Developing a Historical Dredged Sediment Placement Database for the Upper Mississippi River: Implications For Current BU practices



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EMRRP Webinar Series

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US Army Corps of Engineers

ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER

DISCOVER | DEVELOP | DELIVER

Project Team



Principal Investigator Leads:

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Corps District Collaboration (all PDT members):

- **Aaron McFarlane-**Biologist, USACE MVP
- **Lewis Wiechmann-** Forester, USACE MVP
- **Andy Meier-**Forester, USACE MVP
- **Ben Vandermyde-**Forester, USACE MVR
- **Robert Cosgriff-**Forester, USACE MVS

Upper Mississippi River System

- 1250 miles
- Extensive river management and land development
- Degraded floodplain forest habitat
  - Decreased tree diversity
  - Increased monotypic forests
- USACE has beneficially used dredged sediment to restore floodplain forest island habitat in the UMRS



USGS, 2022

UMRS Floodplain Forest Restoration

❖USACE utilizes dredged sediment to restore floodplain forest island habitat in the UMRS

❖However, vegetation outcomes have been difficult to achieve, especially for native forest communities

❖Research is necessary to investigate the influencing characteristics of floodplain vegetation outcomes

❖Retrospective Analysis?

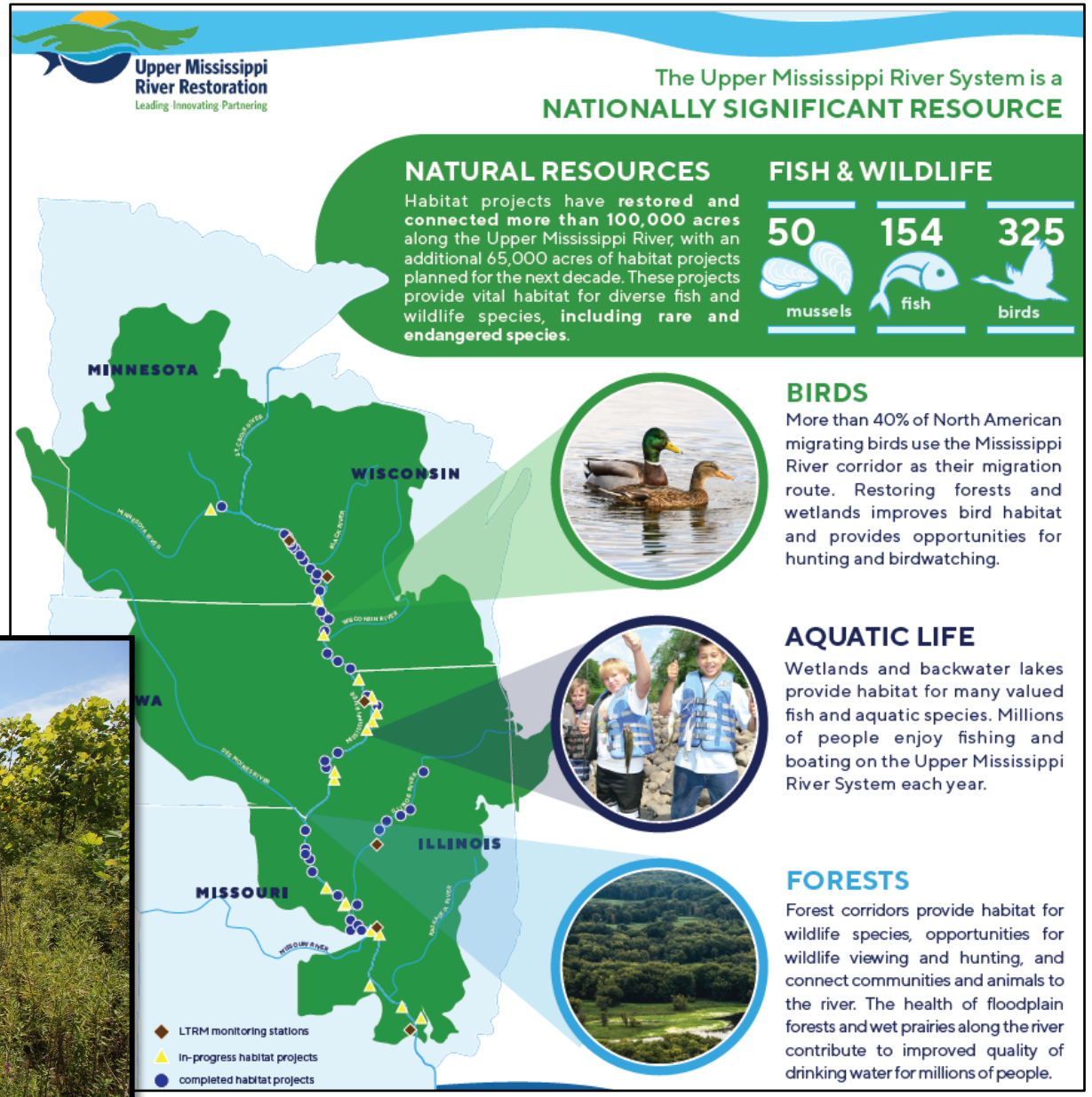


Upper Mississippi River Restoration (UMRR)

- Constructed 100+ projects over 35+ years
- Many construction projects beneficially utilize dredged sediment

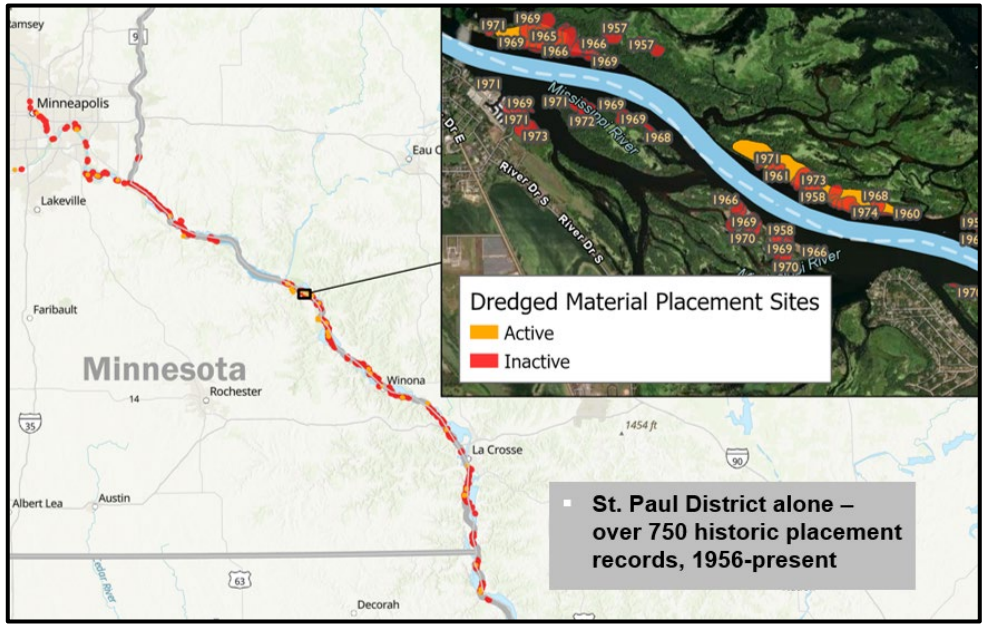






Historical Dredged Sediment Placement

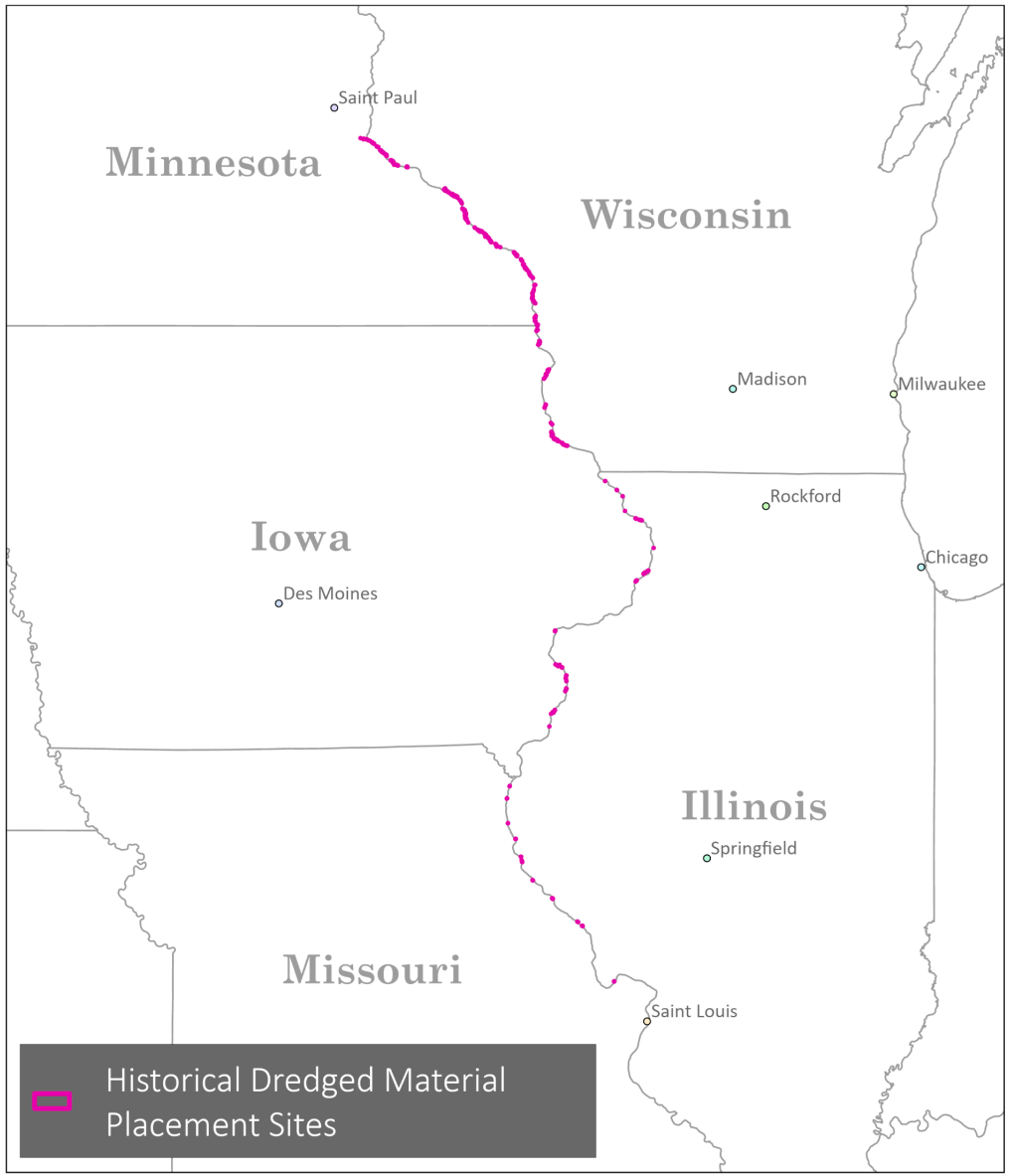
- A significant gap in our knowledge on the long-term outcomes of BU sites
- 100+ years of sediment placement in the UMRS
- A wide spread of forest development, but no analysis of outcomes
- Document long-term outcomes of BU floodplain forest sites



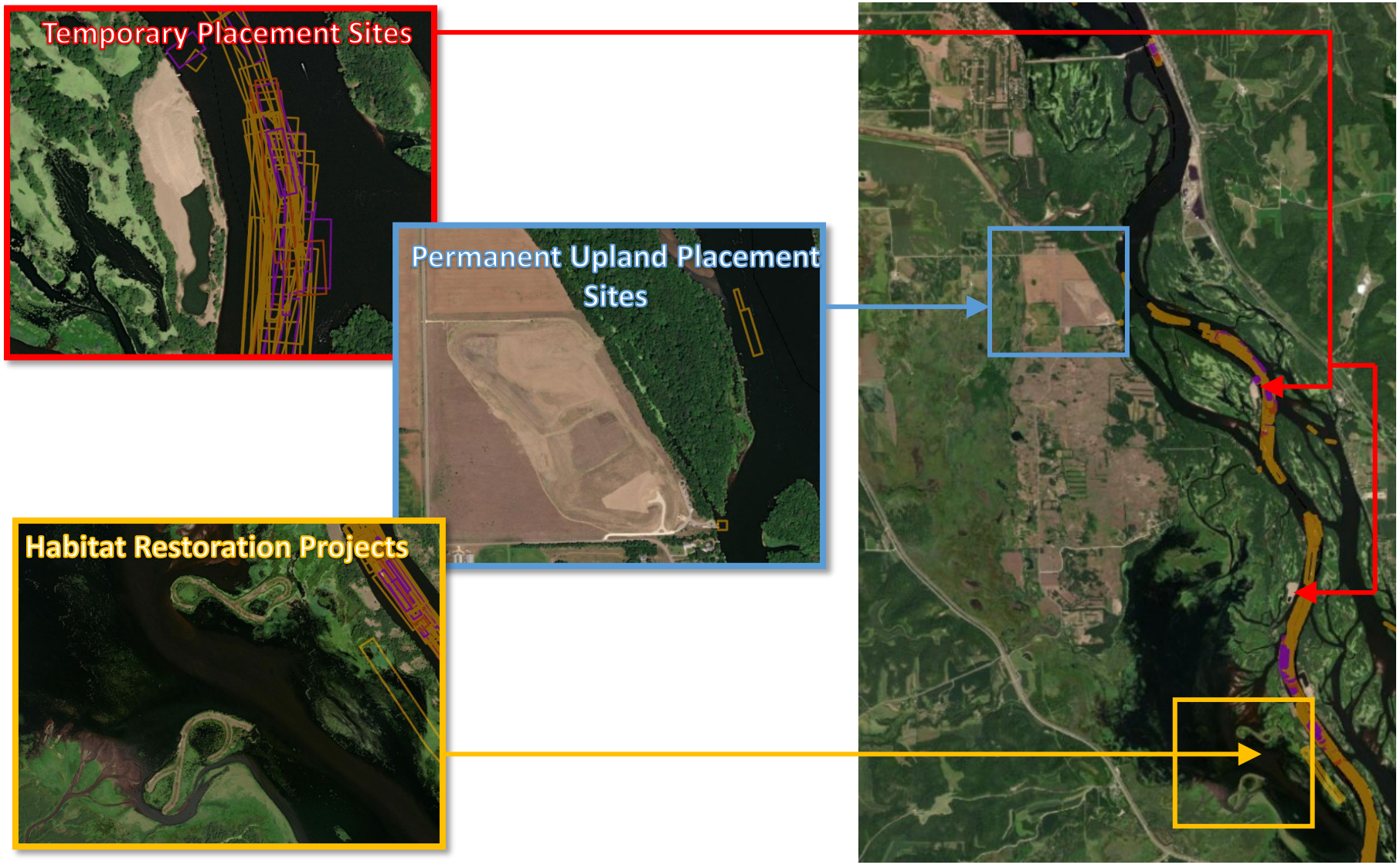
Need: A Historical Dredged Sediment Placement Database

Study Area

- Upper Mississippi River
- St. Paul, Minnesota to St. Louis, Missouri
- RM 840 - 201



Current UMR Routine Channel Maintenance Practices



Current UMR Routine Channel Maintenance Practices

- Consistent locations
- Larger, frequent disturbance

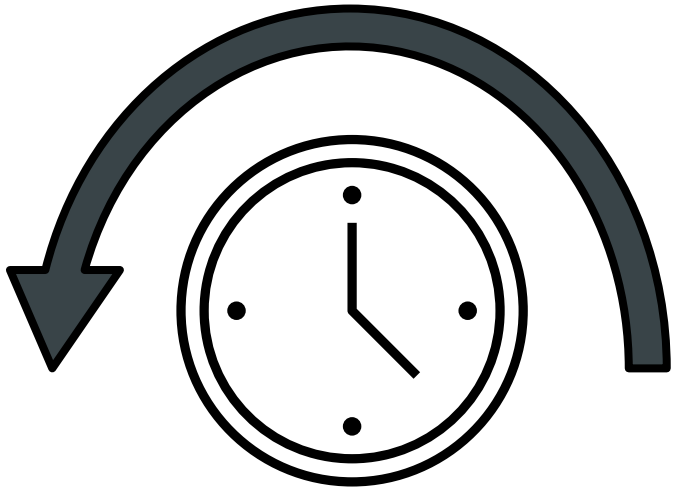


Current UMR Routine Channel Maintenance Practices

- Thalweg placement
- Bankline or main channel border placement



Historical Placement Practices in UMR



1900s – 1970s…



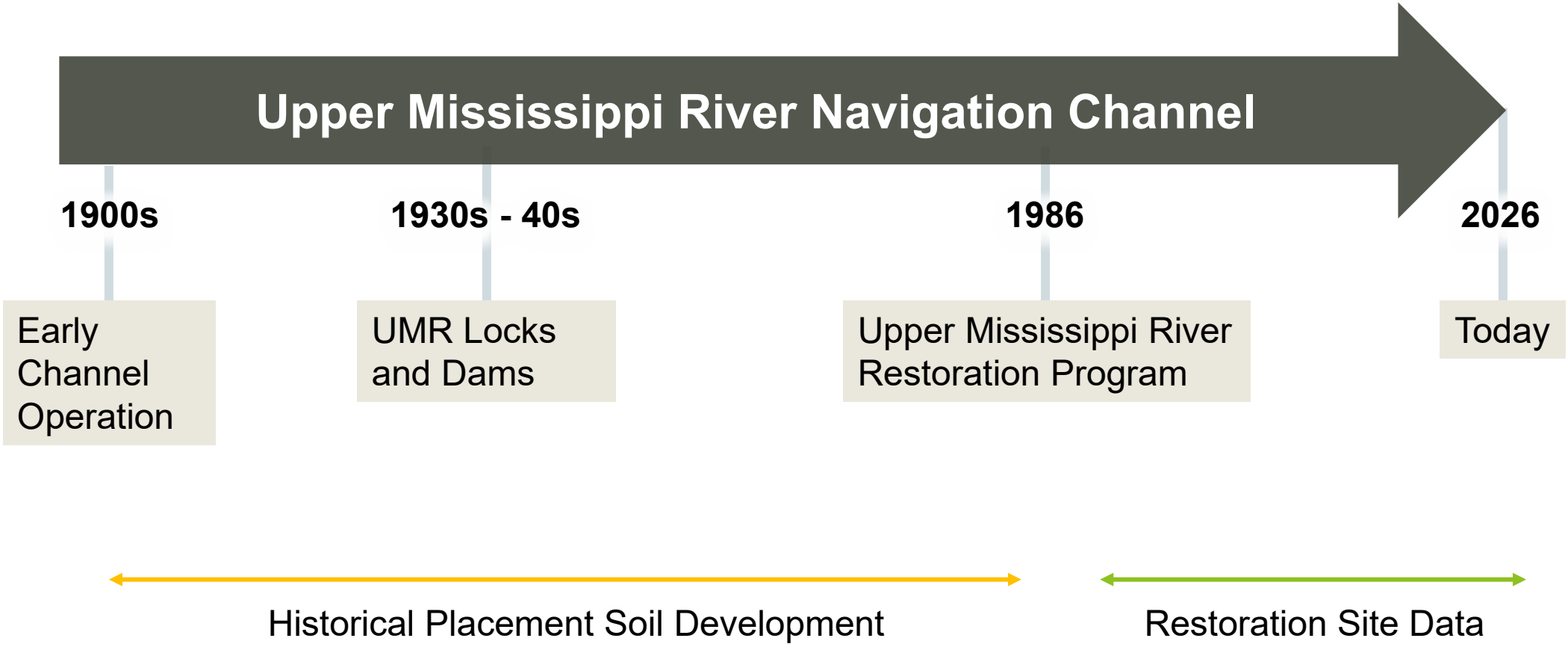
- Primarily side-casting, bankline, and thalweg placement.
- Limited, generalized records of placement locations.

Historical Placement Practices in UMR



Current condition of a site with historical placement.

Extending Floodplain Soil Development Trajectories



Historical Placement Identification

Historical Corps Records

- Dredge Inspector Reports
- Paper copies, digitized by contract in 1990s.

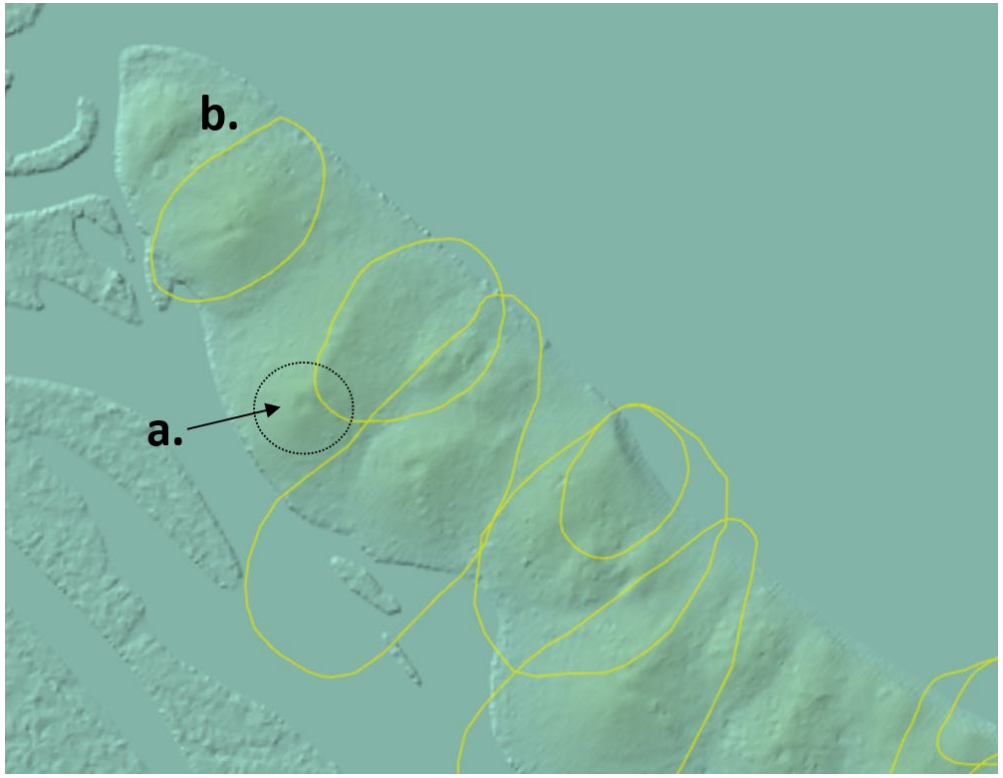


Historical Placement Identification

LIDAR-derived DEMs.

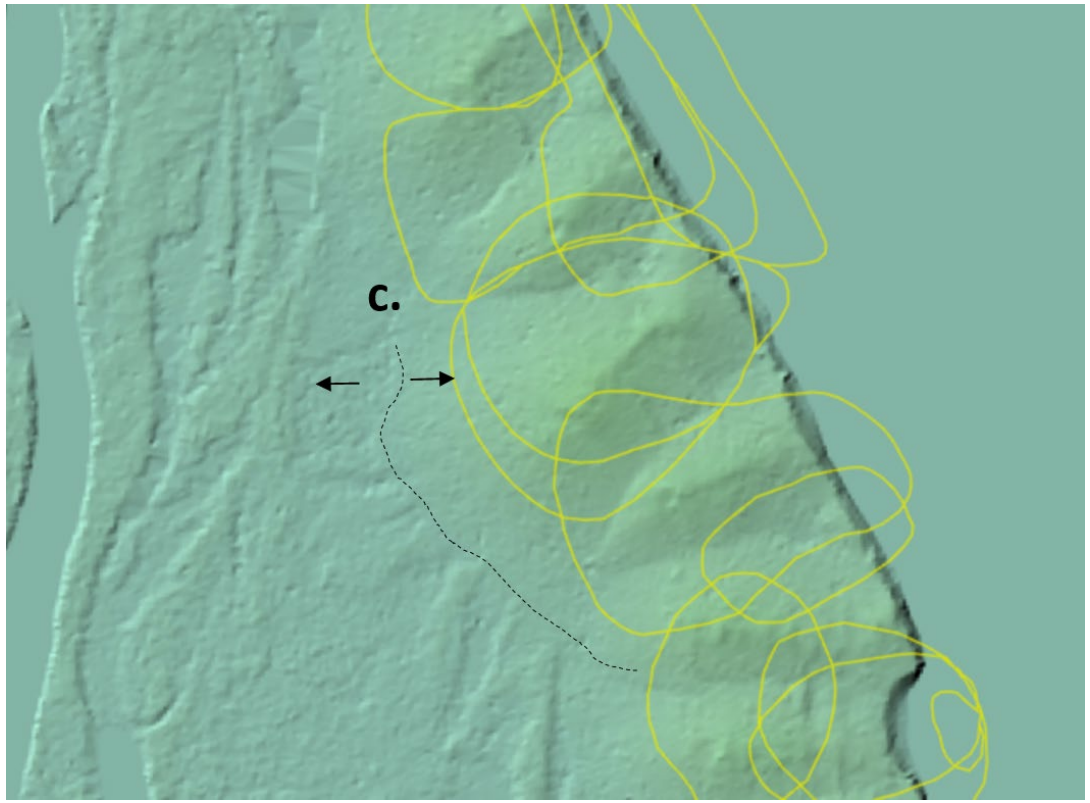
a) Conical / mound feature, typically with depression at apex.

b) Historical records sometimes match placement as shown here, but often do not.



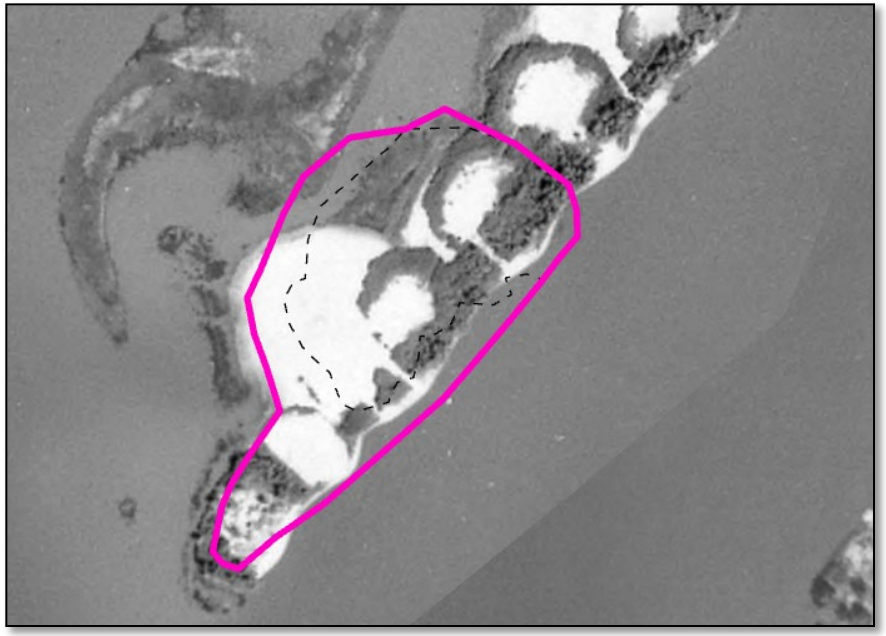
Historical Placement Identification

c) Terrain texture differences often visible between sand placement and natural floodplain.



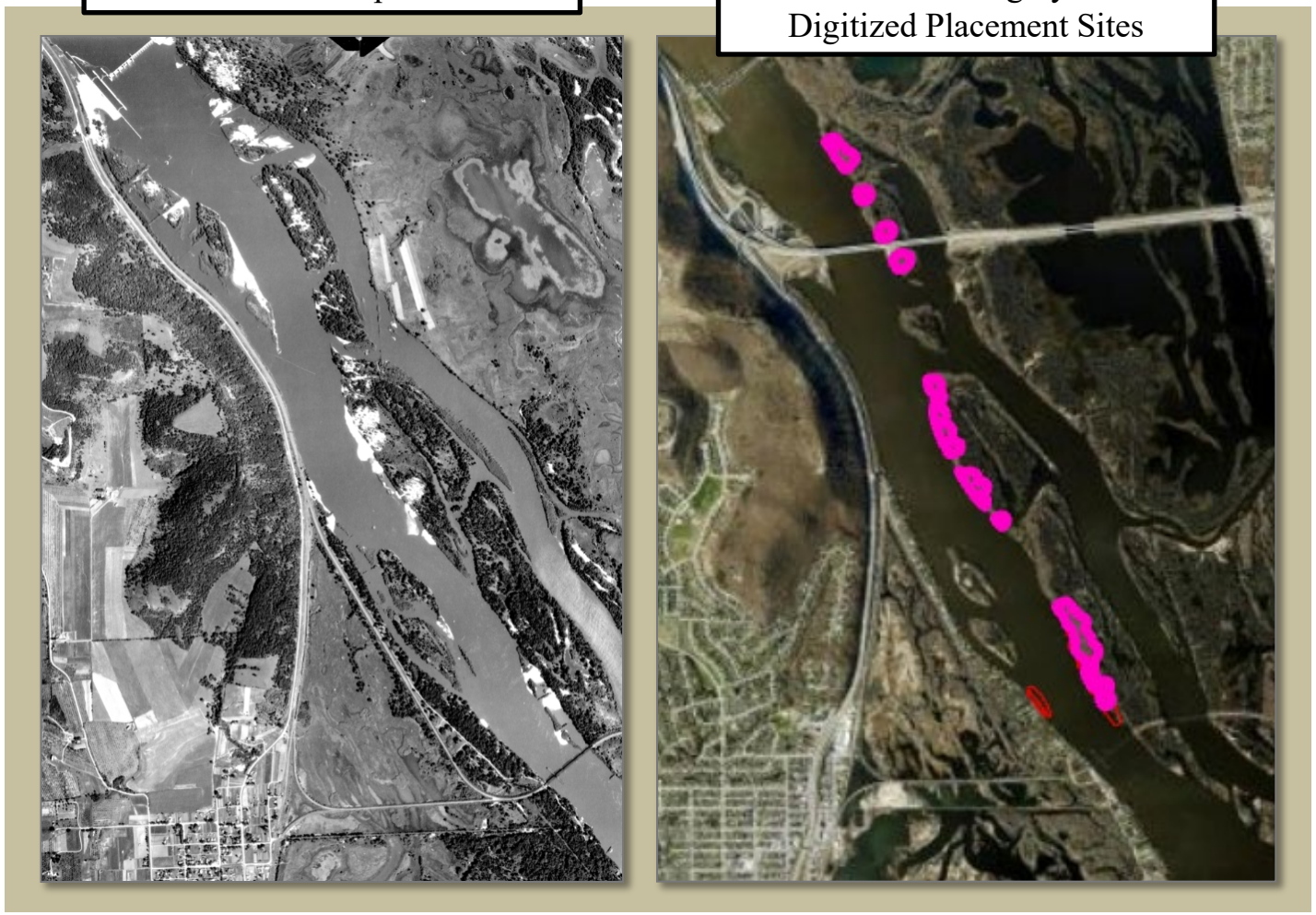
Historical Placement Identification

Historical Aerial Images

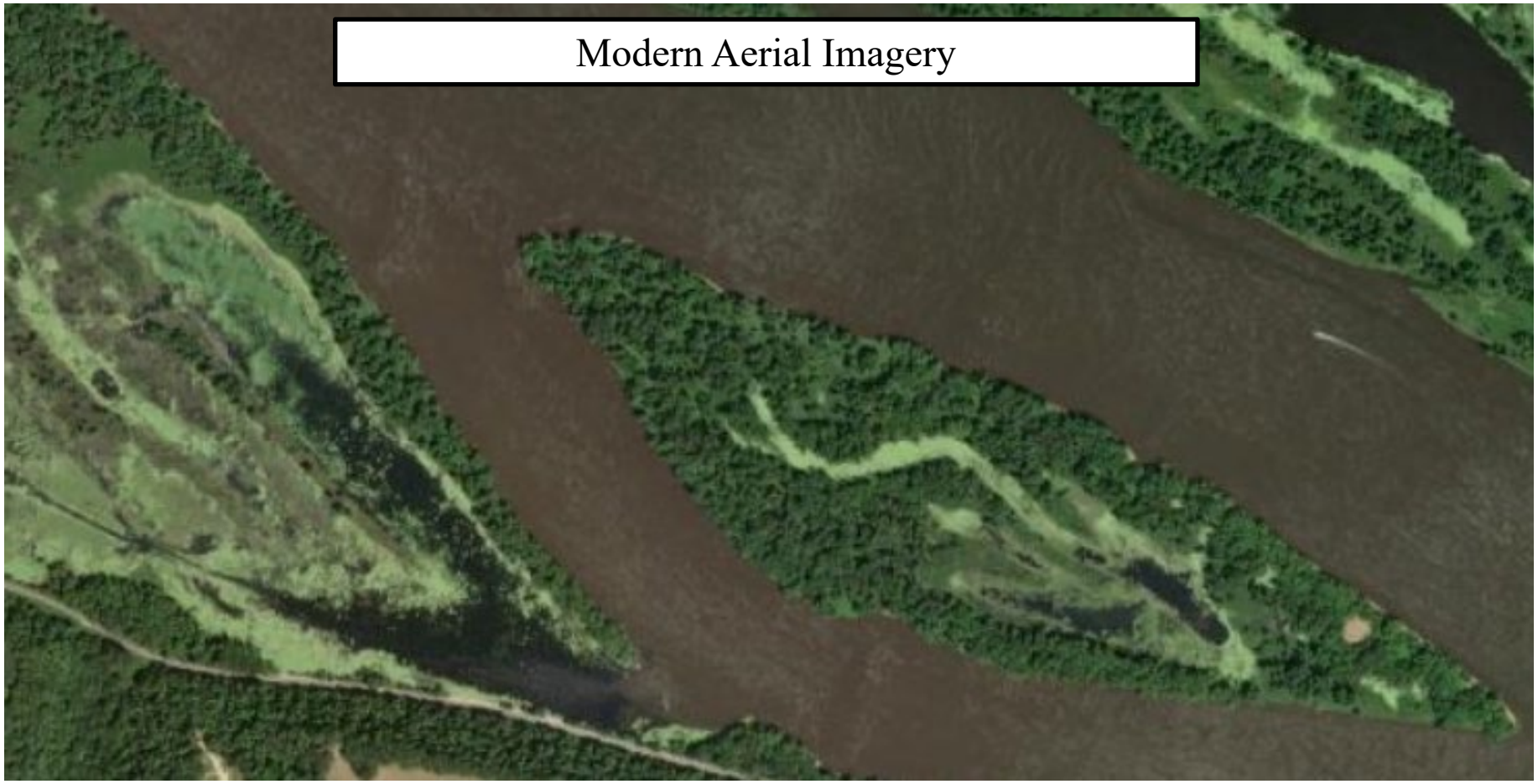


Historic Airphoto

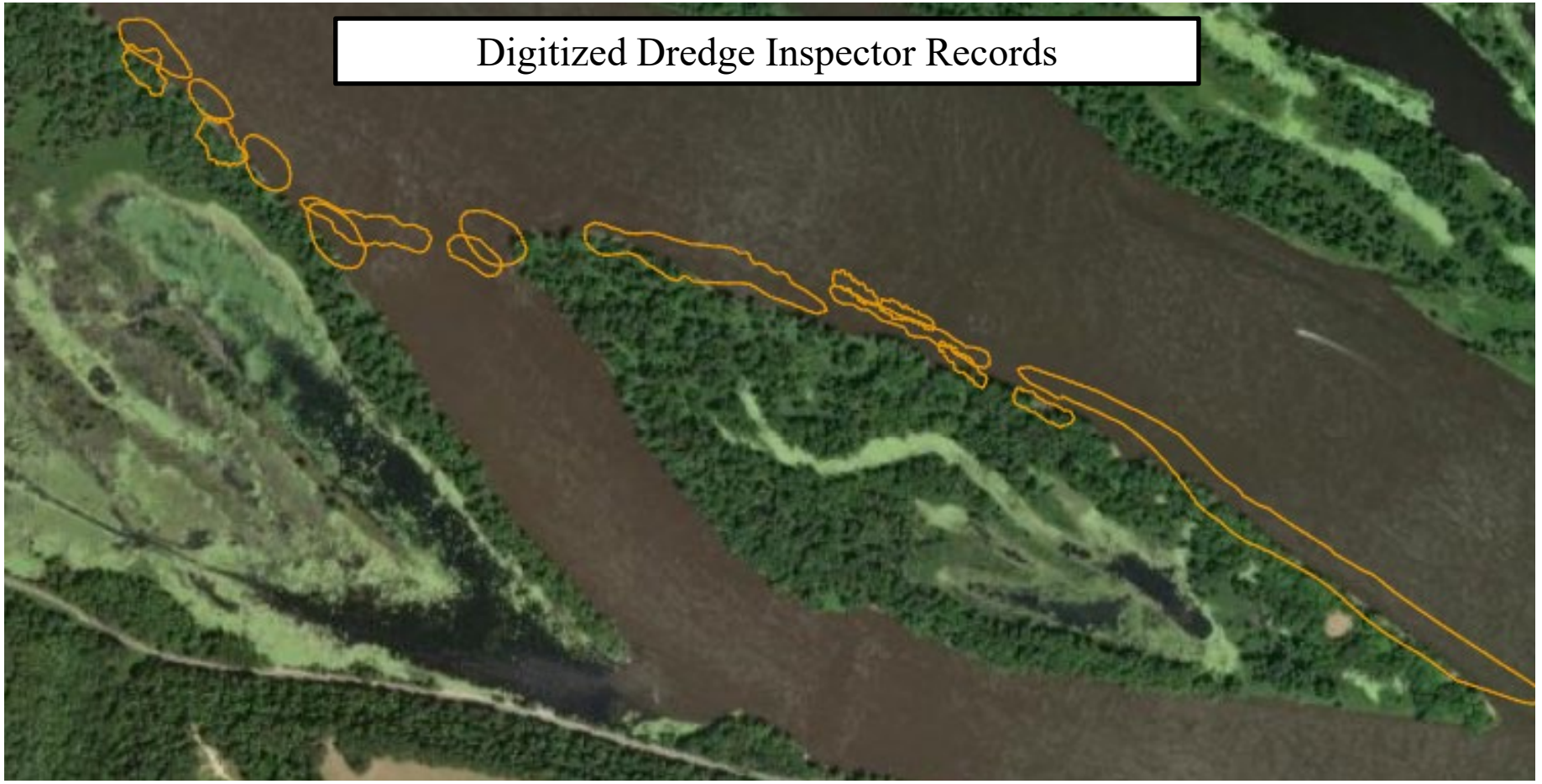
Modern Imagery +
Digitized Placement Sites



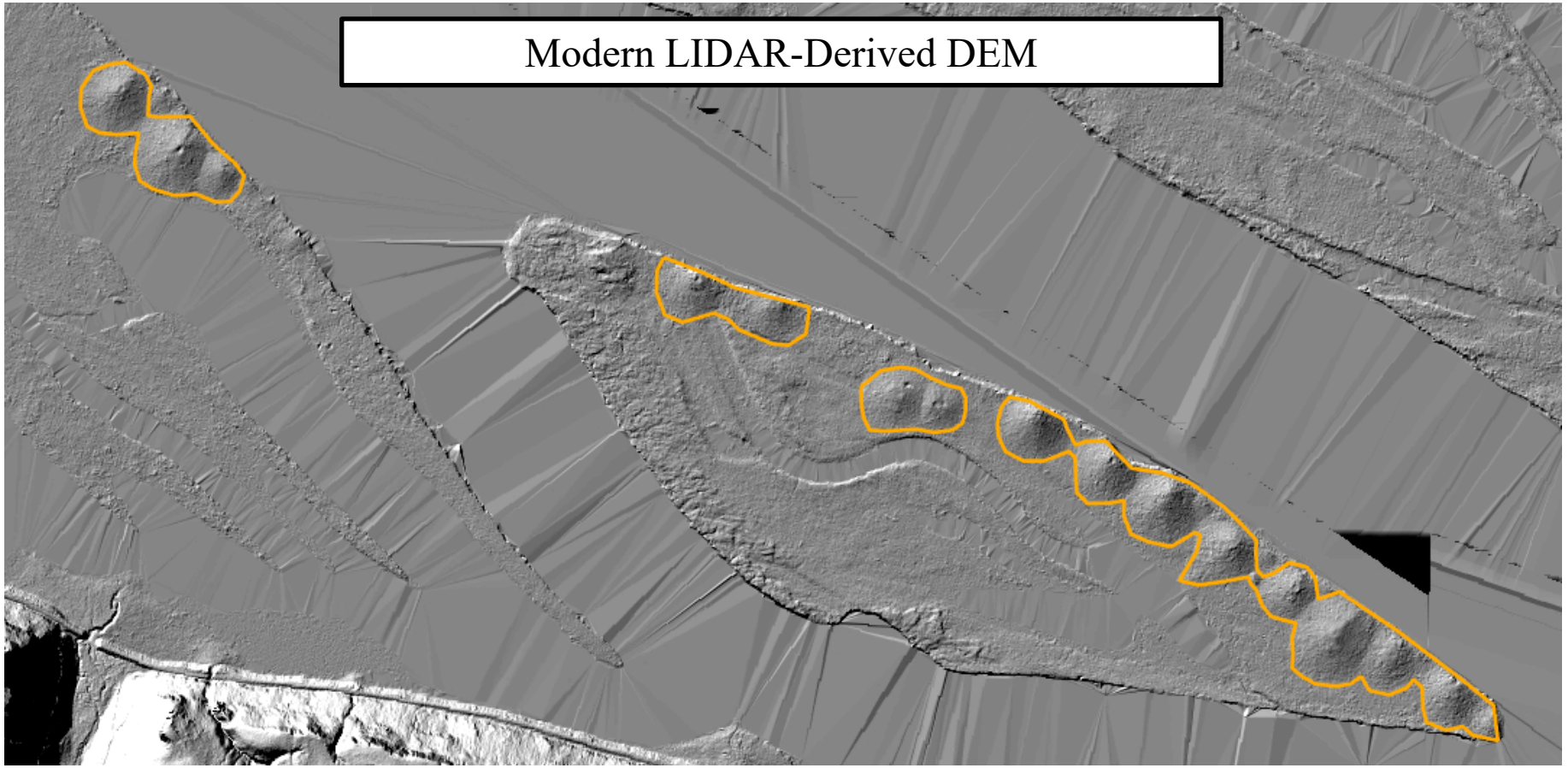
Historical Placement Identification – Sweezy Island, Pool 11



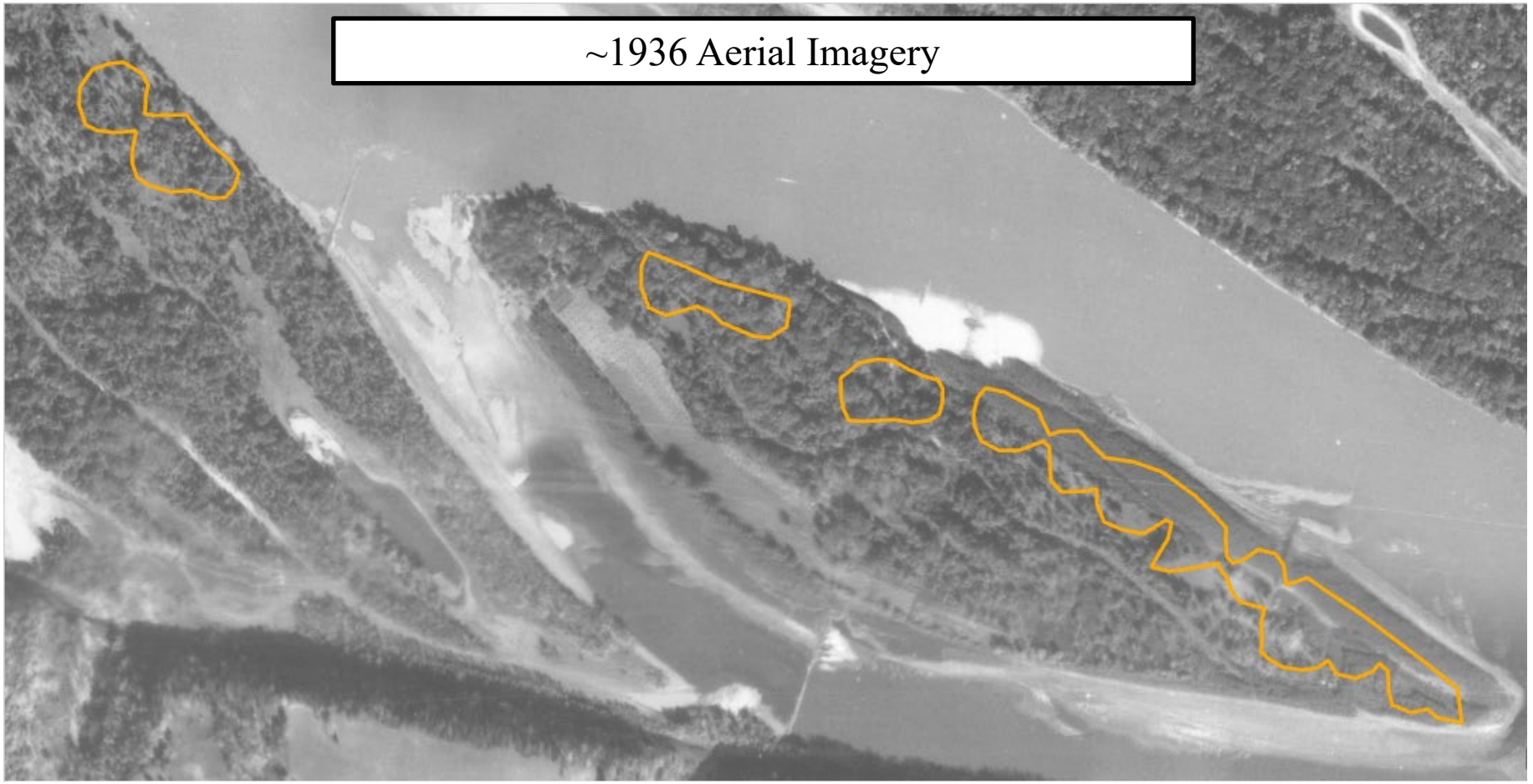
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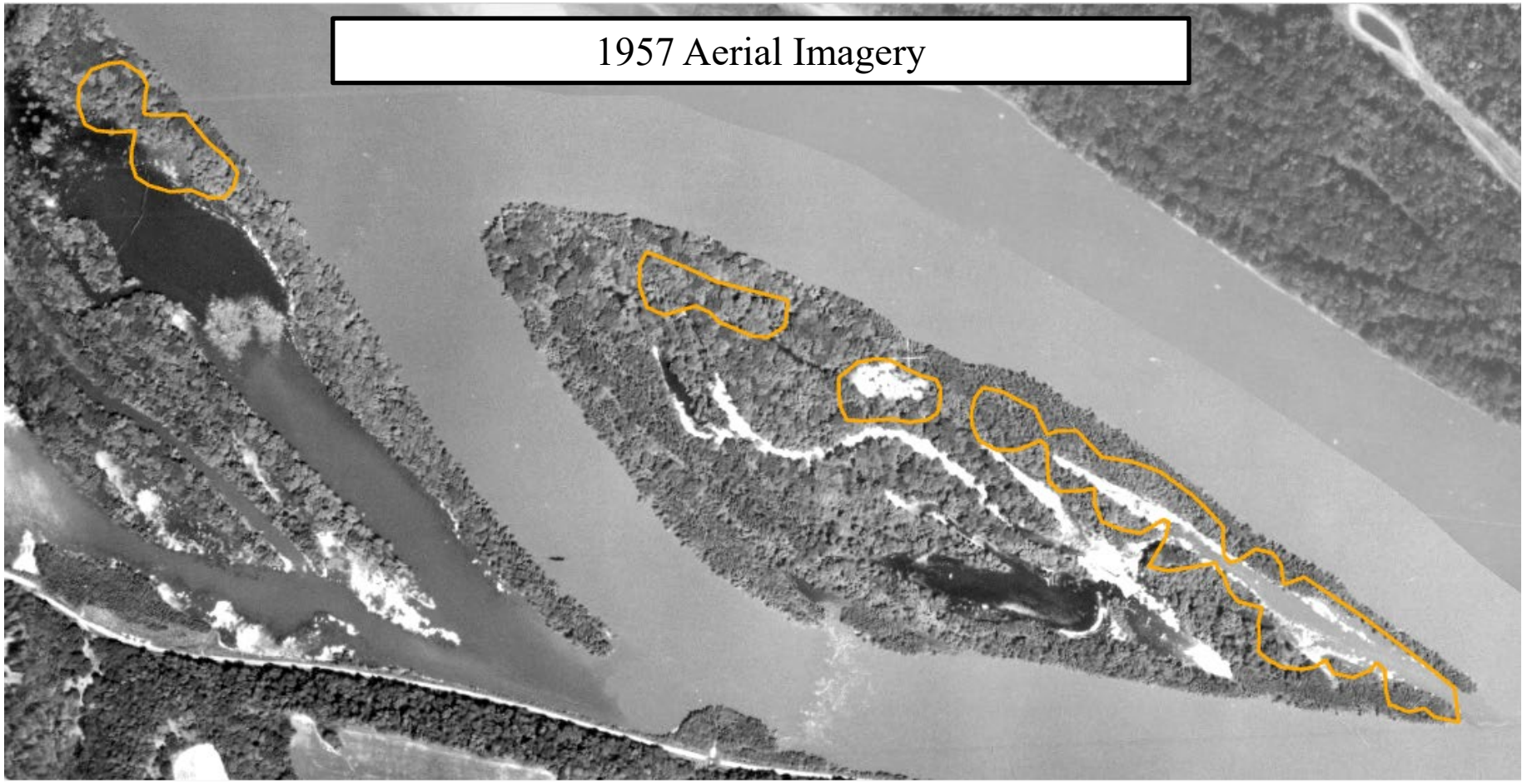
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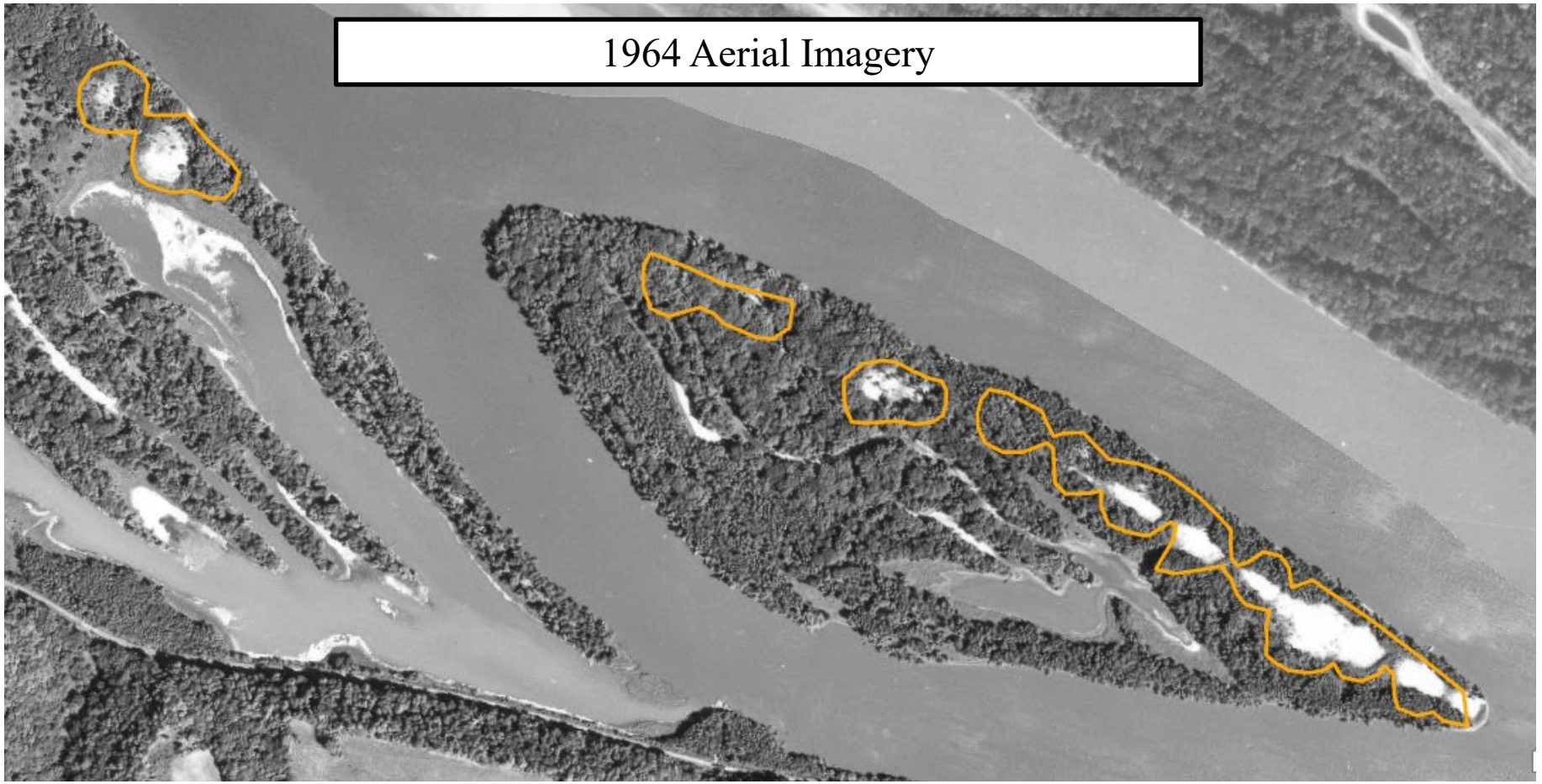
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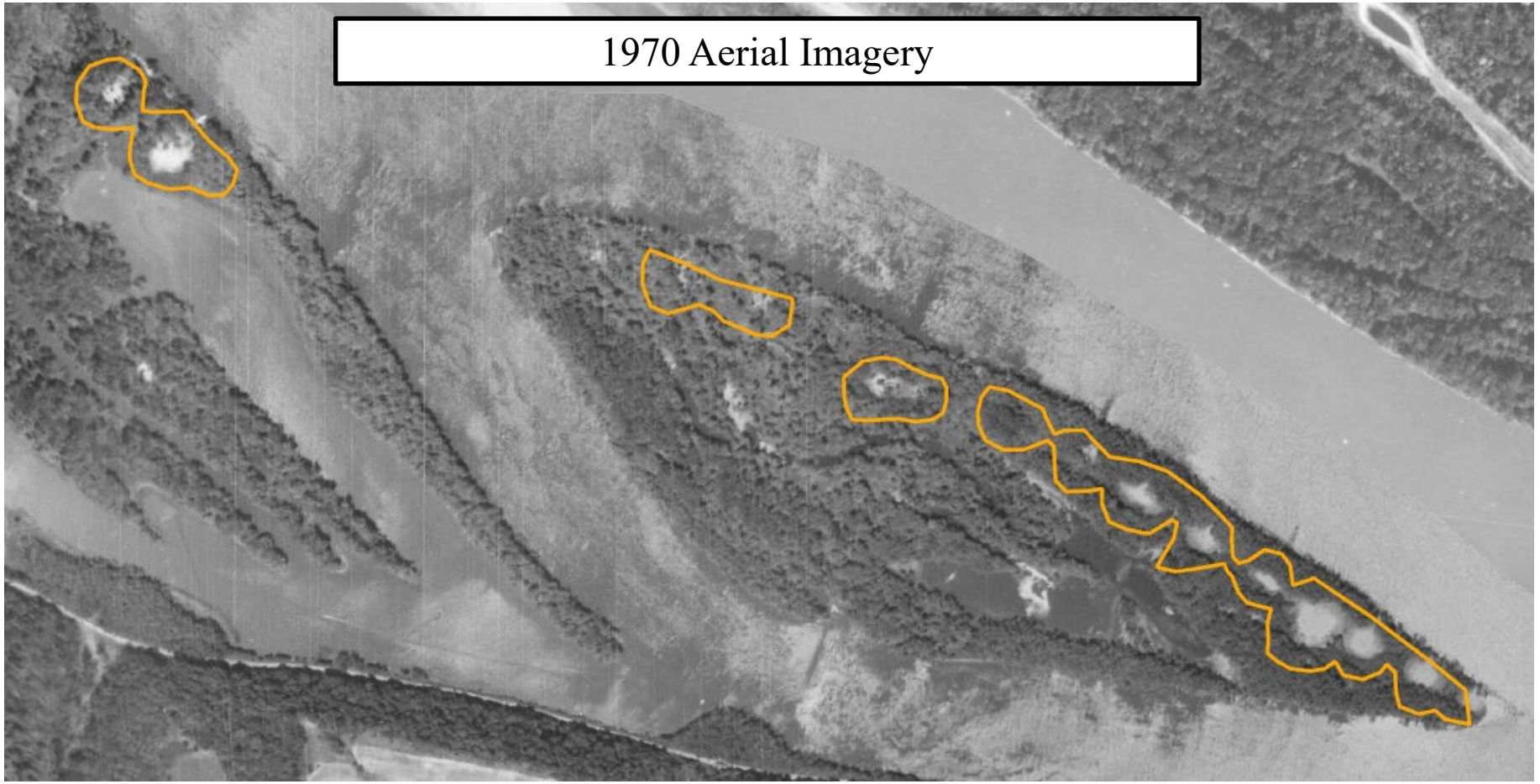
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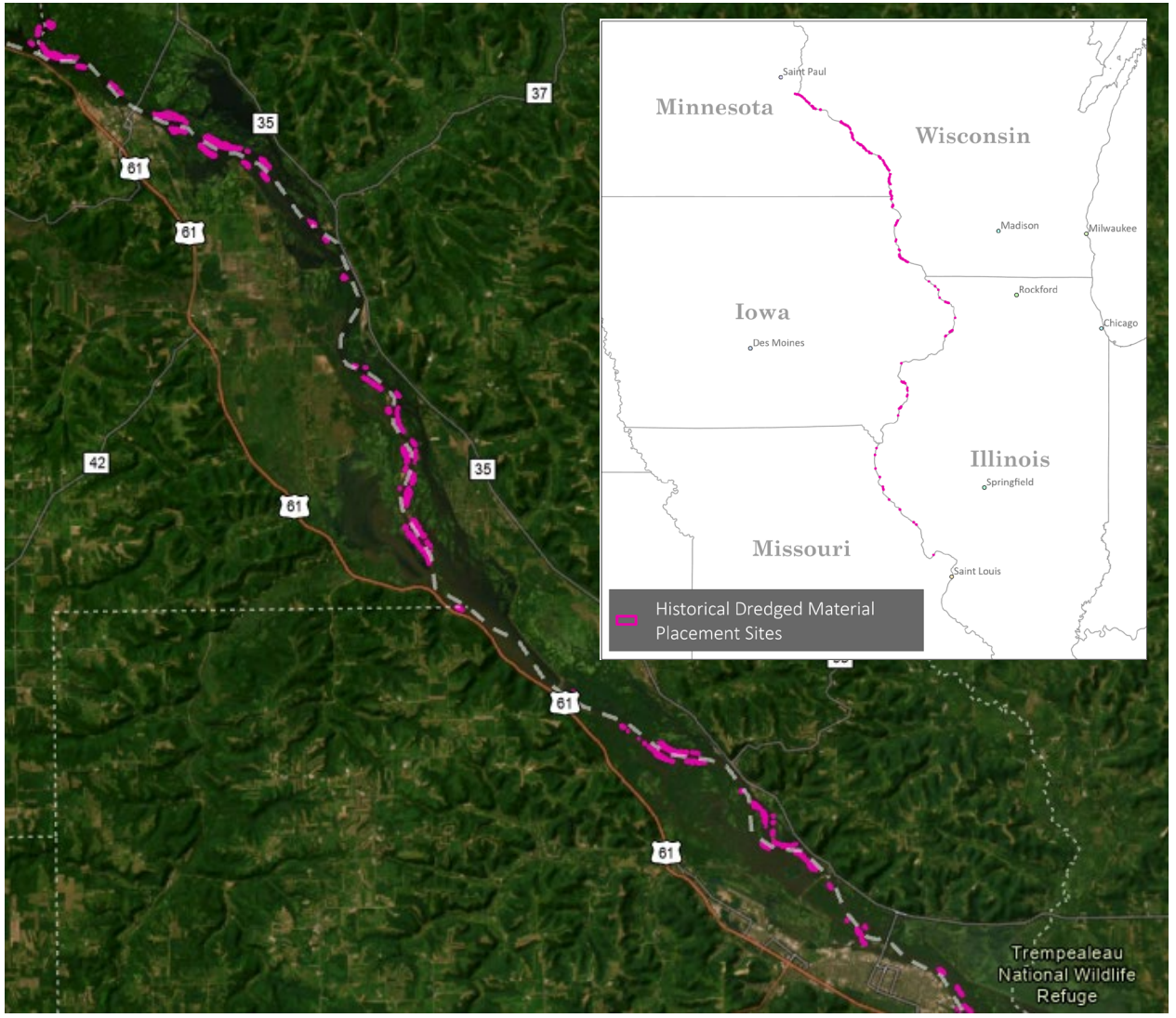


Historical Placement Identification – Sweezy Island, Pool 11



Historical Placement Site Database

- 400+ Records
- Final review underway… but will remain updatable.
- Tech Note draft
- Fields: site names, notes on data sources referenced and confidence.
- Hosting



Ground Truthing

- Walking boundaries
- Shovel Testing
- Vegetation observation



Ground Truthing





Historical Placement + Restoration Site Database



Beneficial Use Sites

- **95 sites**
- 1986-2025

Historical Placement Sites

- **400+**
- Placement dates range from early 1900s to 1980



Following Step: Site Evaluations

❖100+ sites

❖350+ sample points across UMRS

Implications for Current BU Practices

Optimize the restoration of BU floodplain forests by identifying critical conditions that improve project results

1) Develop a comprehensive geodatabase of UMRS BU sites ☑

2) Identify properties and site conditions that promote floodplain forest development

3) Provide guidelines and refine design criteria for the successful creation of floodplain forests





Thank You!

Next EMRRP Webinar: September 2026

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