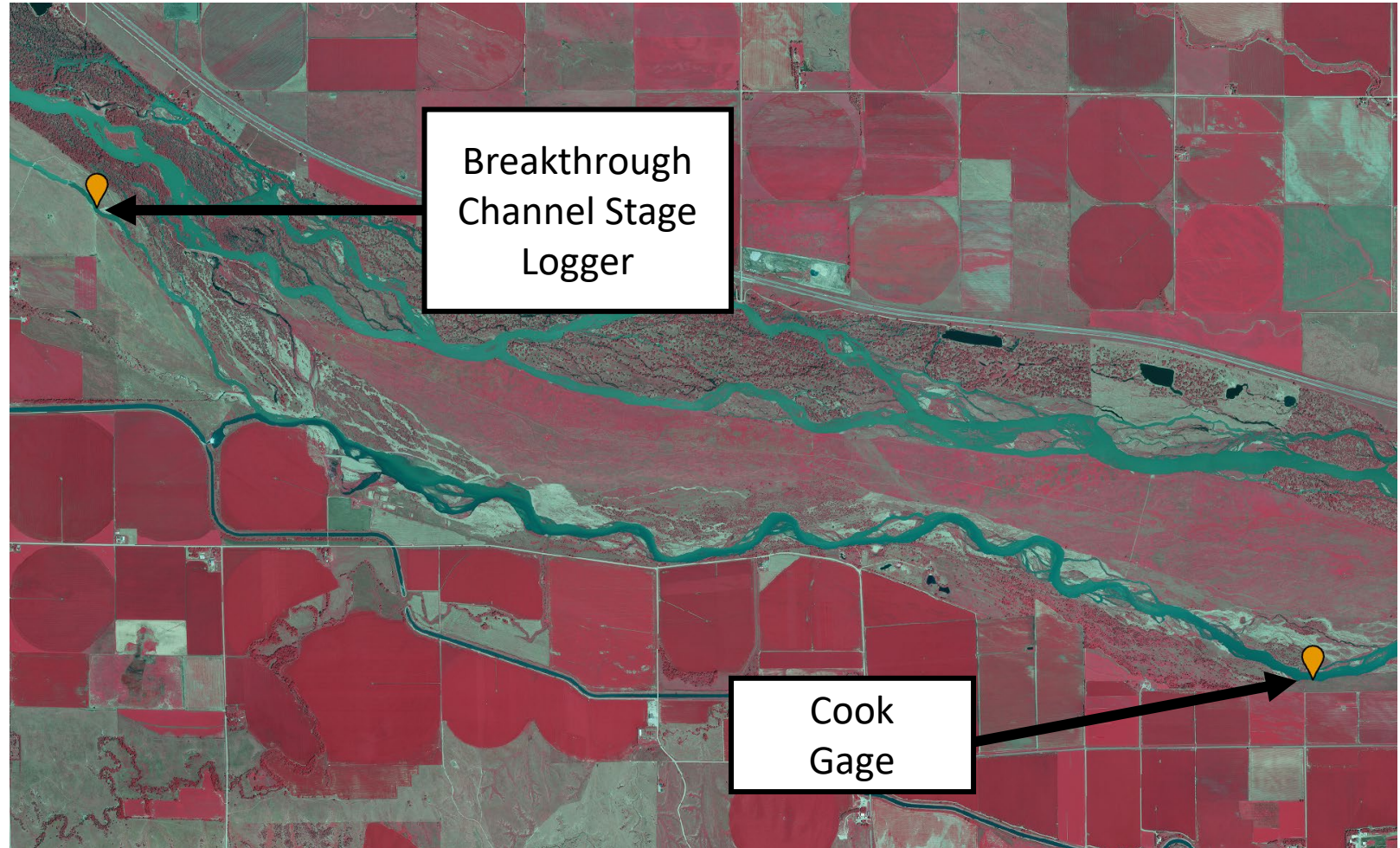
Data Collected – Continued Efforts

- Annual Topobathymetric LiDAR & Imagery
- Stream Gage Records



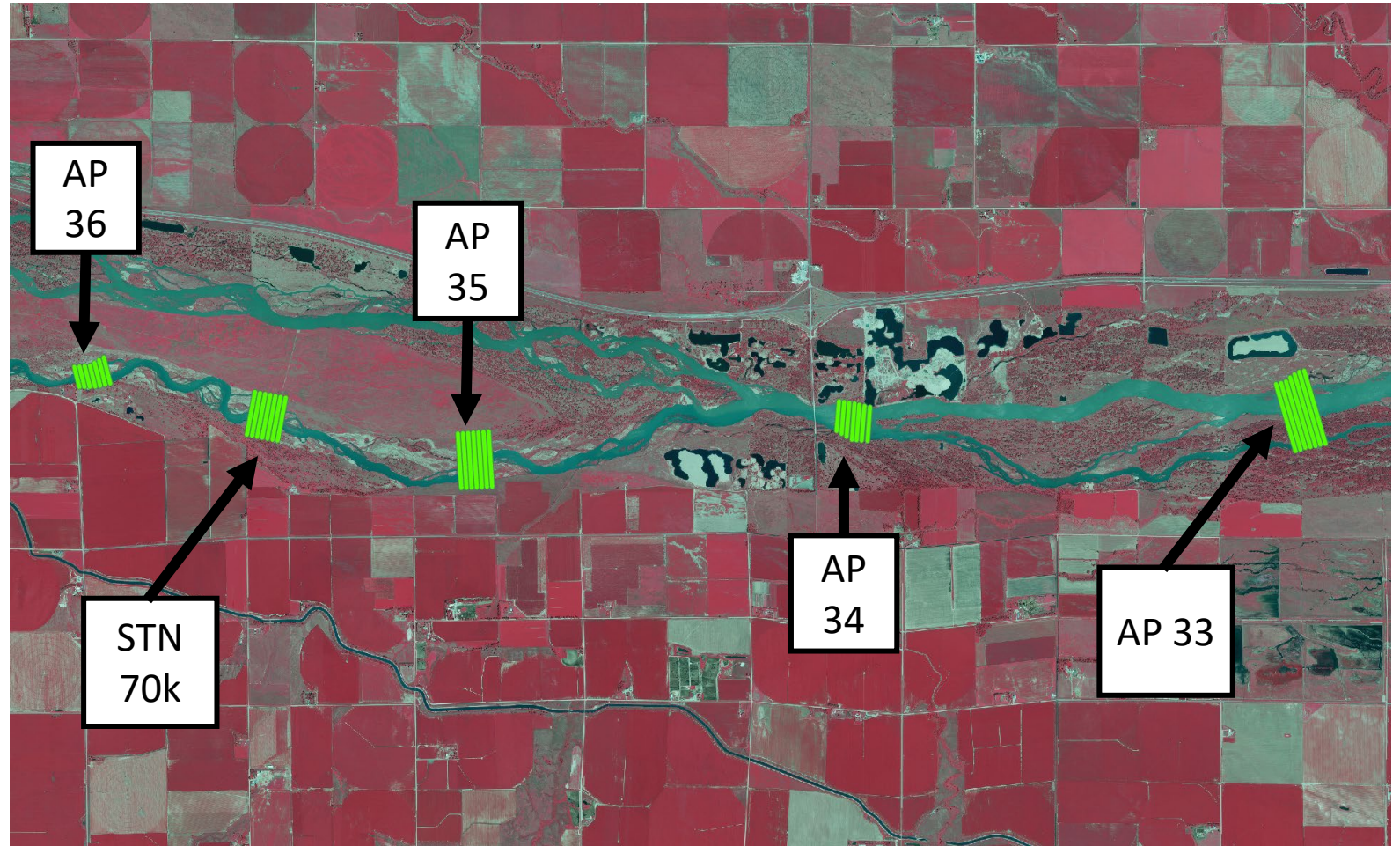
New Data Collection – Flow Monitoring

- Breakthrough channel
 - Stage logger
- Cook Property
 - Real time stream gage
 - USGS managed



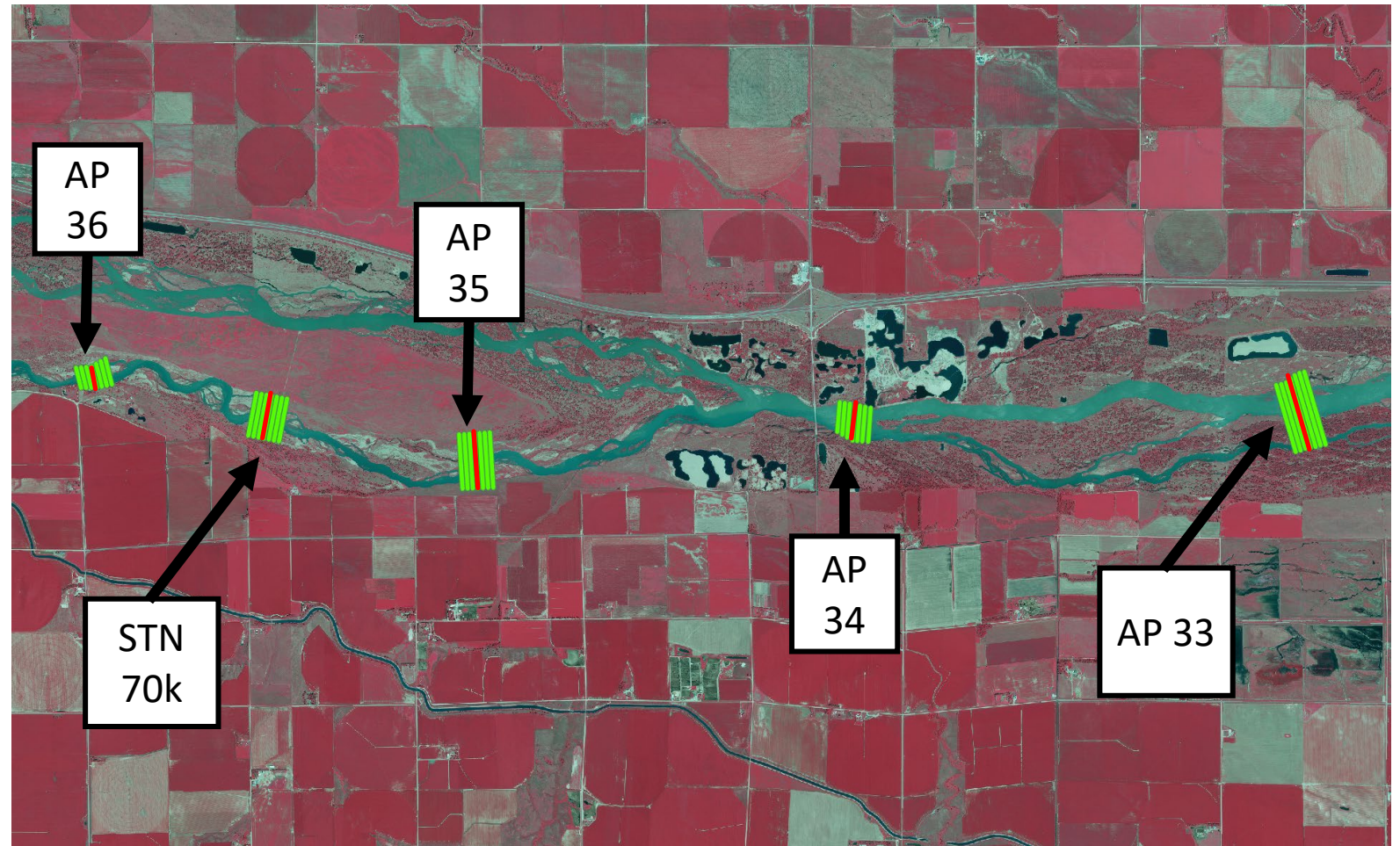
New Data Collection – Cross Section Surveys

- Tied into 4 anchor points and station 70k
 - 7 cross section surveys at each
- Tri-annual data collection
 - March
 - July
 - November



New Data Collection – Sediment Sampling

- Done concurrently with one annual transect survey
 - 3 samples at middle cross section
 - 15 total
- Sampling thalweg, channel left, and channel right





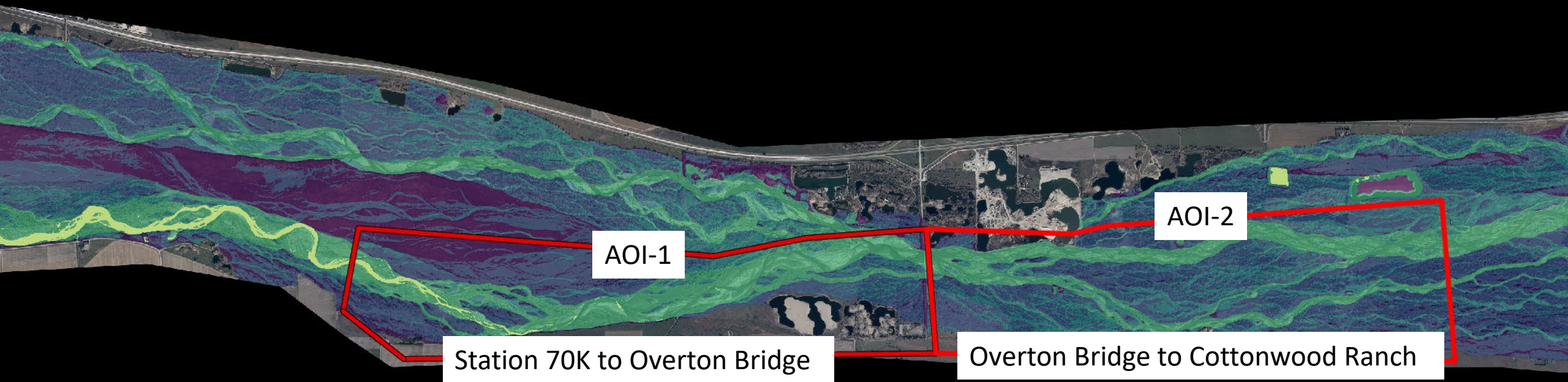
Action Triggers

Action Triggers for this Study

- Relative Elevation Model (REM) Monitoring
- Gage Analysis at Overton



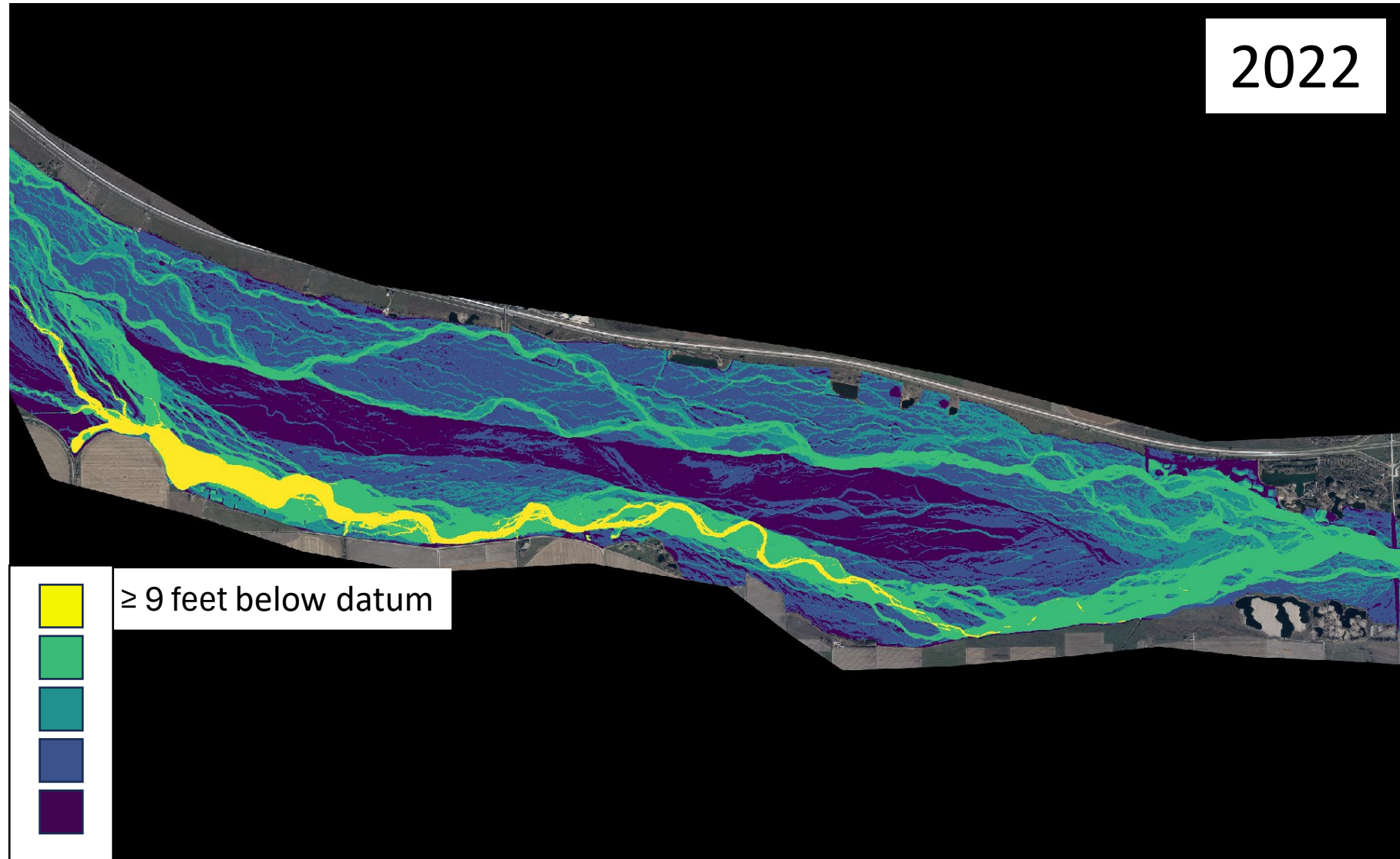
Areas of Interest (AOI) for REM Analysis



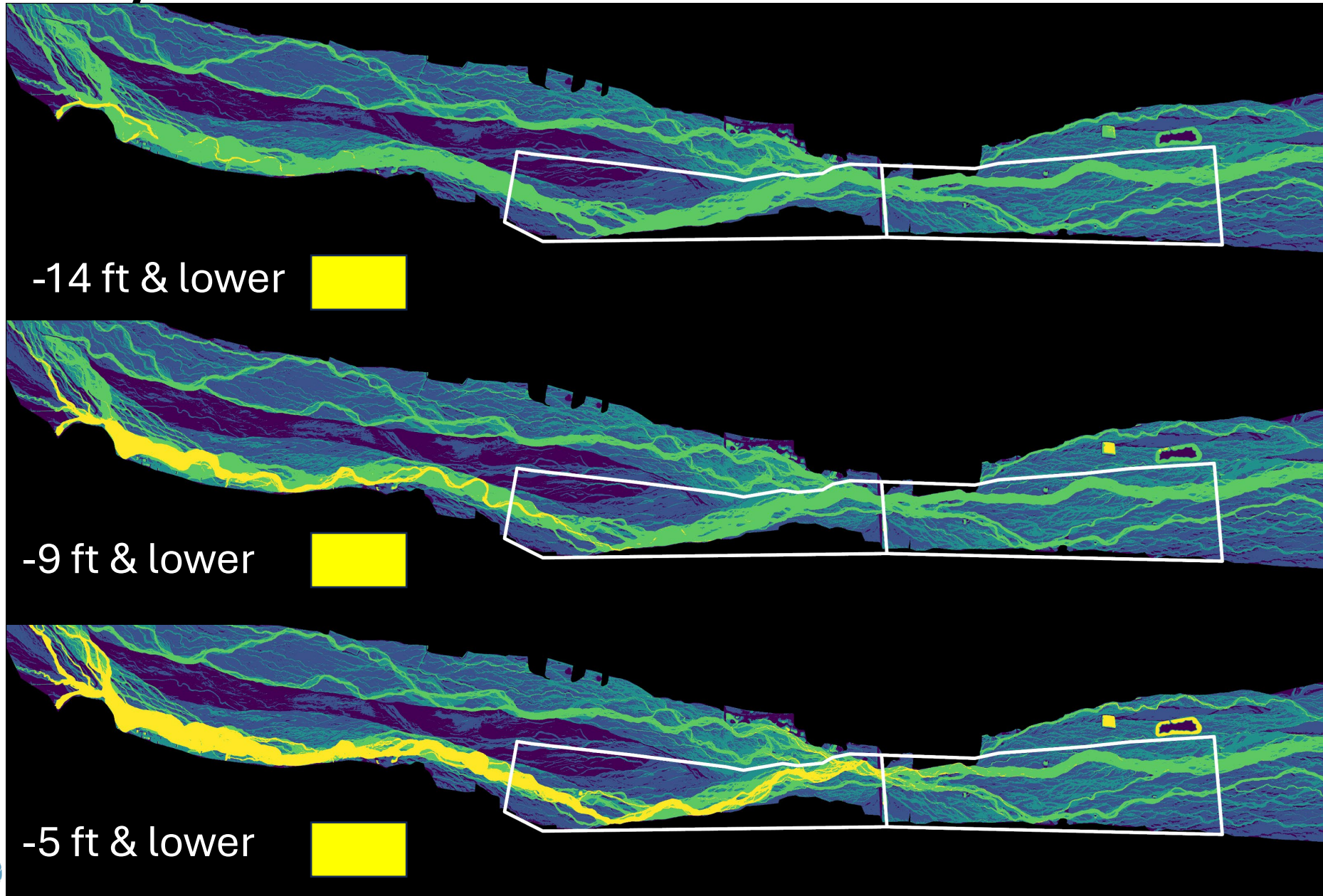
REM Refresh

2022

- Geomorphic grade line (GGL) provides a datum
- Annual LiDAR is compared against GGL
- Creates an REM that represents depth below geomorphic grade line (DBG)

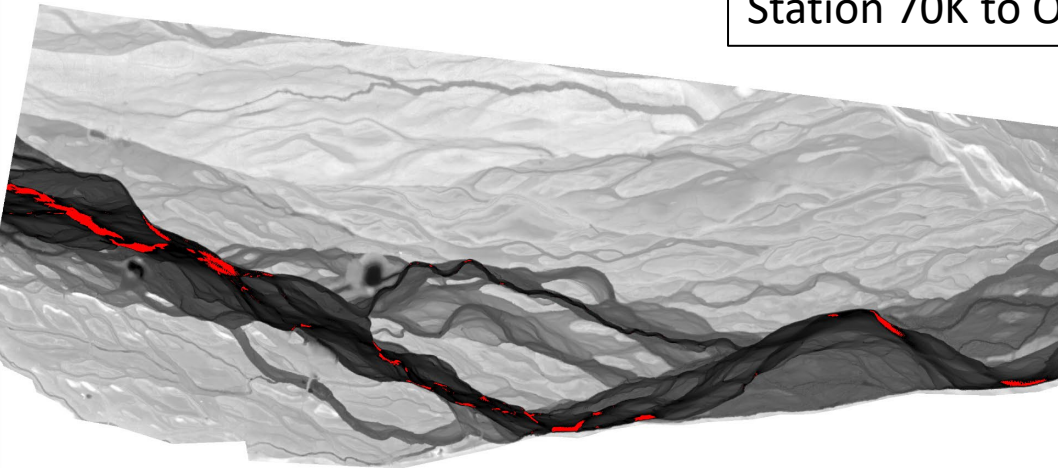


Why 9 feet in AOI-1?

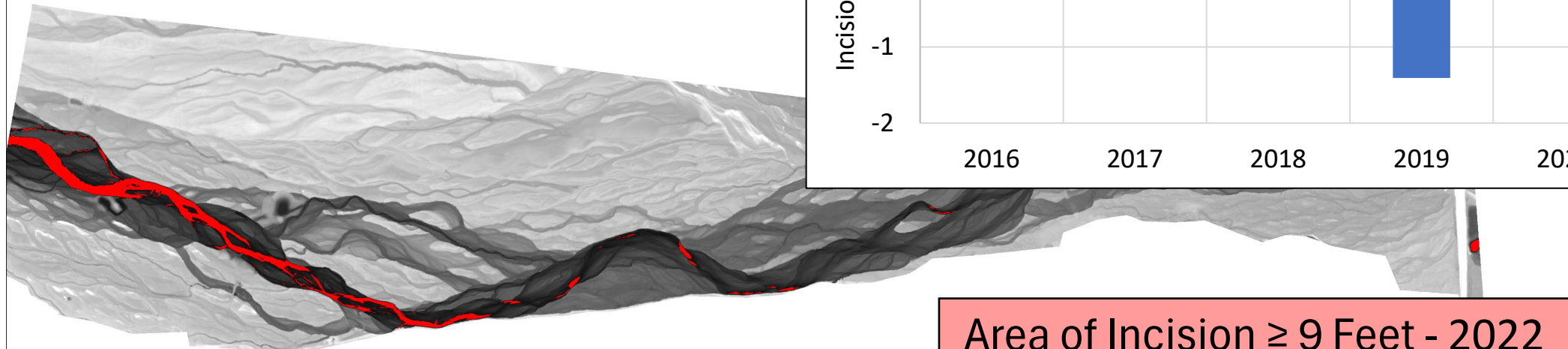
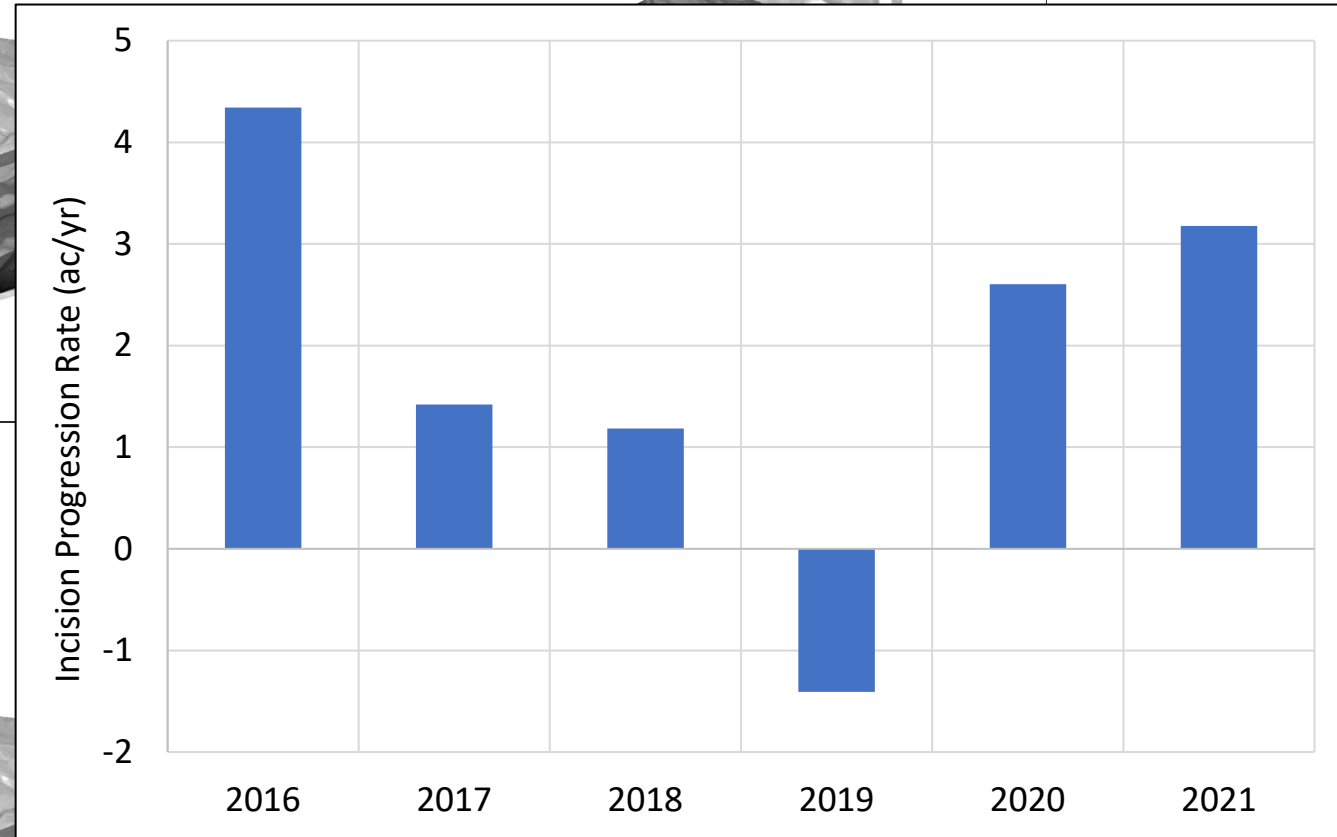


Year to Year Comparison: AOI-1

Station 70K to Overton Bridge



Max Annual Increase: 4.34 acres
Average Annual Increase: 1.89 acres



Area of Incision \geq 9 Feet - 2022

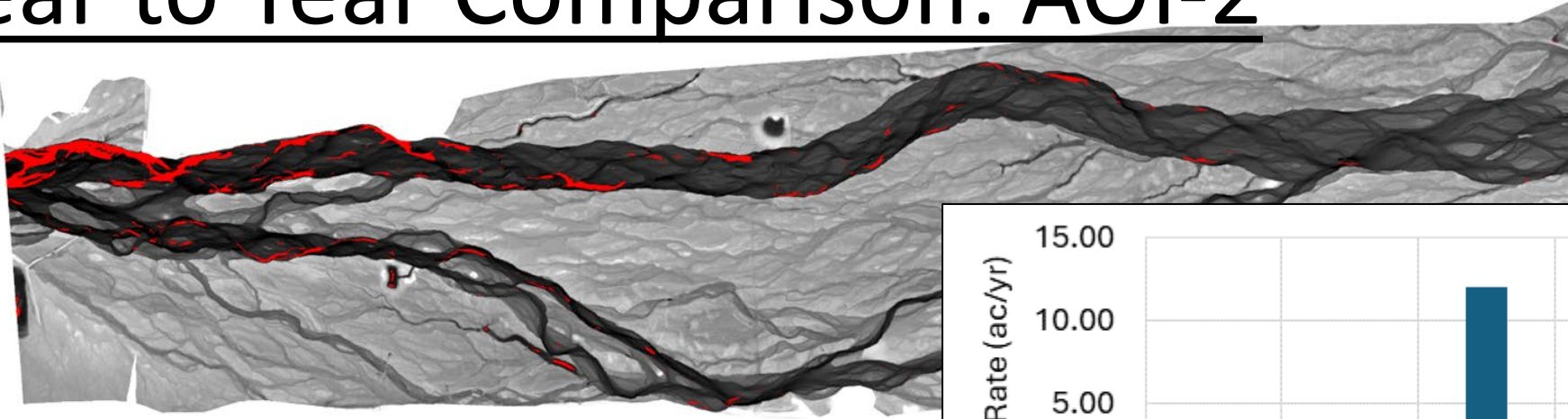


Impact Trigger Example: REM AOI-1

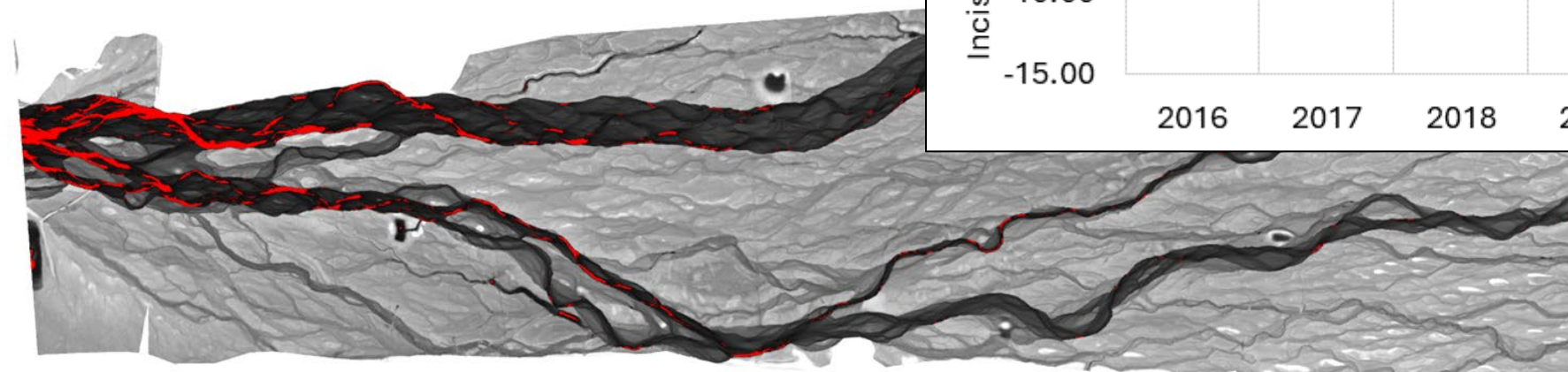
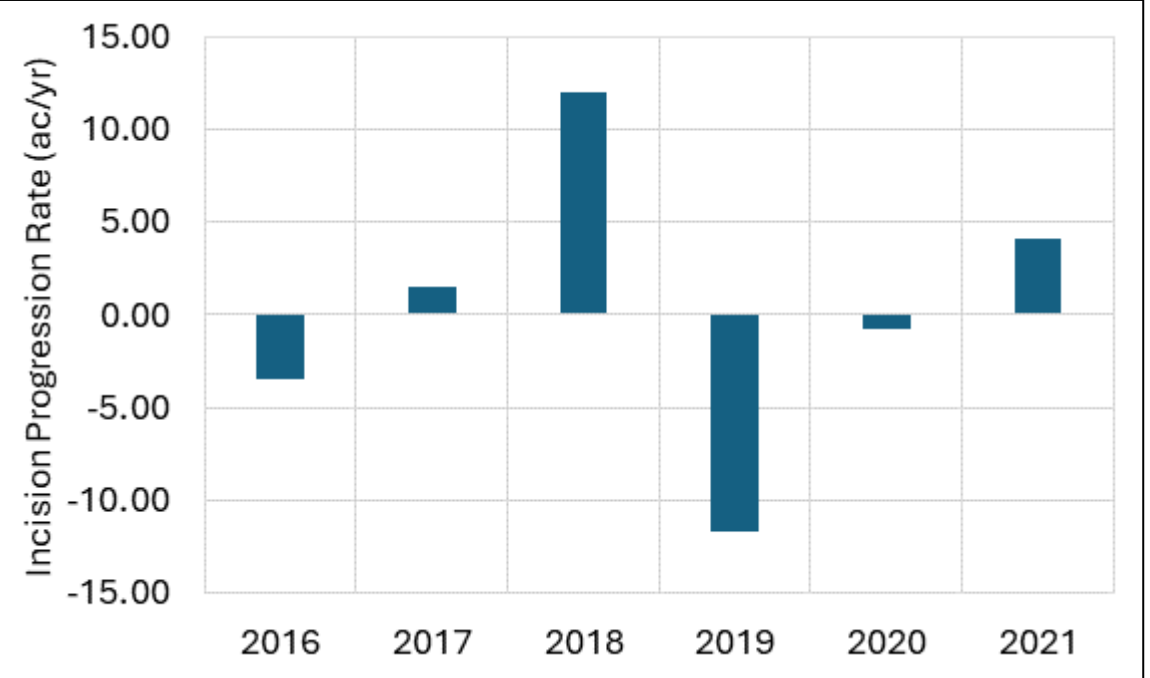
Impact Trigger Level	Description	Response
Normal	Observed area with DBG ≥ 9 ft remained below 10 acres over a year	Maintain monitoring efforts: No change to surveys or REM method.
Warning	Observed area with DBG ≥ 9 ft exceeded 10 acres over a year for the first time	Be on alert for year two, notify TAC of exceedance.
Action Required	Observed area with DBG ≥ 9 ft increased by more than 10 acres for a second consecutive year	Discuss modifications to experiment: Potentially restart augmentation



Year to Year Comparison: AOI-2



Max Annual Increase: 11.96 acres
Average Annual Increase: 0.27 acres



Overton Bridge to Cottonwood Ranch

Area of Incision \geq 5 Feet - 2022

Impact Trigger Example: REM AOI-2

Impact Trigger Level	Description	Response
Normal	Observed area with DBG ≥ 5 ft remained below 24 acres over a year	Maintain monitoring efforts: No change to surveys or REM method.
Warning	Observed area with DBG ≥ 5 ft exceeded 24 acres over a year <i>for the first time</i>	Be on alert for year two, notify TAC of exceedance.
Action Required	Observed area with DBG ≥ 5 ft increased by more than 24 acres for a second consecutive year	Discuss modifications to experiment: Potentially restart augmentation



Gage Analysis

- 2012 Pilot Study
 - Water Surface Elevations
- 30+ years of Data at Overton
- Focus on changes at base flow
 - ~244 CFS
- Open to input!



An aerial photograph showing a river restoration project. Two yellow bulldozers are working on a large, sandy bar in the middle of a river. The river is surrounded by green vegetation and trees. The sky is blue with some clouds.

Thank you!

Seeking Input:

- Monitoring Efforts?
- Action Triggers?

