



NEBRASKA



BIG

Examining River Evolution: A historical analysis of riparian vegetation and channel morphology of the Platte River, Nebraska

USGS 104-(b) proposal

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Motivation of the study

Critical Transformation

Wide braided channel
→ narrower, vegetated floodplain

Habitat Loss

Endangered species:
whooping crane, piping plover, Pallid Sturgeon

Knowledge Gap

Limited research on multi-decadal vegetation and channel changes

Transferable knowledge

Generate relevant information to align PRRIP's goal

2006



2022



NCOLN

Building on Prior Research



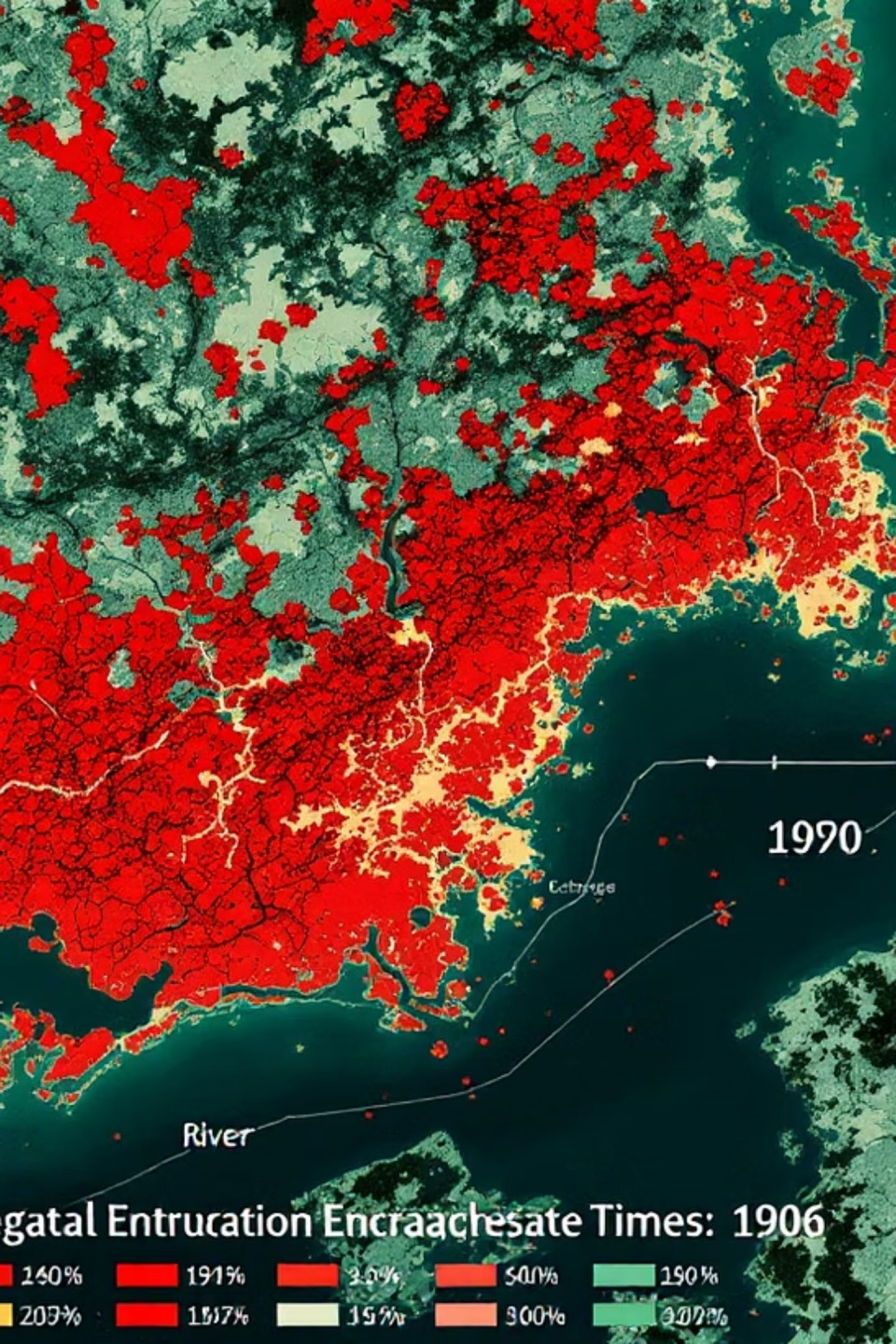
Rio Grande Study

Similar sand-bed river methodology
(Chaulagain et al., 2024)

doi.org/10.1016/j.jaridenv.2023.105068

Outcomes

Increased vegetation, incised and reduced channel width due to reduced flows impacted by long-term drought



Project Objectives

1

Quantify Changes (1984-2025)

Determine riparian vegetation and channel morphology trends

2

Analyze Hydroclimatic Effects

Determine how streamflow and climate drive river changes

Our research focus area

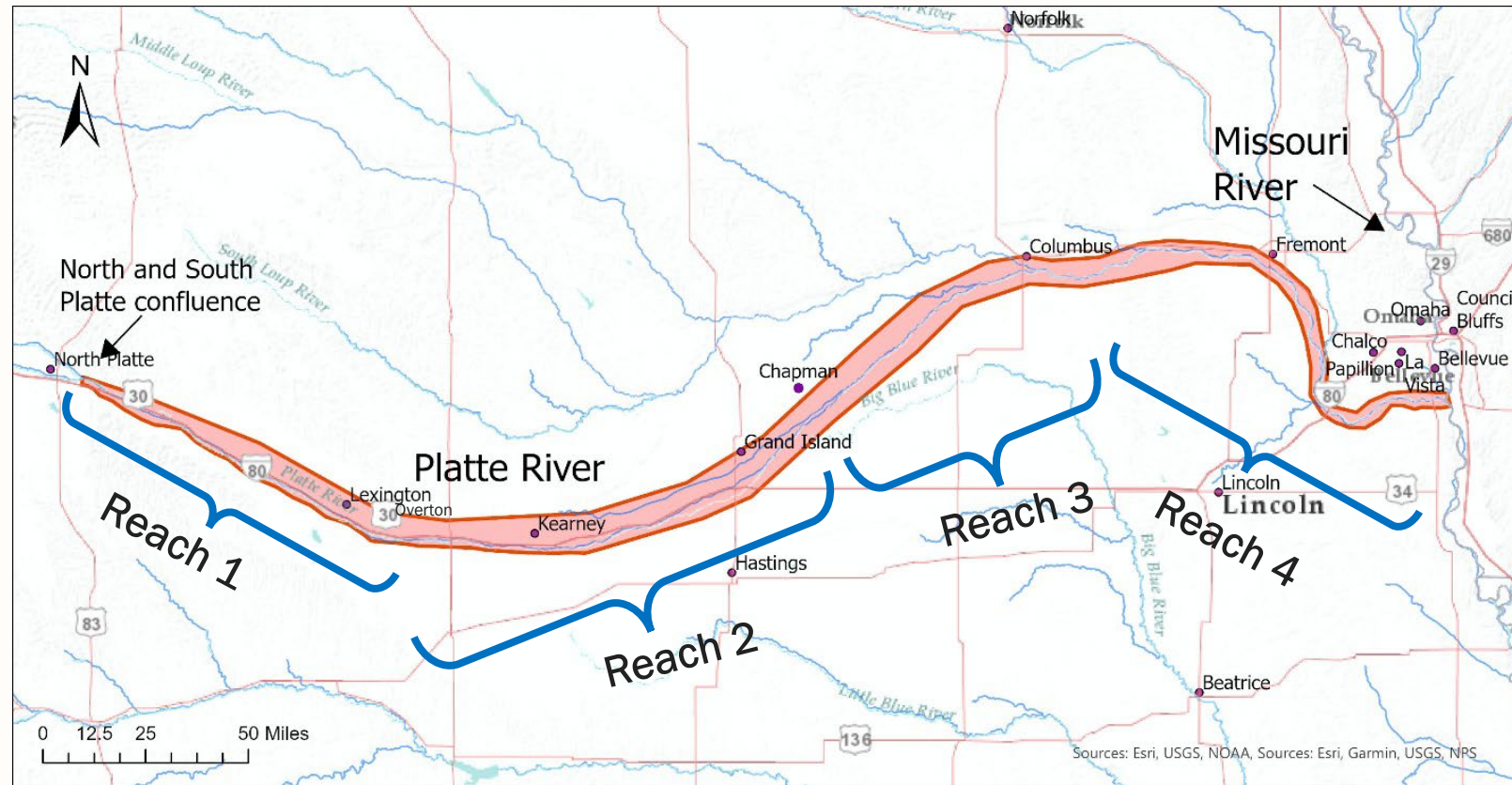
Overall trend based on the hydrological regime

Reach 1: North and south plates to Lexington

Reach 2: Lexington to Chapman (data reach/highly managed)

Reach 3: Chapman to Loup confluence

Reach 4: Loup confluence to the Missouri River confluence



Methodology

Satellite Imagery

Landsat (1984-2025) & Sentinel-2 (2015-2025)



Google Earth Engine

Google Earth Engine

NDVI & NDWI indices, Random Forest classification
(every 5 to 10 years)

Hydroclimatic Analysis

Correlation with temperature, precipitation & streamflow

Data validation

With existing PRRIP data



Expected Outcomes

Historical Baseline

40-year record of vegetation and channel changes

Management Insights

Evaluate the vegetation removal and sediment management effectiveness

Restoration Guidance

Identify critical areas for habitat restoration

Timeline: 12 Months

- Funding starts from October 2025
- One-year timeframe to complete the project
- Outcomes: Report, manuscript, publication & scripts



Partnership and collaboration

Aligning the goals to assess the
vegetation and channel morphology
to avoid duplication of work

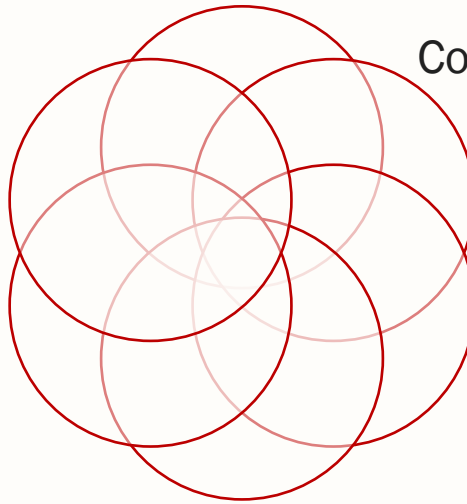
Proposal development for
extended studies

Complement with a pilot
project of PRRIP

Potential of publishing a
paper together

Data validation

Sharing preliminary results
for feedback



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BIOLOGICAL SYSTEMS ENGINEERING



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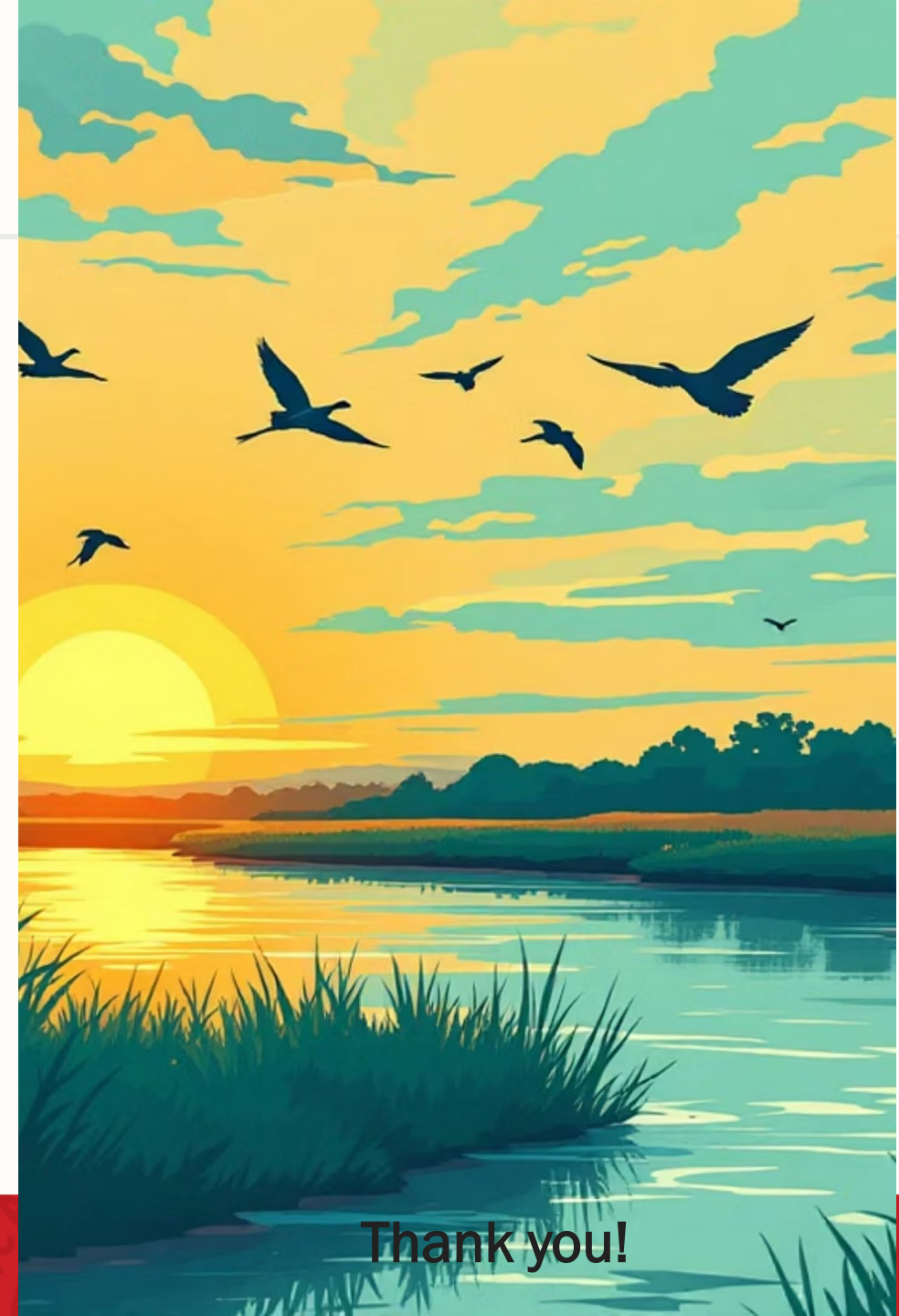
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Thank you!