Reach-Wide Monitoring AMP Reporting Session Feb. 16, 2021

Julia Grabowski

RWM Goals

- Document spatial and temporal trends in channel morphology and vegetation
- Evaluate relationships between the changes and natural drivers (flow)
- Serve as effectiveness monitoring for PRRIP management
- Serve as a resource for evaluating PRRIP hypotheses

- Deliverable: annual report

Background

- Field Methods: 2010-2016
- Remote Sensing: 2017-

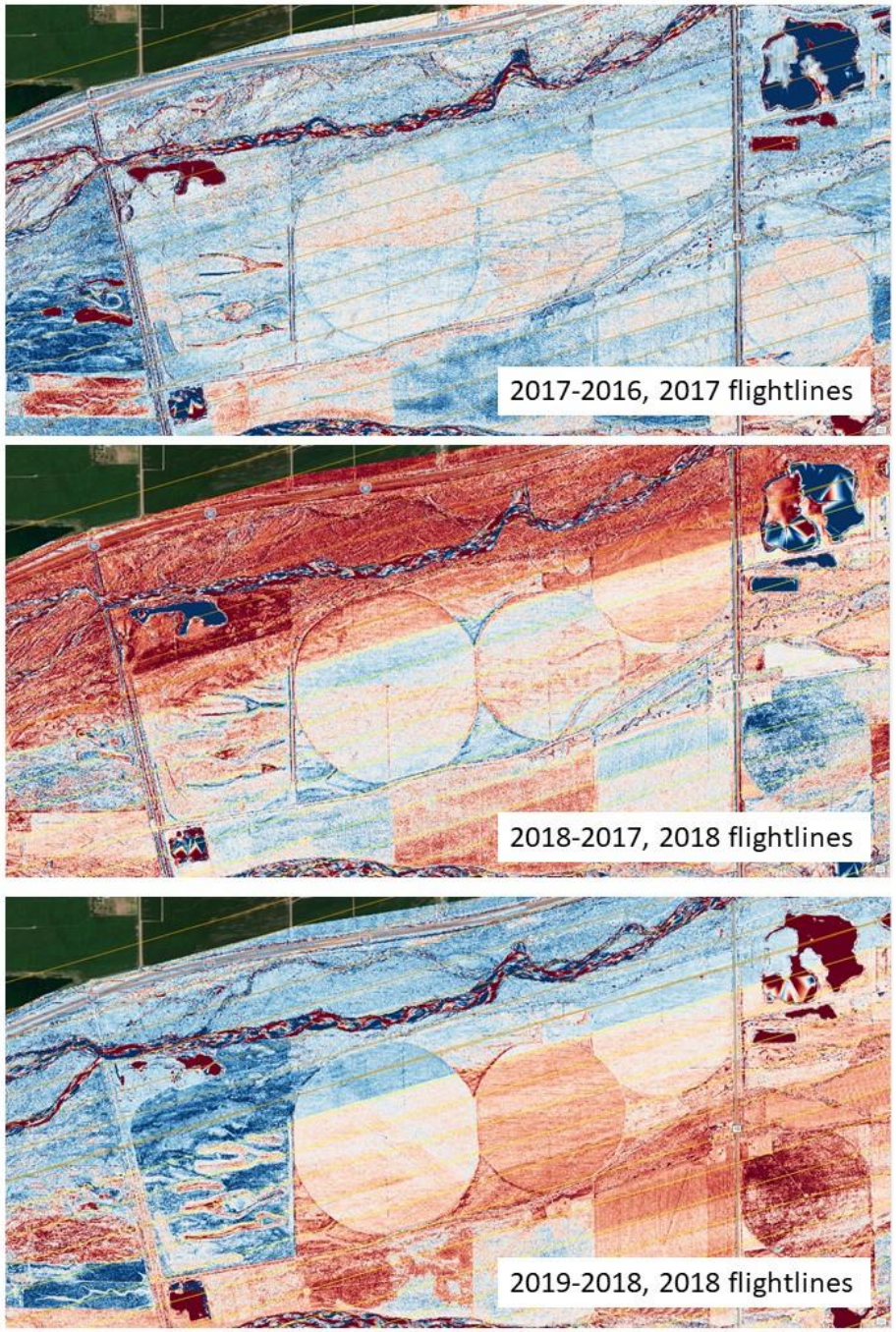
Remote Sensing Methods

- Scale:
  - 3-foot resolution aerial imagery (B,G,R,NIR)
  - 1-foot resolution LiDAR (highest-hit; topobathymetric)
- Channel morphology: 2D hydraulic modeling
- Land cover: Object-based classification
- Sediment supply: Topobathymetric elevation differencing

LiDAR Issues

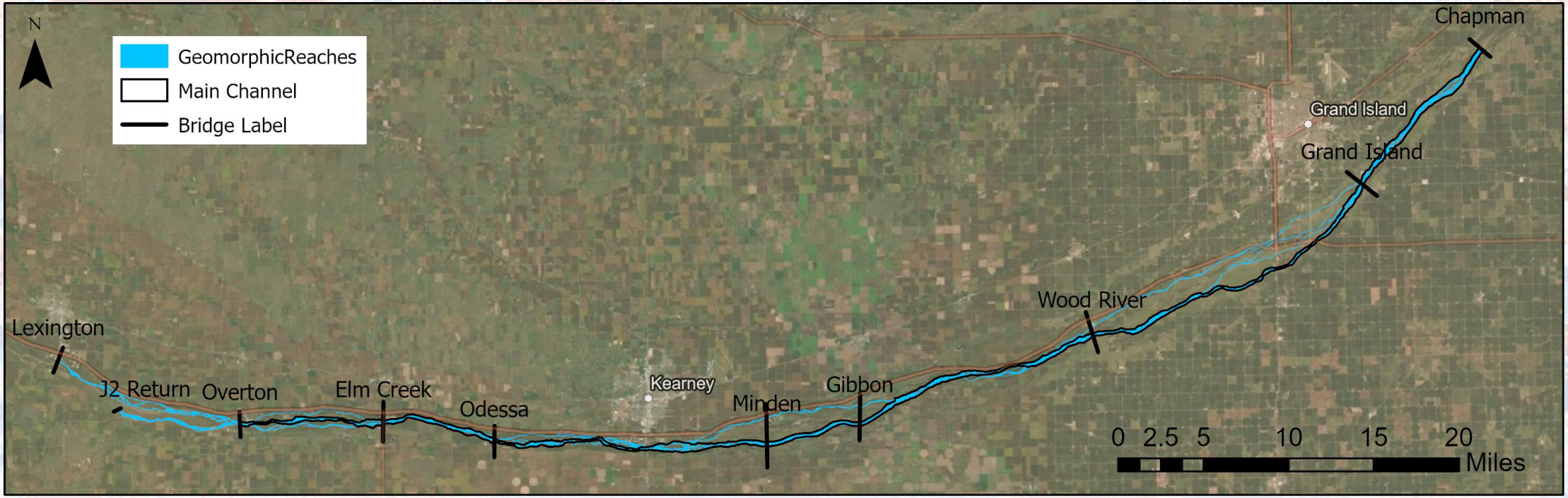
*** All results in this presentation are preliminary ***

- Reprocessed data coming this Spring



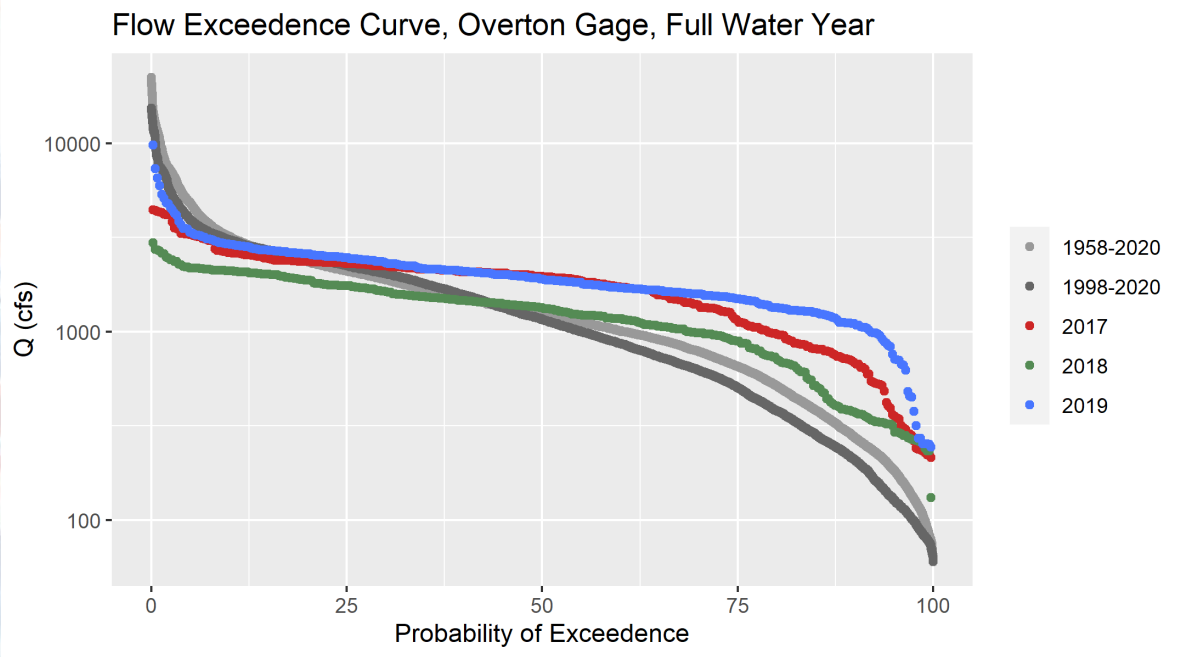
Reporting Scale

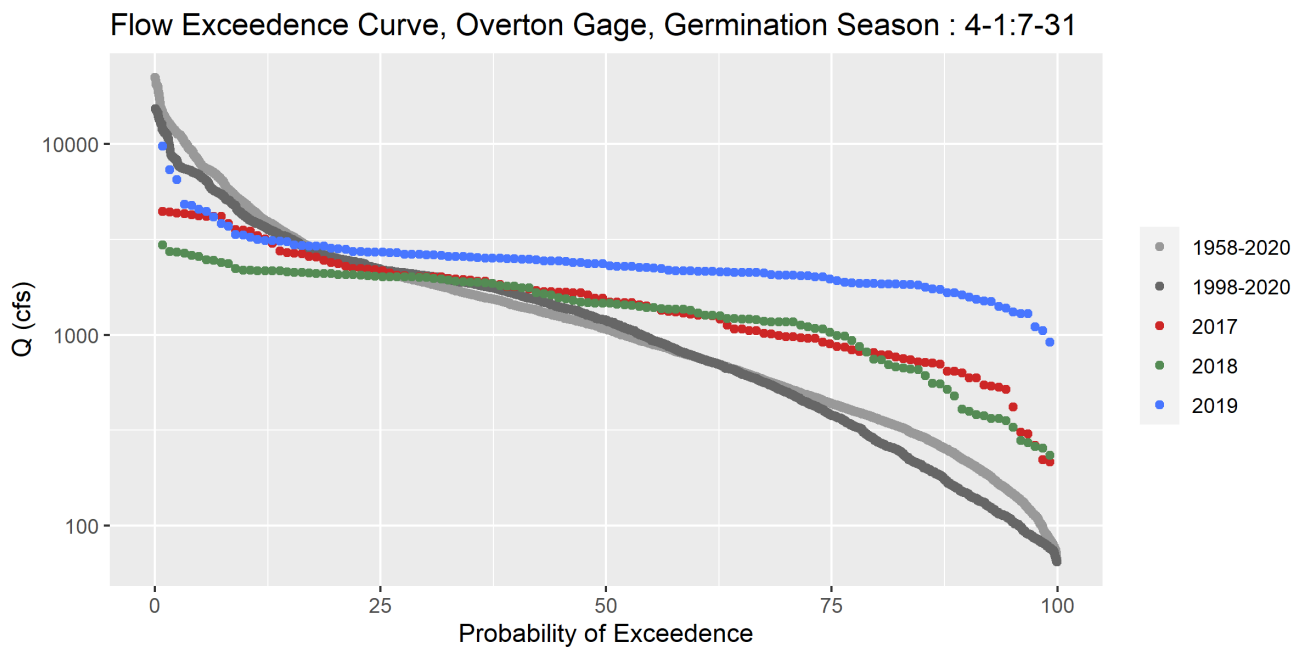
- Year
- Geomorphic Reach
- Channel type (main, side, all)



Hydrologic Conditions

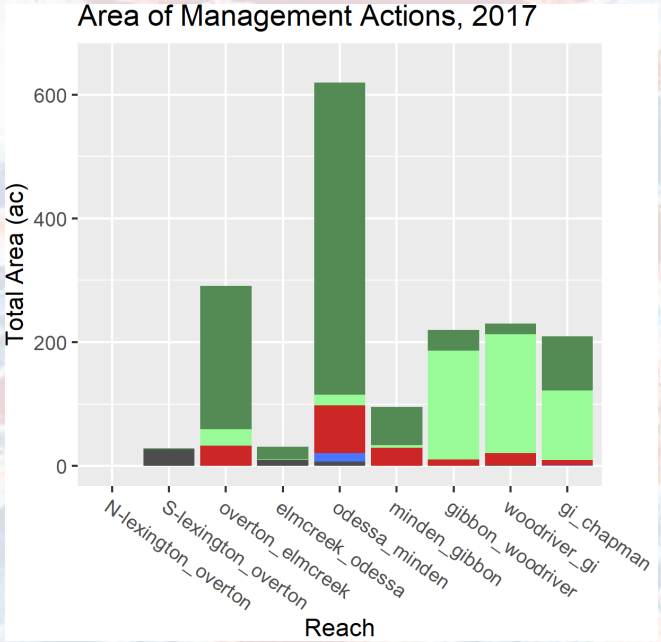
- Q_{Max}, Q_{40Avg}, $Q_{Germination}$, $Q_{SpringWC}$, Q_{FallWC}

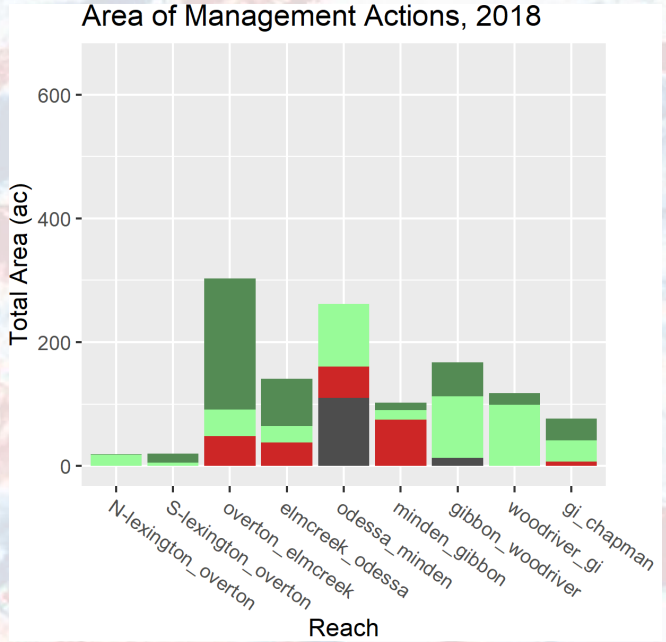


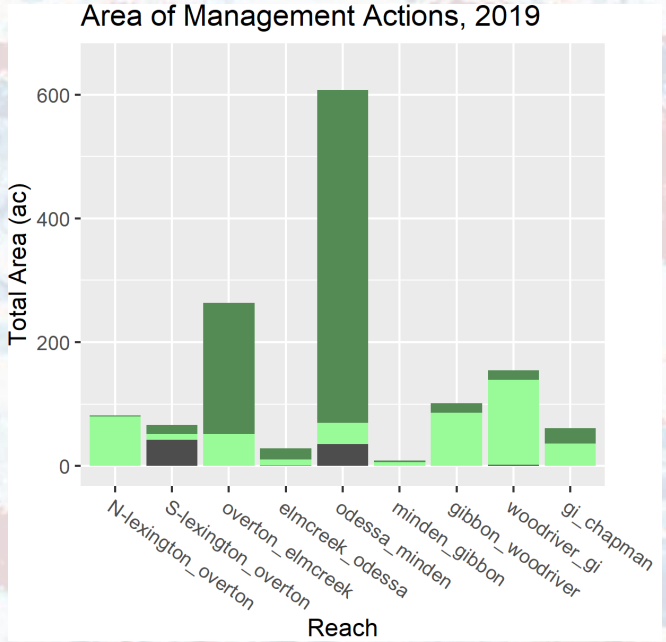


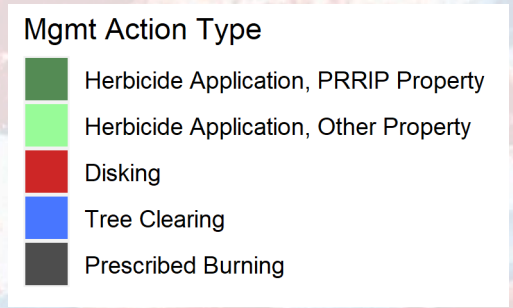
Management Action Data

- Geodatabase compiled by Tim Tunnell
- Area, in acres of each type of management action by geomorphic reach





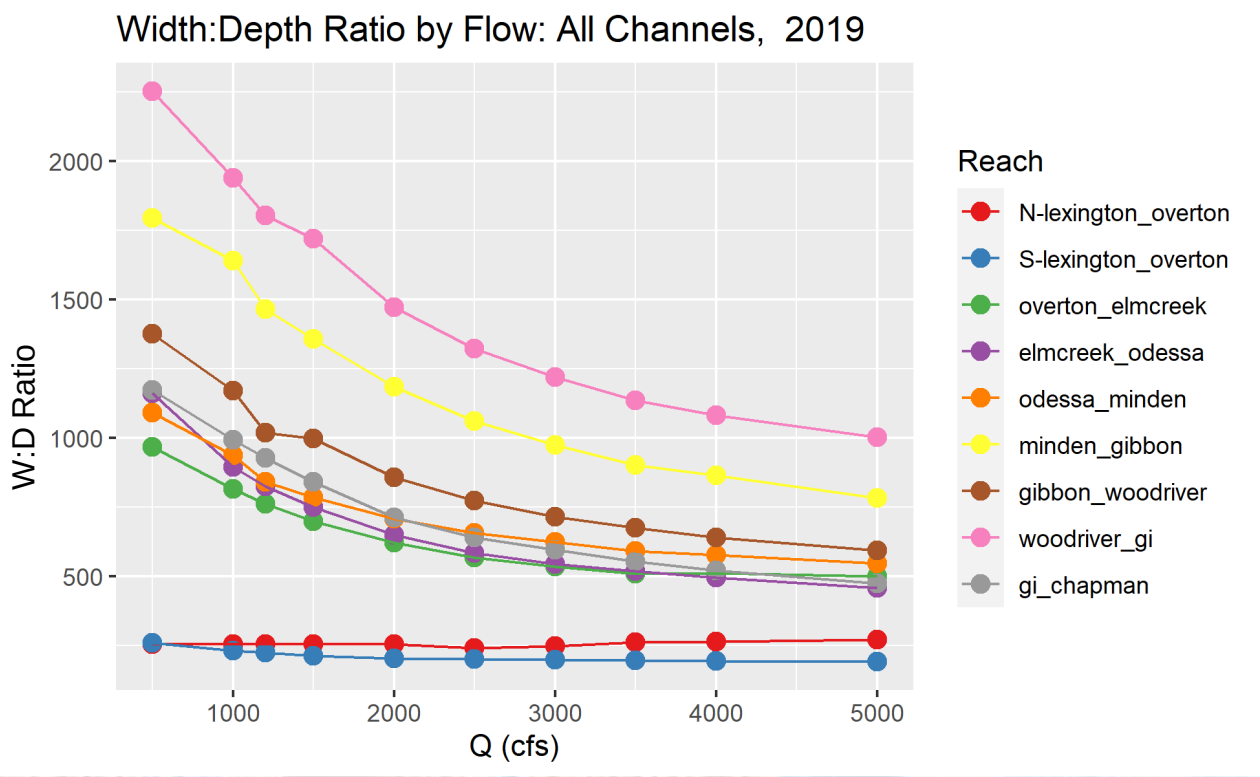


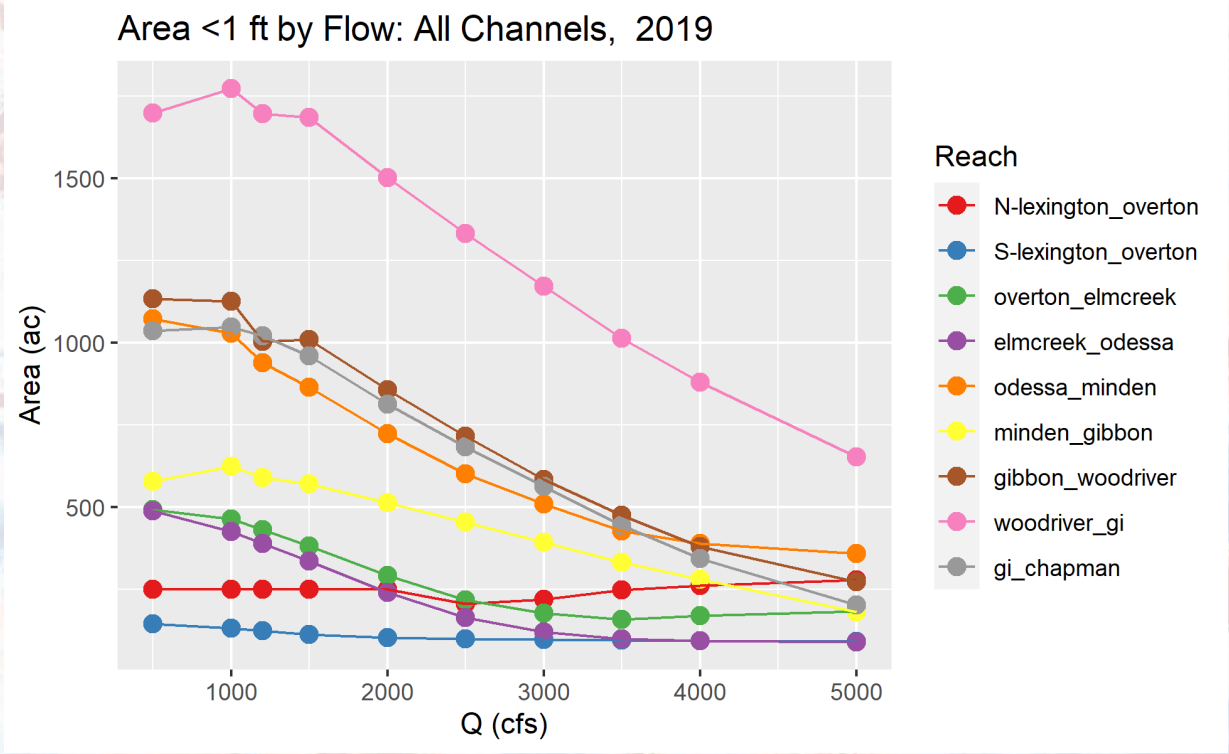


Channel Morphology and Hydraulics

- 2D Modeling with LiDAR data – Tom Smrdel
- 2018 and 2019 have been run, 2017 on deck
- RWM Metrics:
  - Total wetted area
  - Average depth
  - Average width
  - Width to depth ratio
  - Total area with depth less than one foot

Hydraulic Modeling Results



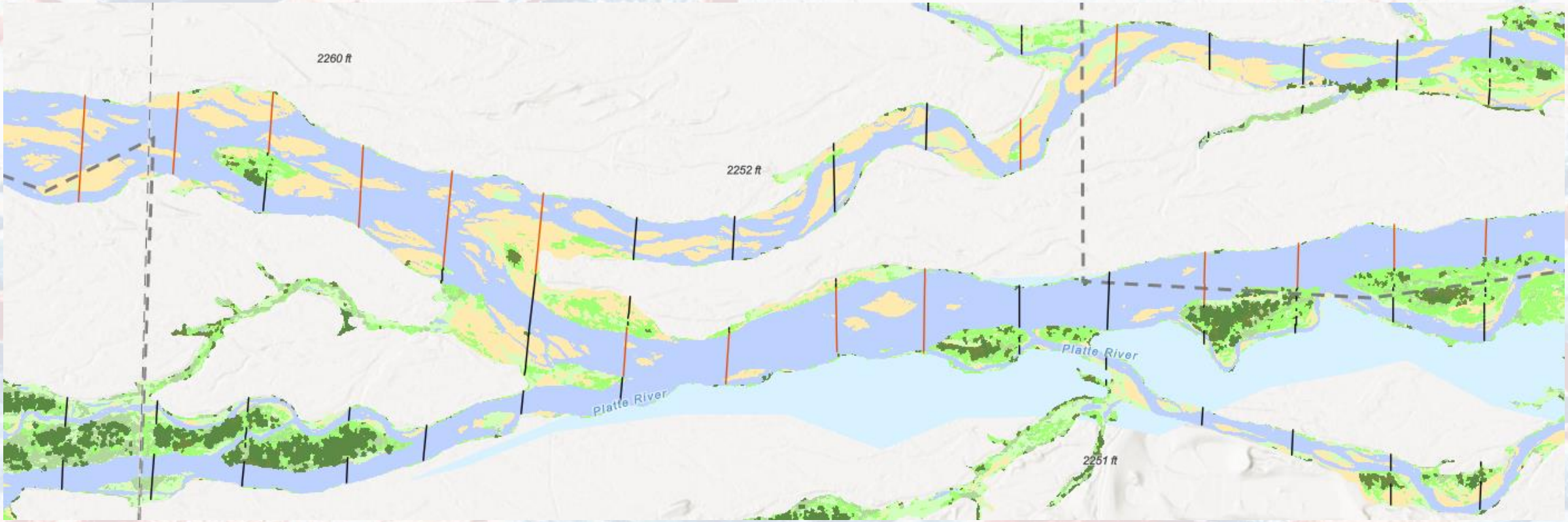


In-Channel Vegetation Cover Analysis

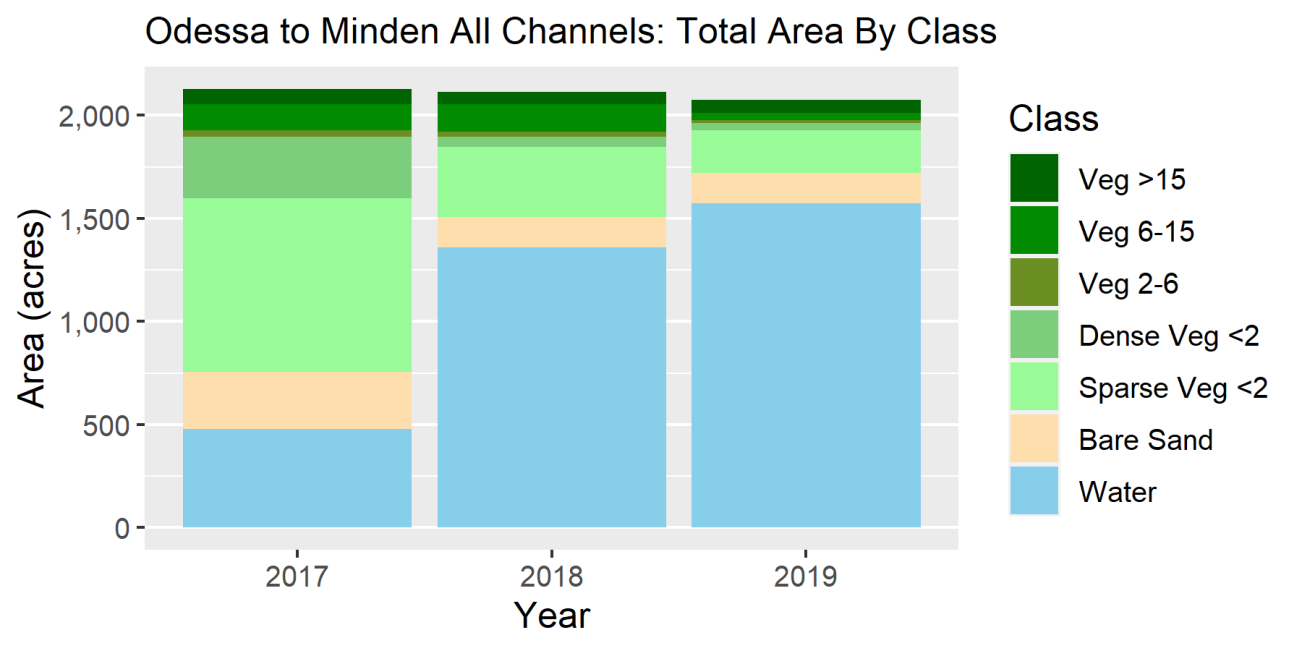
- Classification of LiDAR DSM (HH-BE) and aerial imagery with E-Cognition object-based methods
  - NDWI, NDVI, Vegetation height
- Masking: 5,000 cfs polygon
- Classes:
  - Water
  - Bare Sand
  - Vegetation: <2 (Sparse+Dense); 2-6; 6-15; 15+ ft
- Comparison to field points
- Calculating total and maximum unobstructed (<2ft) width (TUCW&MUCW)

TUCW and MUCW

- TUCW: black + red lines
- MUCW: red lines only



Example: Odessa to Minden Reach



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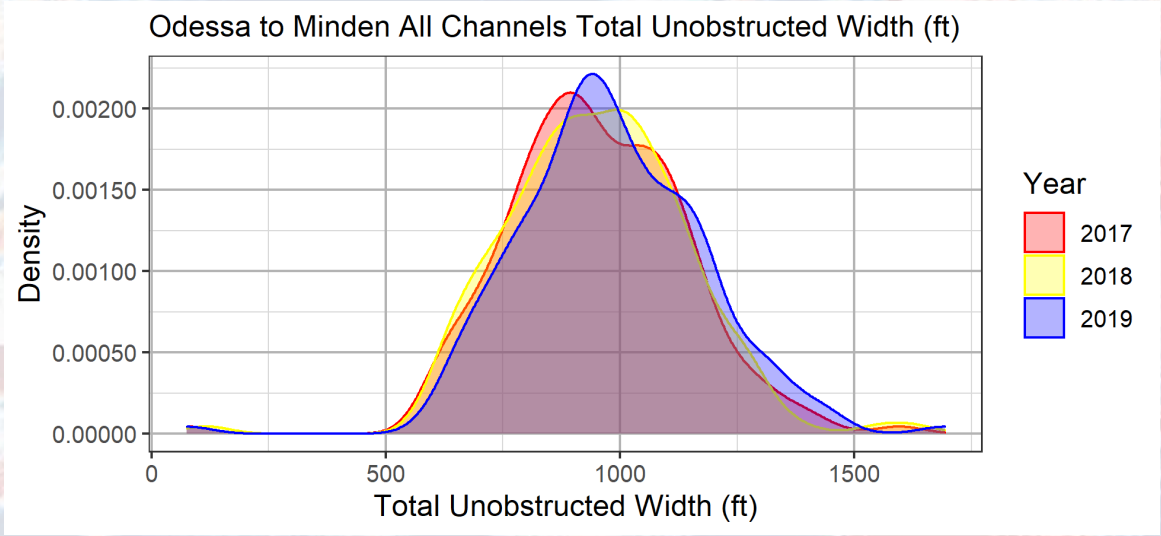
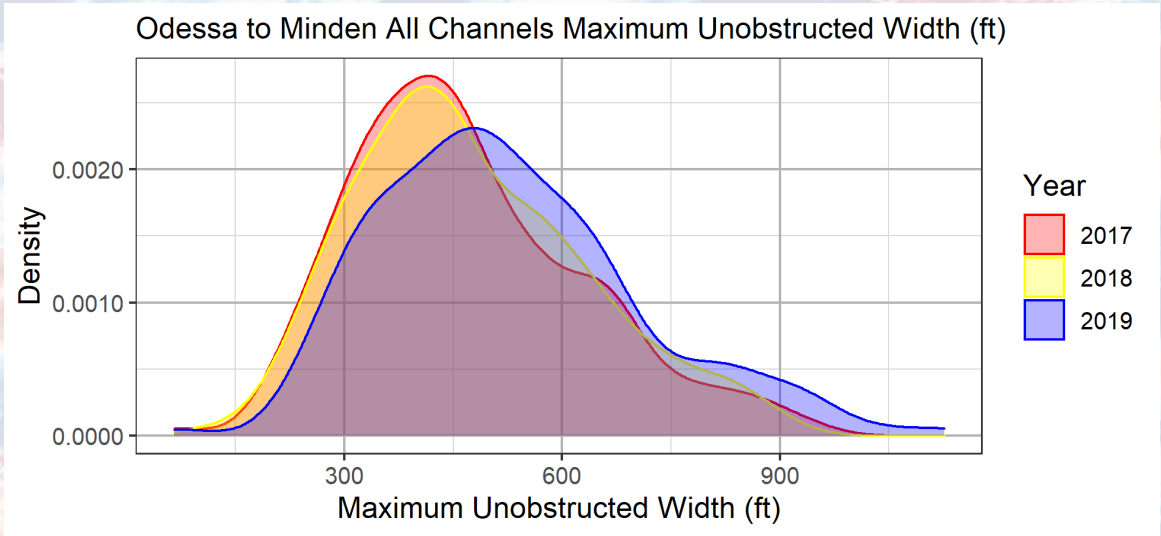
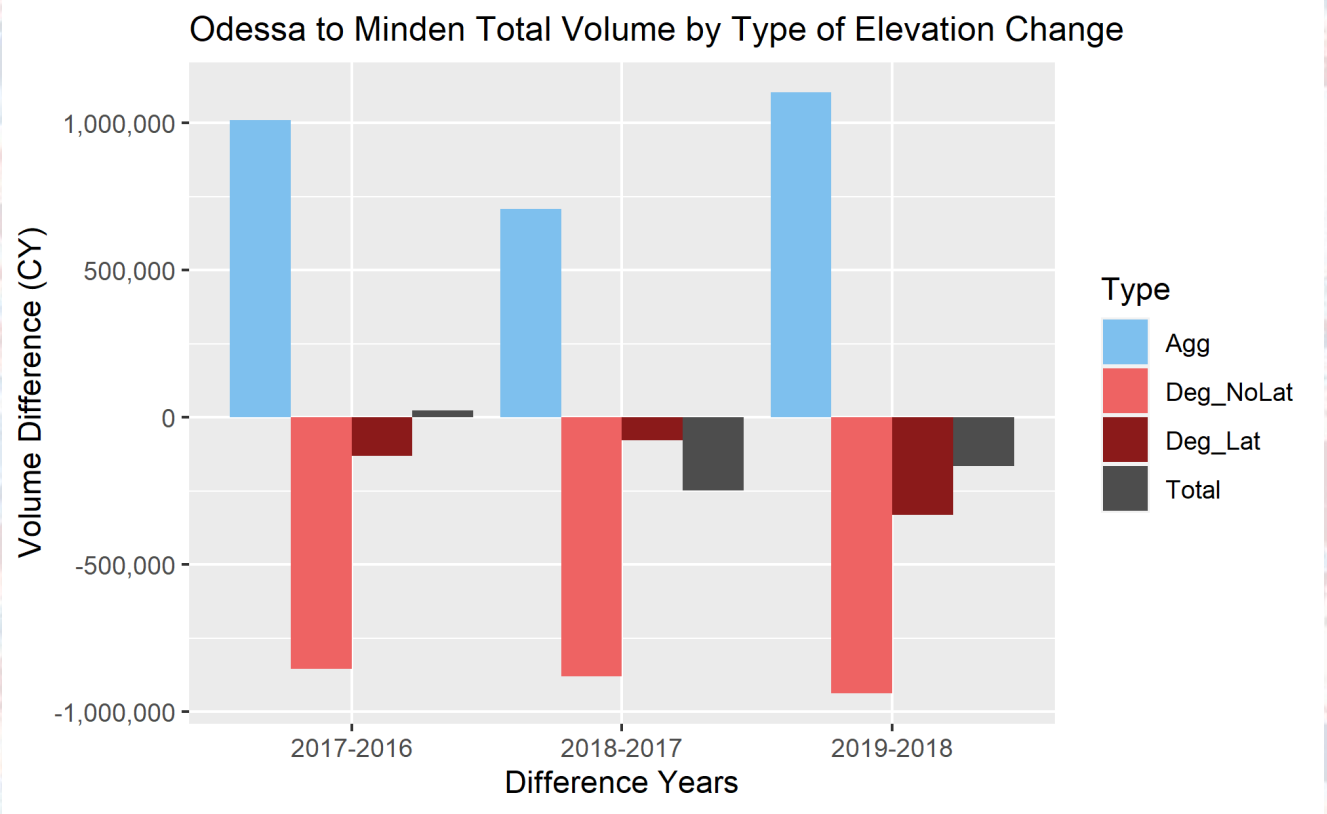




Volume Change Analysis

- Difference topobathymetric LiDAR rasters
- Sum total volume change
- Classify volume change by type
  - Aggradation (>0 ft)
  - Degradation (0: -2 ft)
  - Lateral Erosion (<-2 ft)

Example: Odessa to Minden

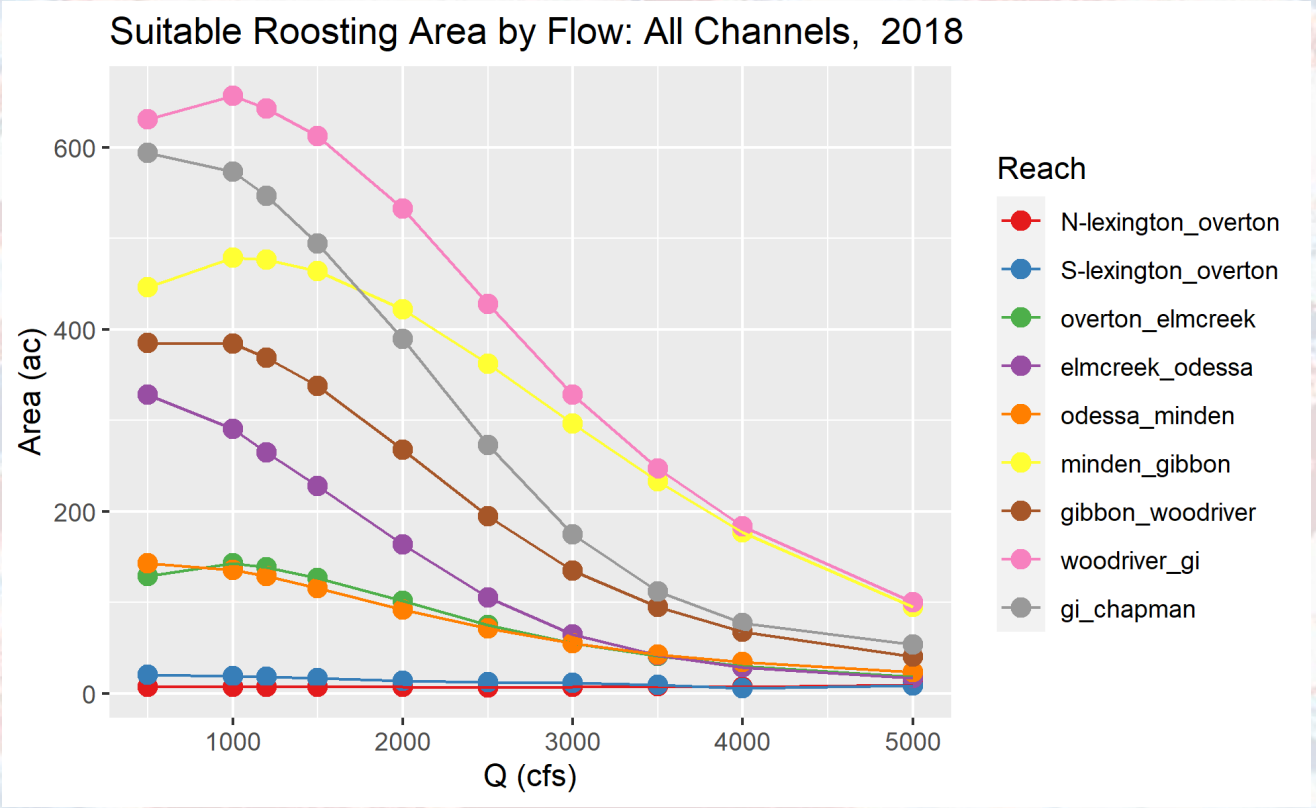


Agg=Aggradation; Deg_NoLat=Degradation (0:-2 ft); Deg_Lat=Lateral Erosion

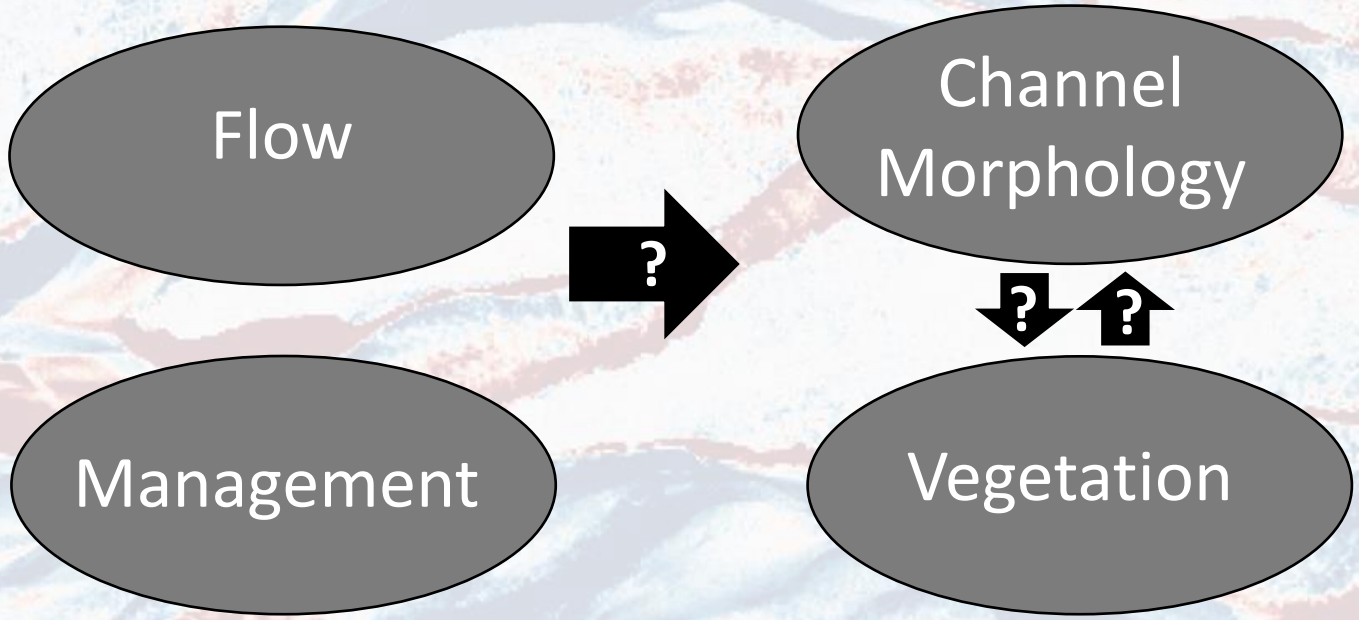
Whooping Crane Habitat Metrics

- Maximum Unobstructed Channel Width
- Suitable Roosting Area, by modeled flows
  - MUCW >650 ft
  - Water <1 ft deep

Suitable Roosting Area



Analysis of in-channel vegetation drivers



- SedVeg model?
- Other models in development
- Comparison of RWM Metrics: PRRIP-management vs other

Future of RWM

- For now: revising methods; seeking input from stakeholders

- Short-term
  - Re-running analysis with revised LiDAR
  - Representation of results with ArcGIS Online
- Long-term
  - Addressing other hypotheses?
  - Seeking academic partners?

Questions?

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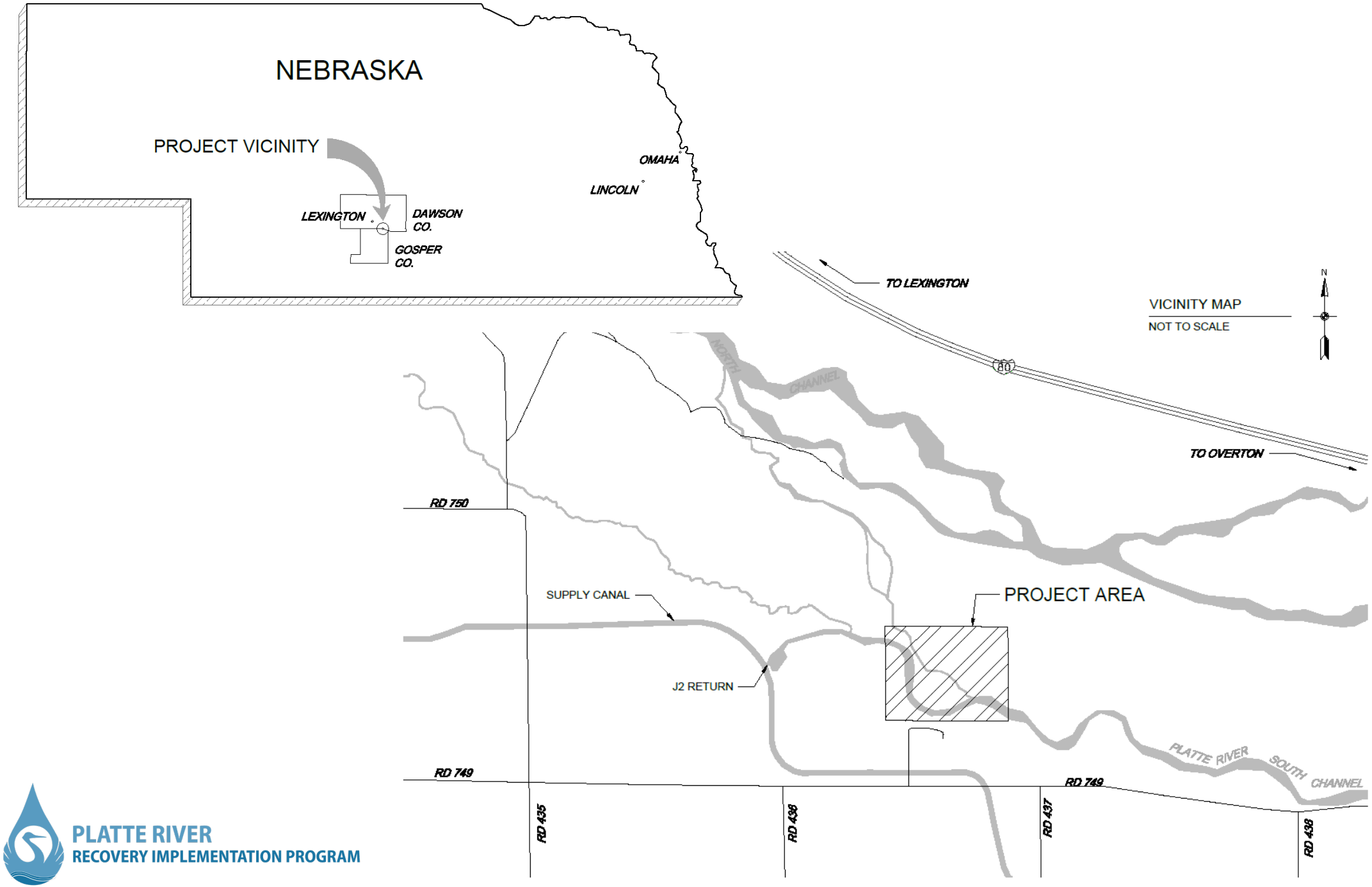
grabowskij@headwaterscorp.com

Full-Scale Sediment Augmentation

Year 4 Update

Tom Smrdel - Fluvial Geomorphologist

PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

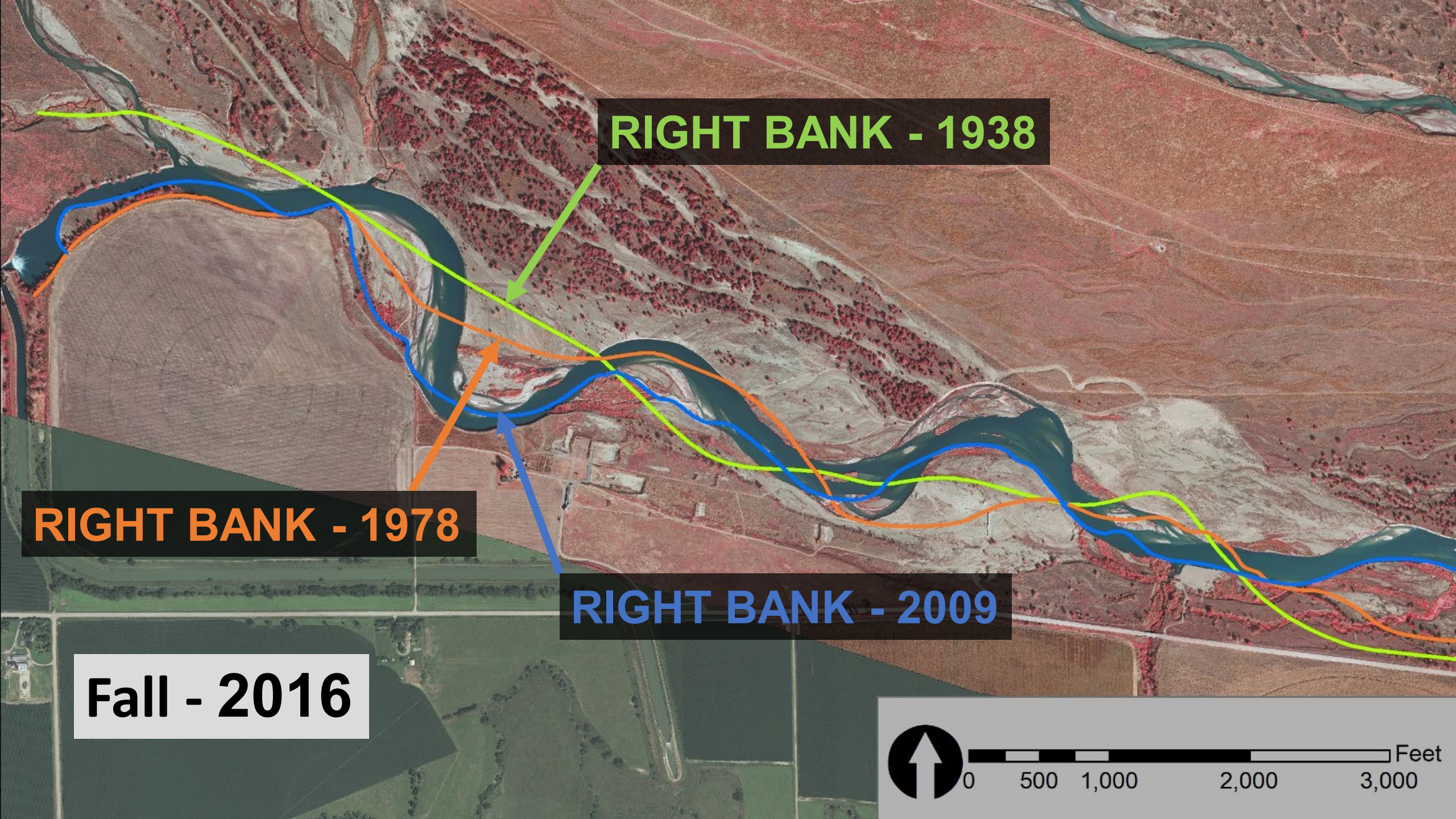


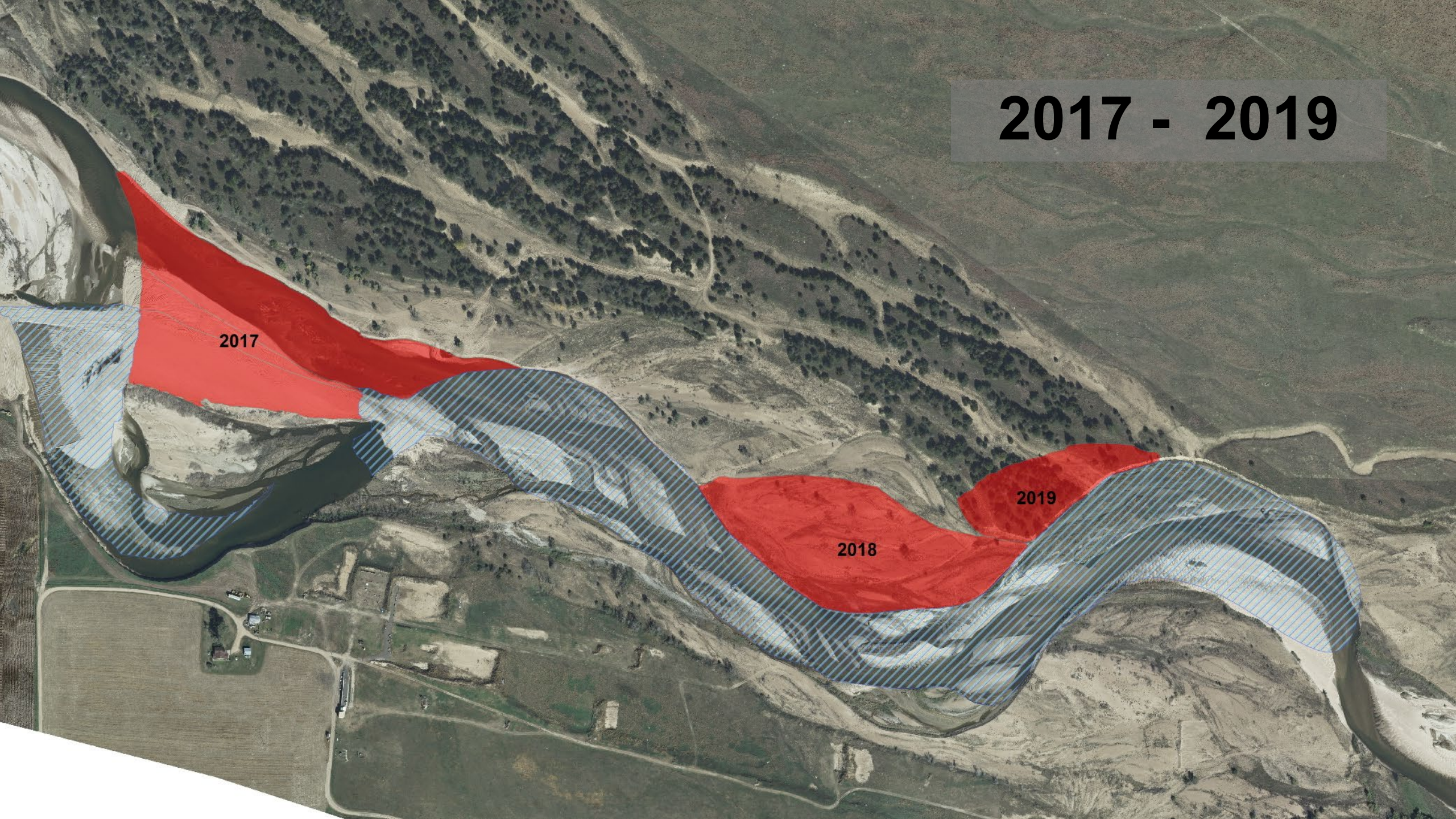
PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

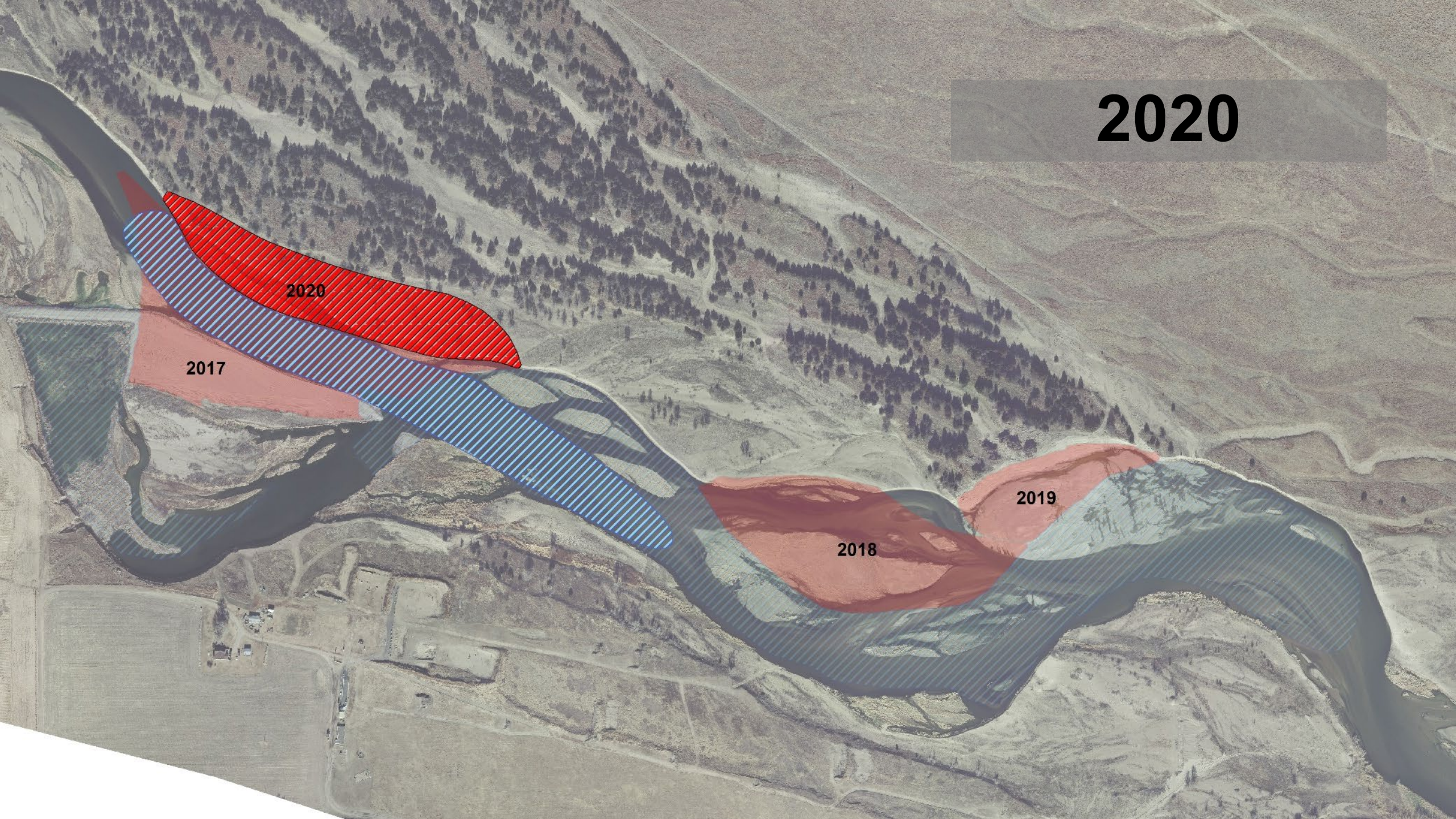

RIGHT BANK - 1938
Summer - 1938
0
500
1,000
2,000
3,000
Feet

Summer - 1978

0 500 1,000 2,000 3,000 Feet


RIGHT BANK - 1938
RIGHT BANK - 1978
RIGHT BANK - 2009
Fall - 2016
0
500
1,000
2,000
3,000
Feet


2017 - 2019
2017
2018
2019

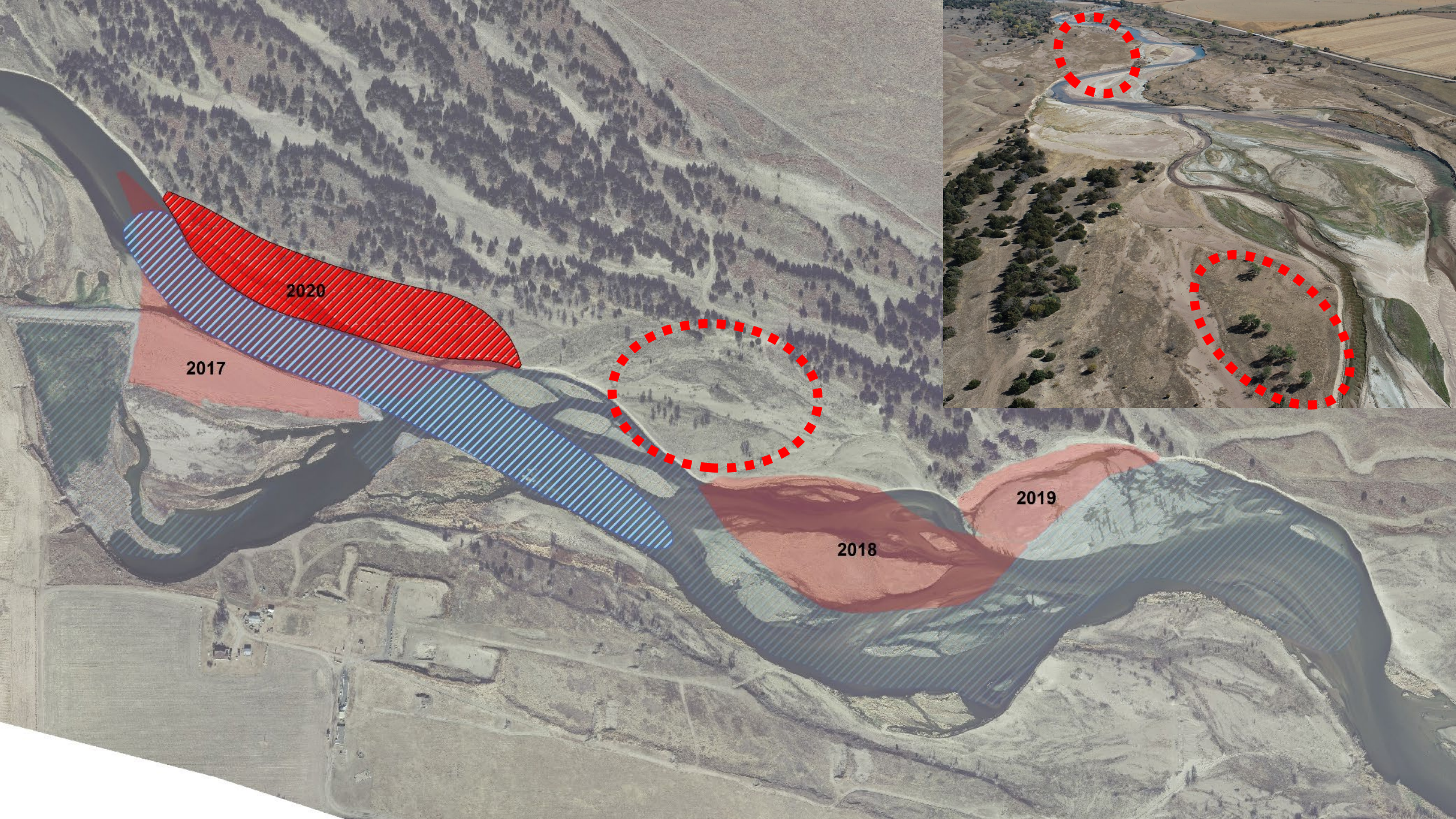

2020
2020
2017
2019
2018

Pre-Project, Fall 2020

PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

Post-Project 10/13

PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM


2020
2017
2018
2019

Germination Suppression

EXPERIMENT DESIGN DISCUSSION

Tom Smrdel - Fluvial Geomorphologist

In the absence of vegetation, all alluvial rivers would be braided…

THE QUESTION:
CAN VEGETATIVE GROWTH IN THE CHANNEL BE REDUCED BY SUPPRESSING GERMINATION WITH INUNDATING FLOWS?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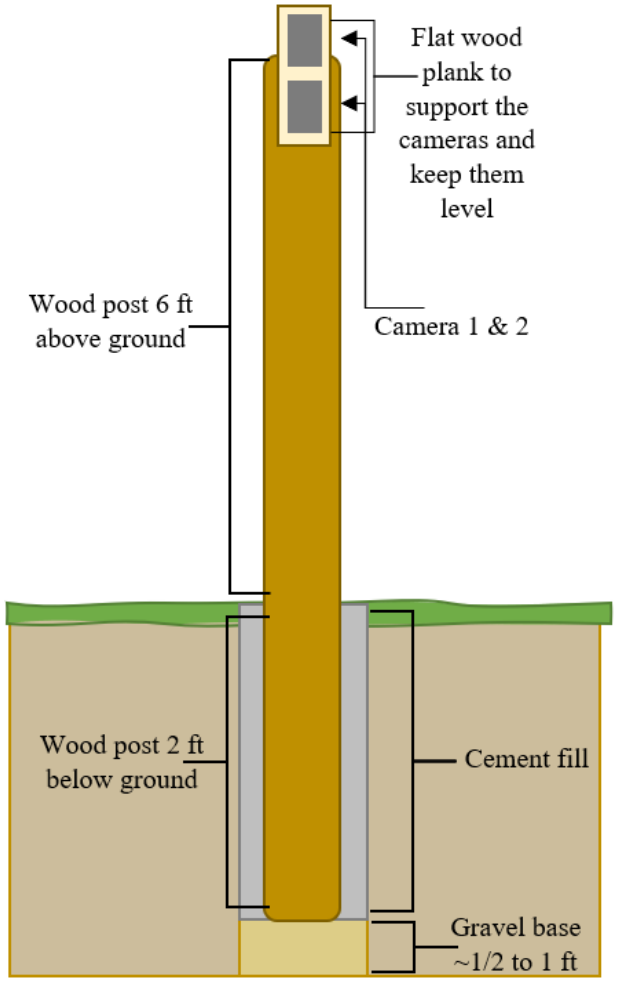
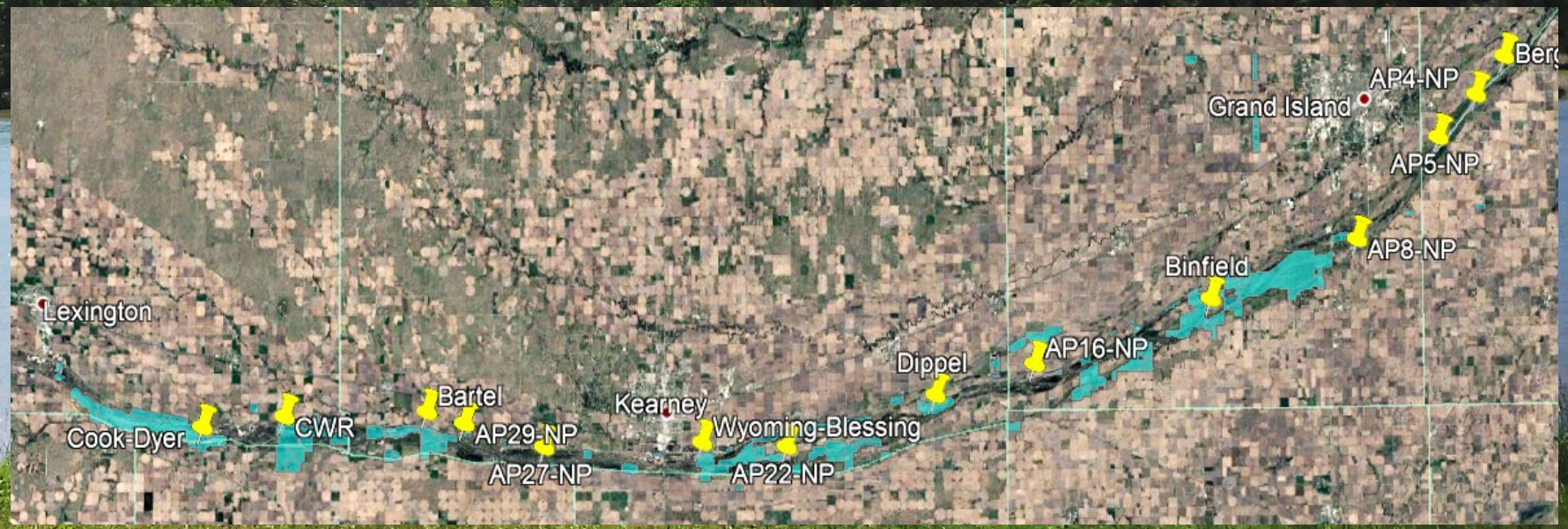
RECONYX
BF-E

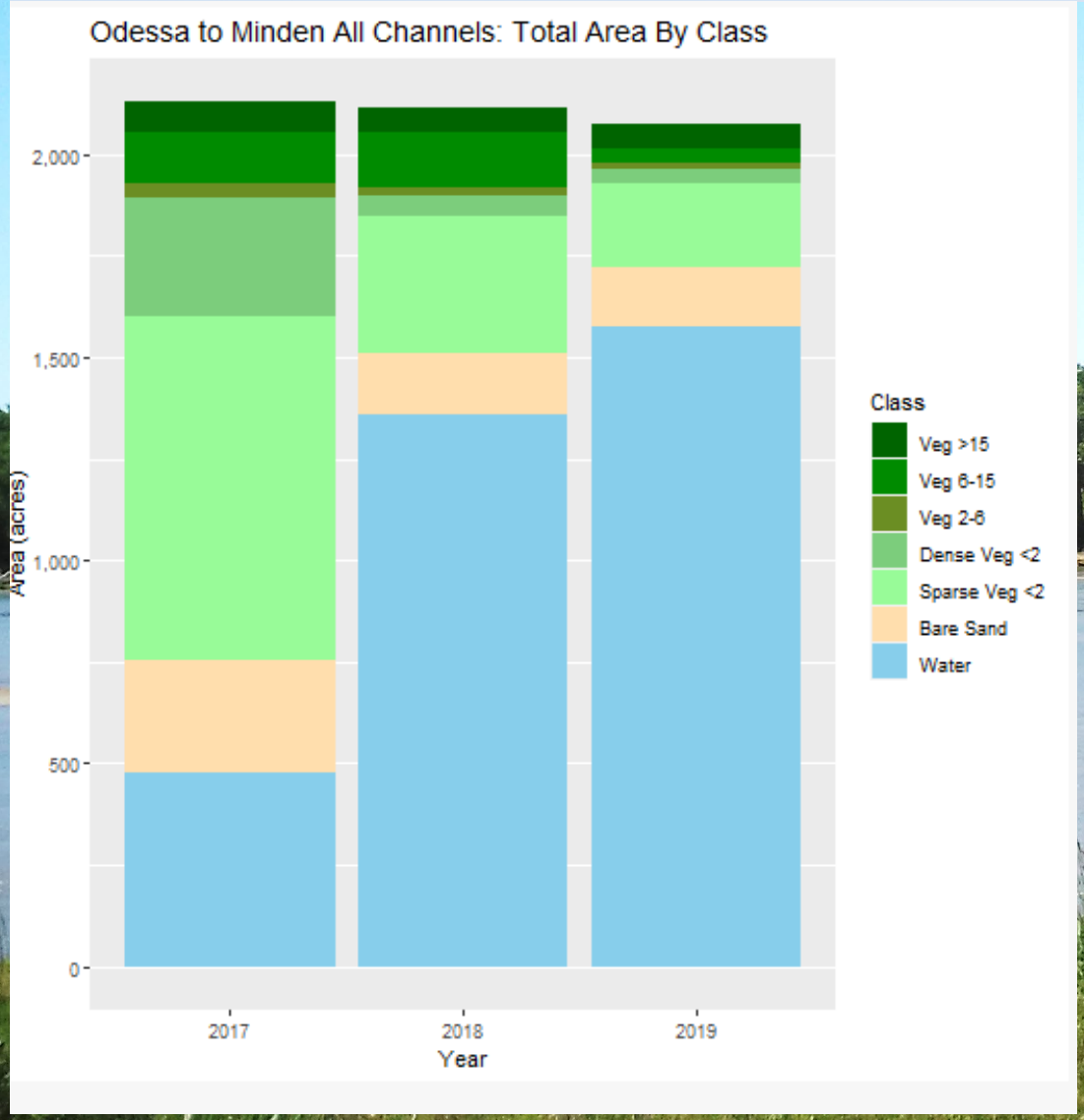
Validation Data Collection Setup

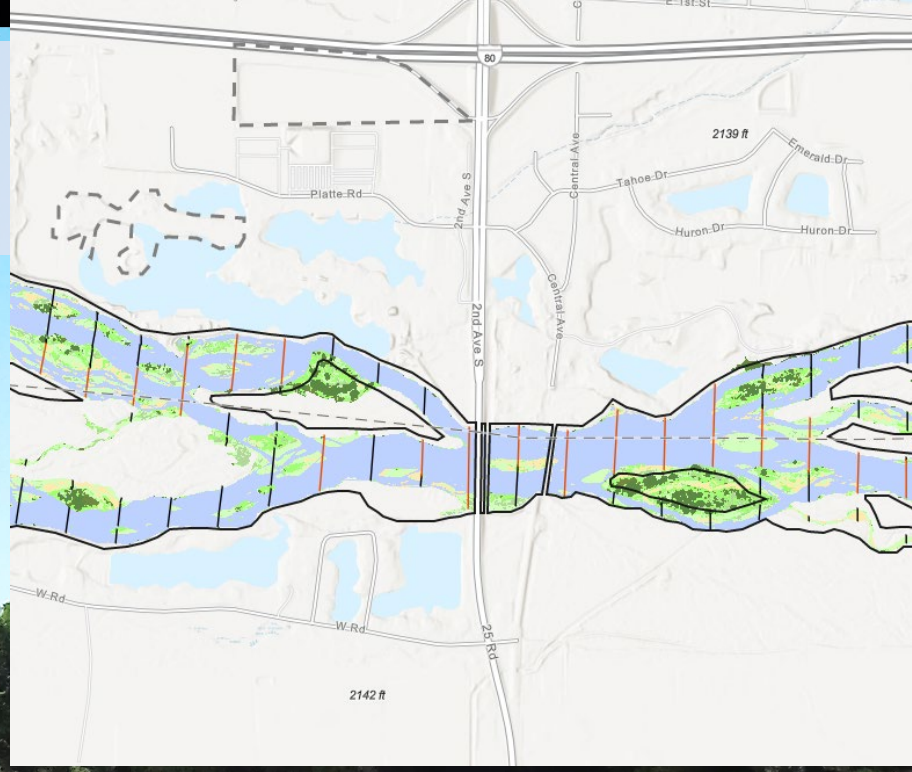


- 10-15 cameras deployed in early April and maintained during river surveys.
- Locations will be evenly distributed amongst PRRIP and non-PRRIP and generally field fit to balance access, current conditions and learning potential.
- Photos will be taken hourly during daylight hours.
- Cameras will be removed in early October and data compiled for analysis



Evaluation Data





Still some things we need to know…

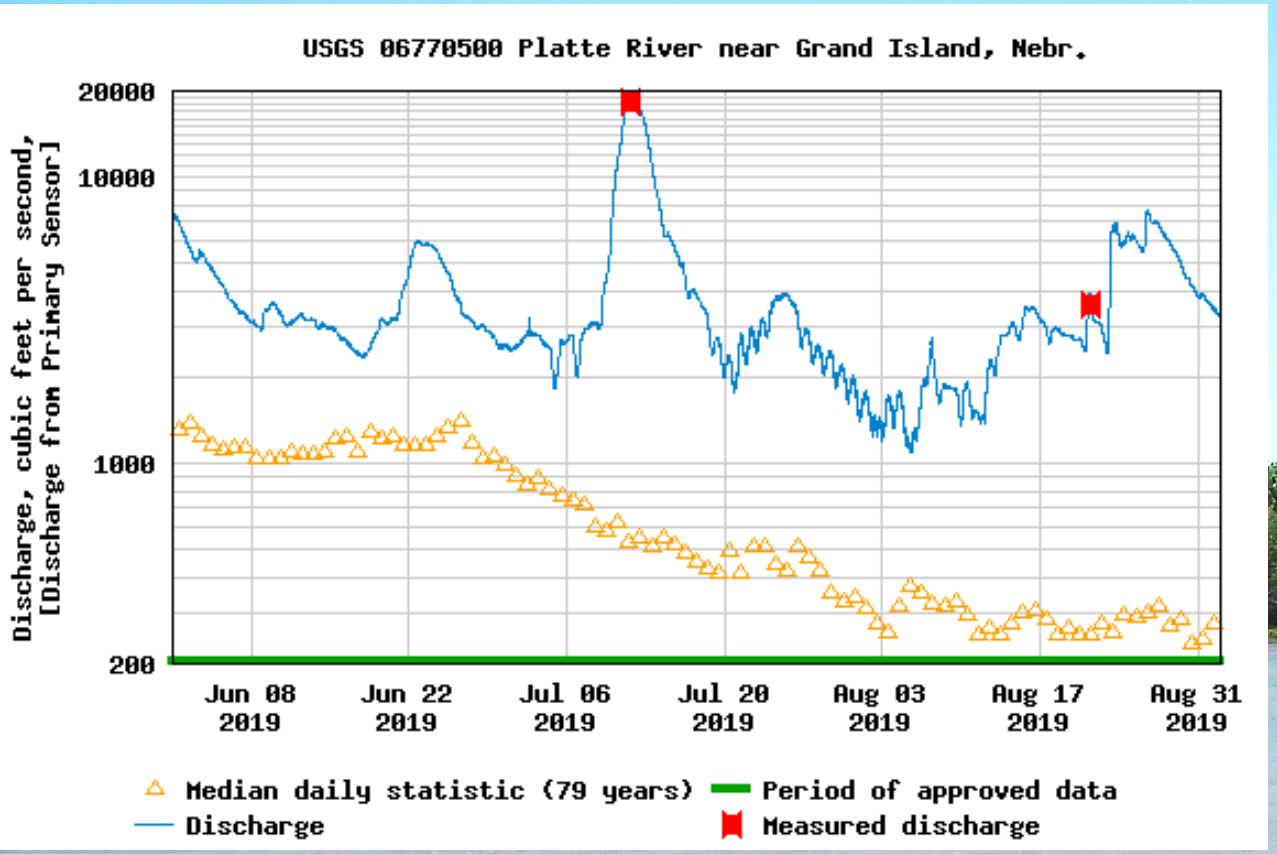
What specific plants or communities are we trying to suppress or limit germination?

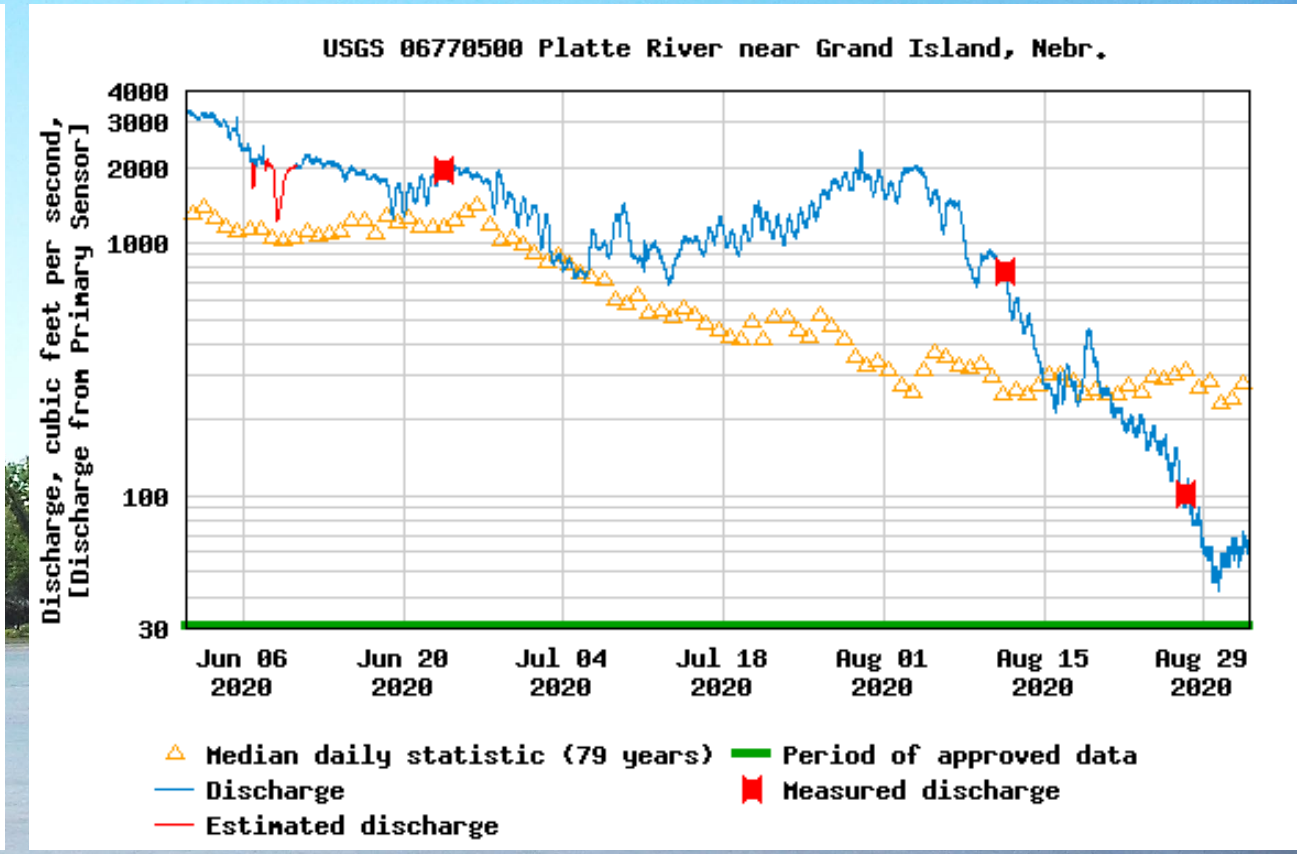
How much water do we need and when?

Hydrocycling considerations?

Room to adjust?

Grand Island Stream Gage: June 1 – September 1

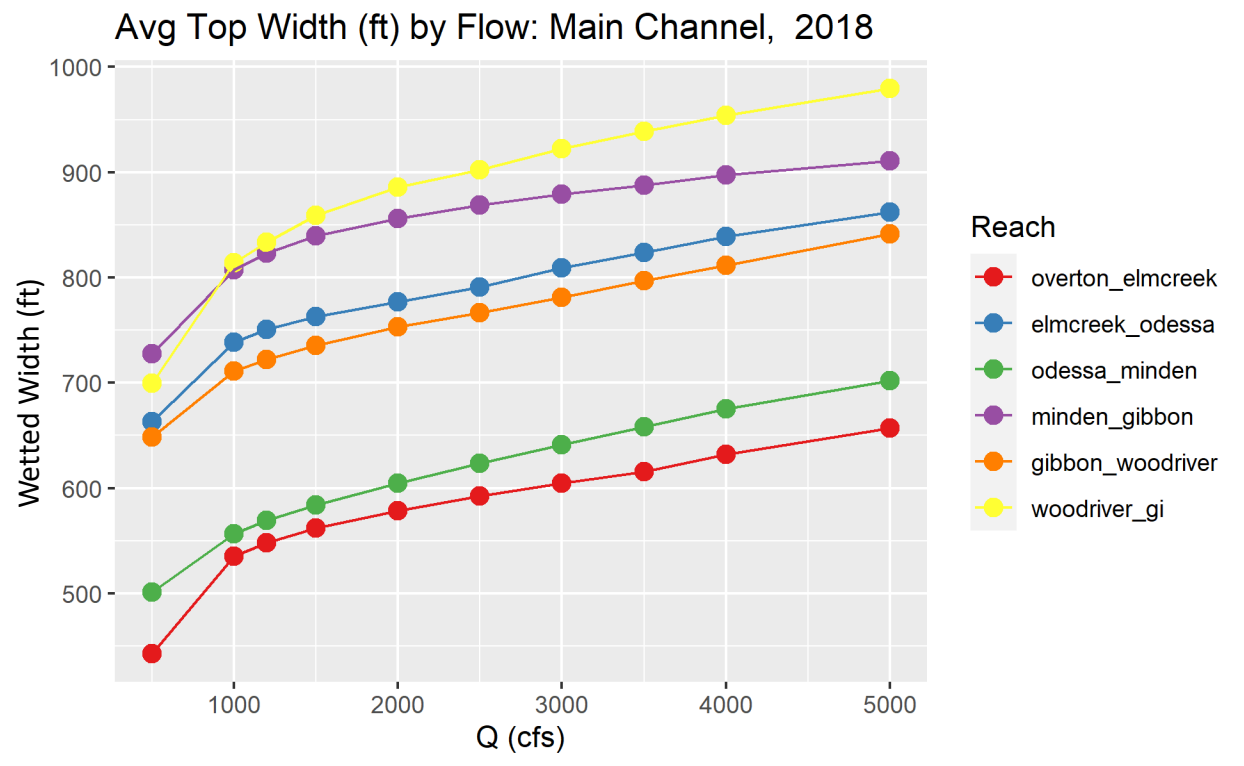


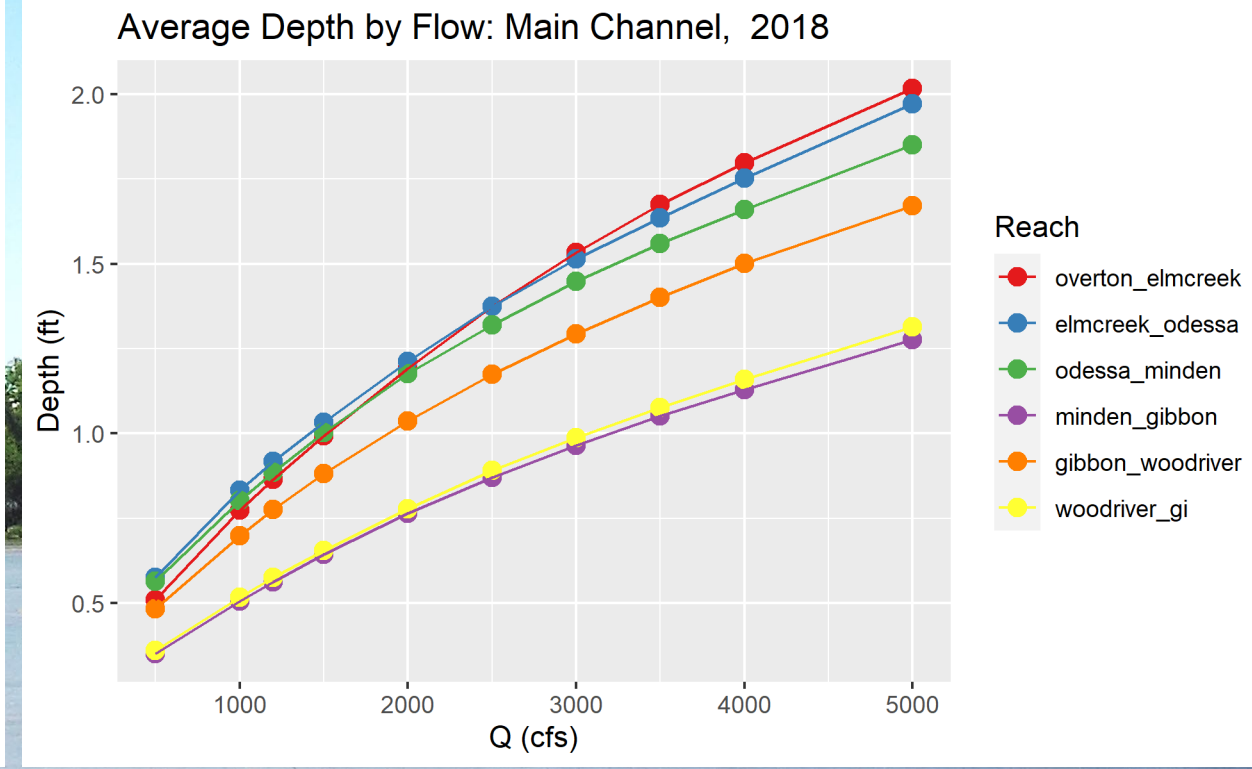


2019

2020

Preliminary Monitoring Results: Main Channel Hydraulics

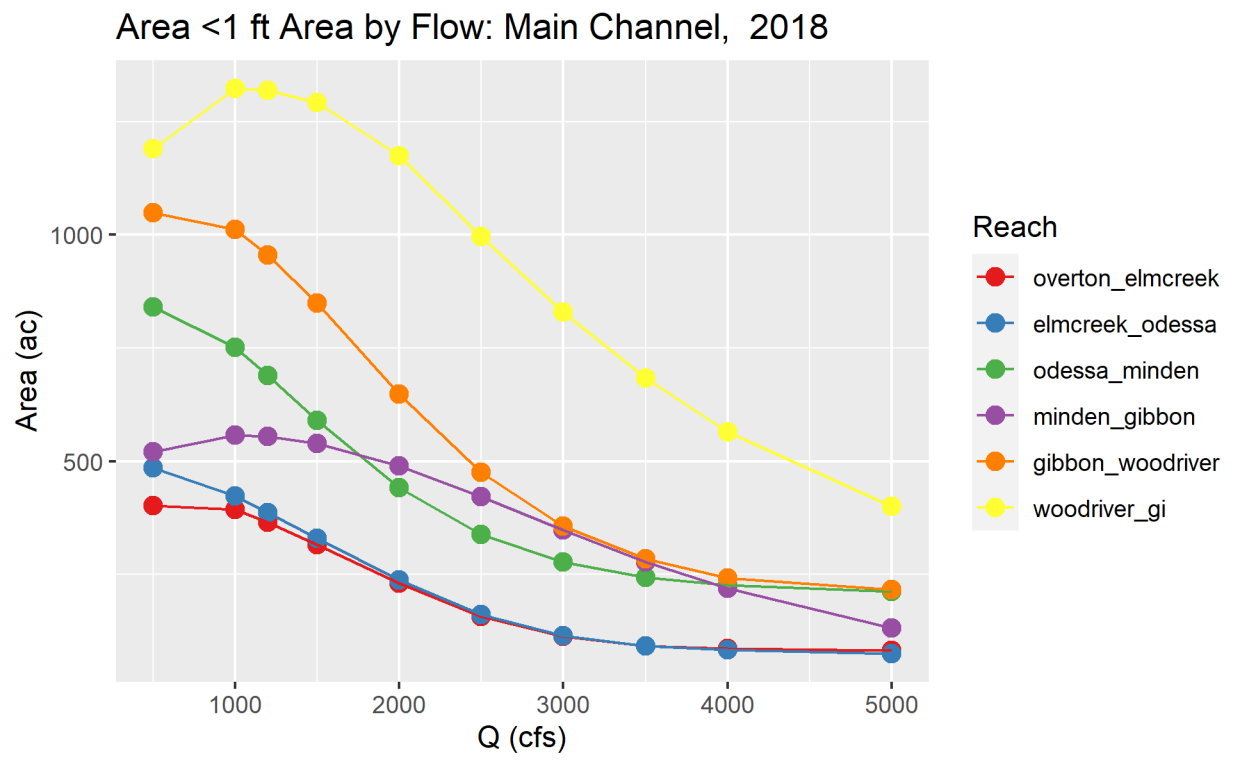


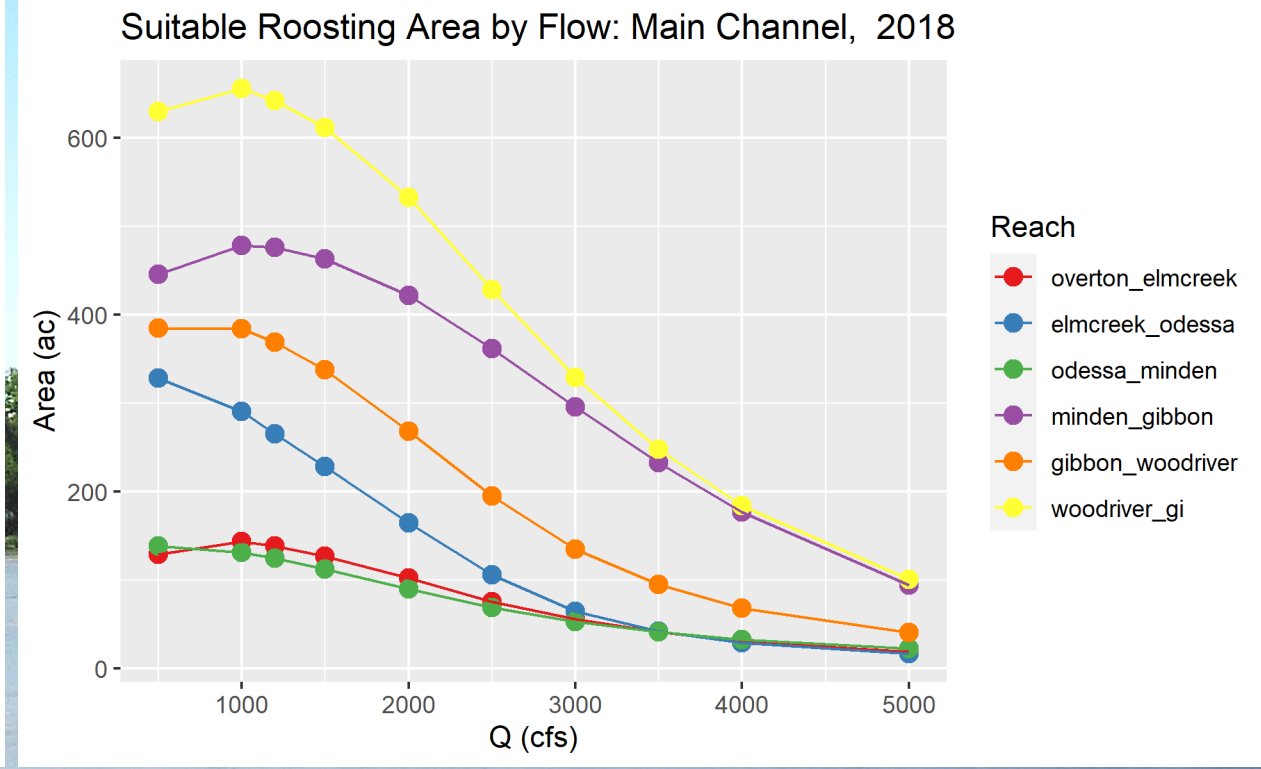


Average wetted top width vs flow, by geomorphic reach

Average depth vs flow, by geomorphic reach

Preliminary Monitoring Results: Whooping Crane Specific Results





Area less than one foot vs flow , by geomorphic reach

Area less than one foot overlapping with >650 ft vs flow, by geomorphic reach

Next Steps

- Incorporate comments from AMP and ISAC.
- Finalize details for the experiment.
- Deploy cameras and get to quantification.