



Utilizing NASA Earth Observations to Evaluate Invasive Species Cover in Riparian Areas of the Colorado River Basin



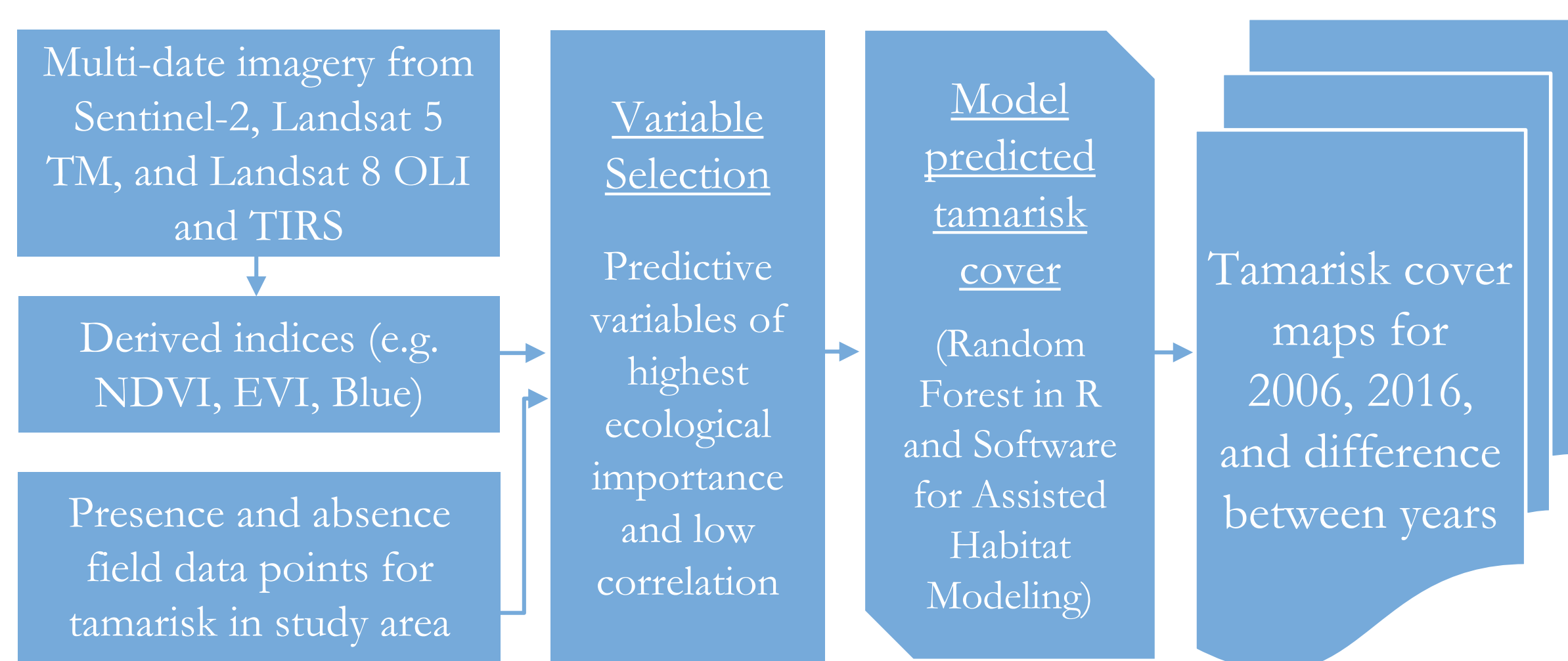
Abstract

Riparian corridors are inhabited by unique and biodiverse plant communities that control erosion, manage sediment loads, and filter pollutants. These ecosystems are transitional zones between terrestrial and aquatic systems that provide important wildlife habitat and maintain the overall health of rivers. The Colorado River Basin not only serves as an important ecological system, but also provides a water supply to more than 40 million people in the western United States. However, the spread of invasive species such as tamarisk (*Tamarix* spp.) impacts the ecosystem functionality of this river basin by altering flow regimes, sediment loads, and evapotranspiration rates. This project utilized Shuttle Radar Topography Mission (SRTM) topographic data, Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS), Landsat 7 Enhanced Thematic Mapper Plus (ETM+), and Landsat 5 Thematic Mapper (TM) to map and distinguish tamarisk cover from that of riparian species in 2006 and 2016 in the Green River watershed of the Colorado River Basin. Further, for 2016 tamarisk cover maps, we compared Landsat 8 to Sentinel-2 Multispectral Instrument (MSI) in a cross-platform analysis. Invasive species cover maps and an in-depth tutorial will allow partners at the Walton Family Foundation to create effective management plans and to reproduce this methodology for future planning.

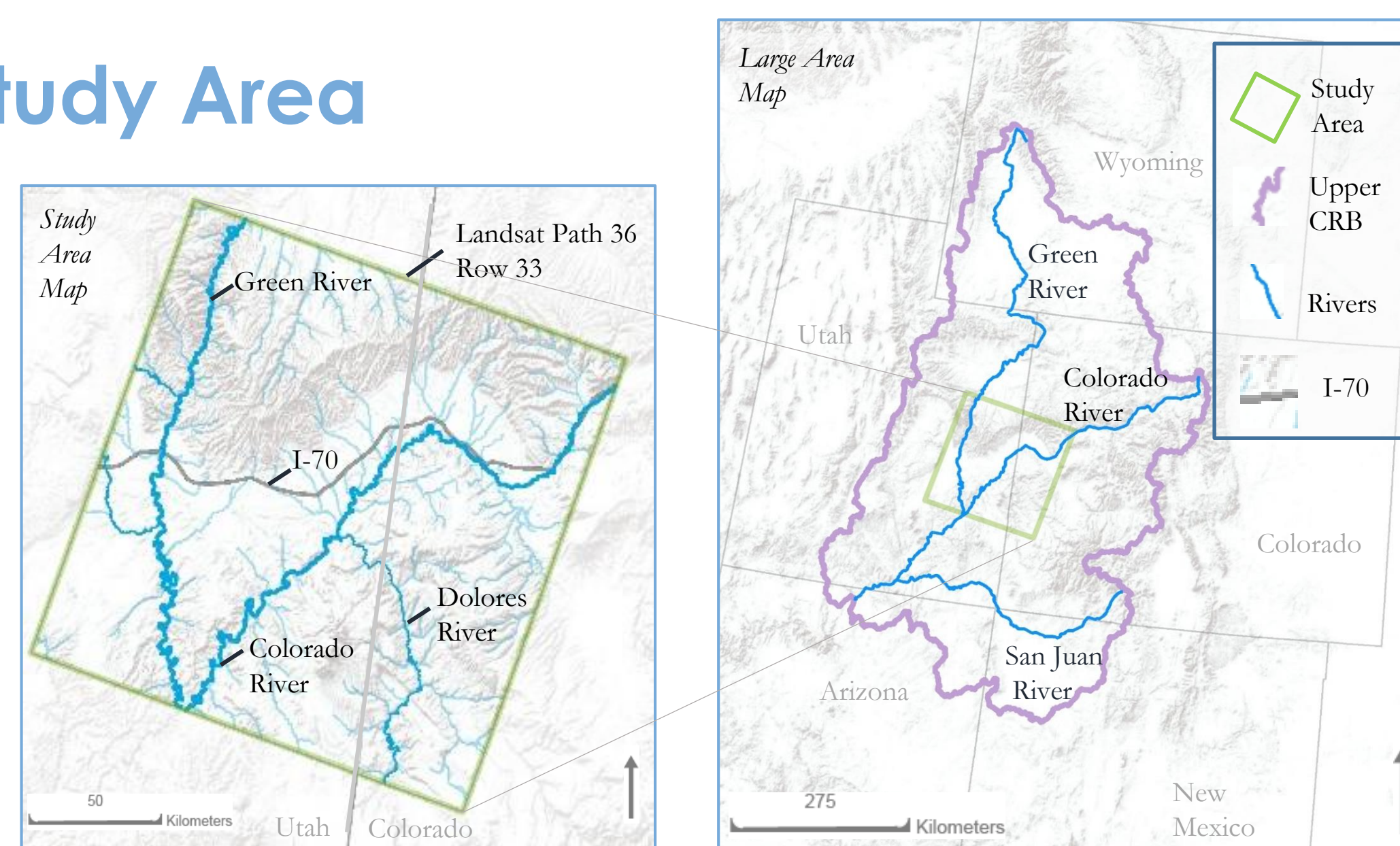
Objectives

- ▶ **Quantify** the percent area inhabited by invasive tamarisk (*Tamarix* spp.) in riparian corridors of the Green River, a tributary of the Colorado River
- ▶ **Map** predicted tamarisk presence and percent cover
- ▶ **Evaluate** changes in tamarisk cover between 2006 and 2016
- ▶ **Compare** 2016 maps created with Landsat 8 and Sentinel-2 data
- ▶ **Provide** tutorial to end users to facilitate future development of yearly tamarisk maps

Methodology



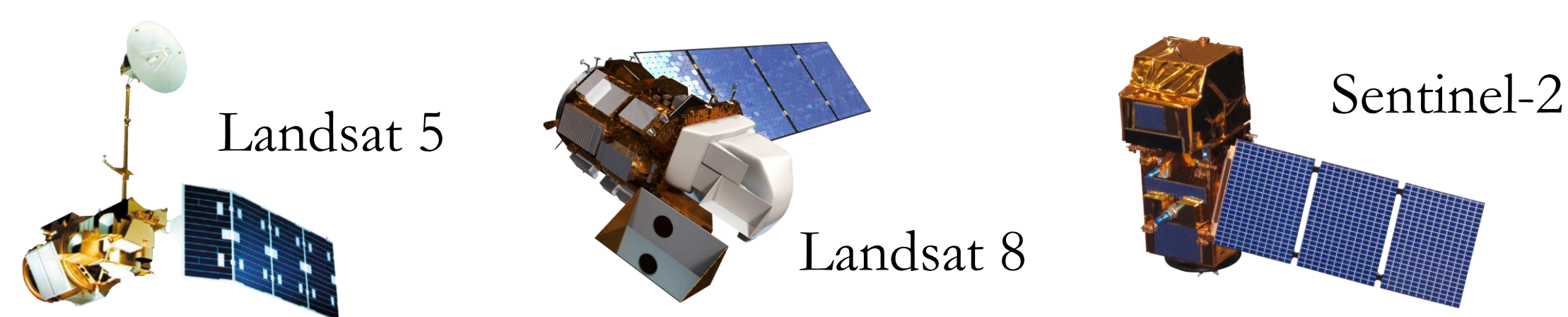
Study Area



Project Partners

- ▶ Walton Family Foundation
- ▶ US Geological Survey, Fort Collins Science Center
- ▶ US Geological Survey, North Central Climate Science Center

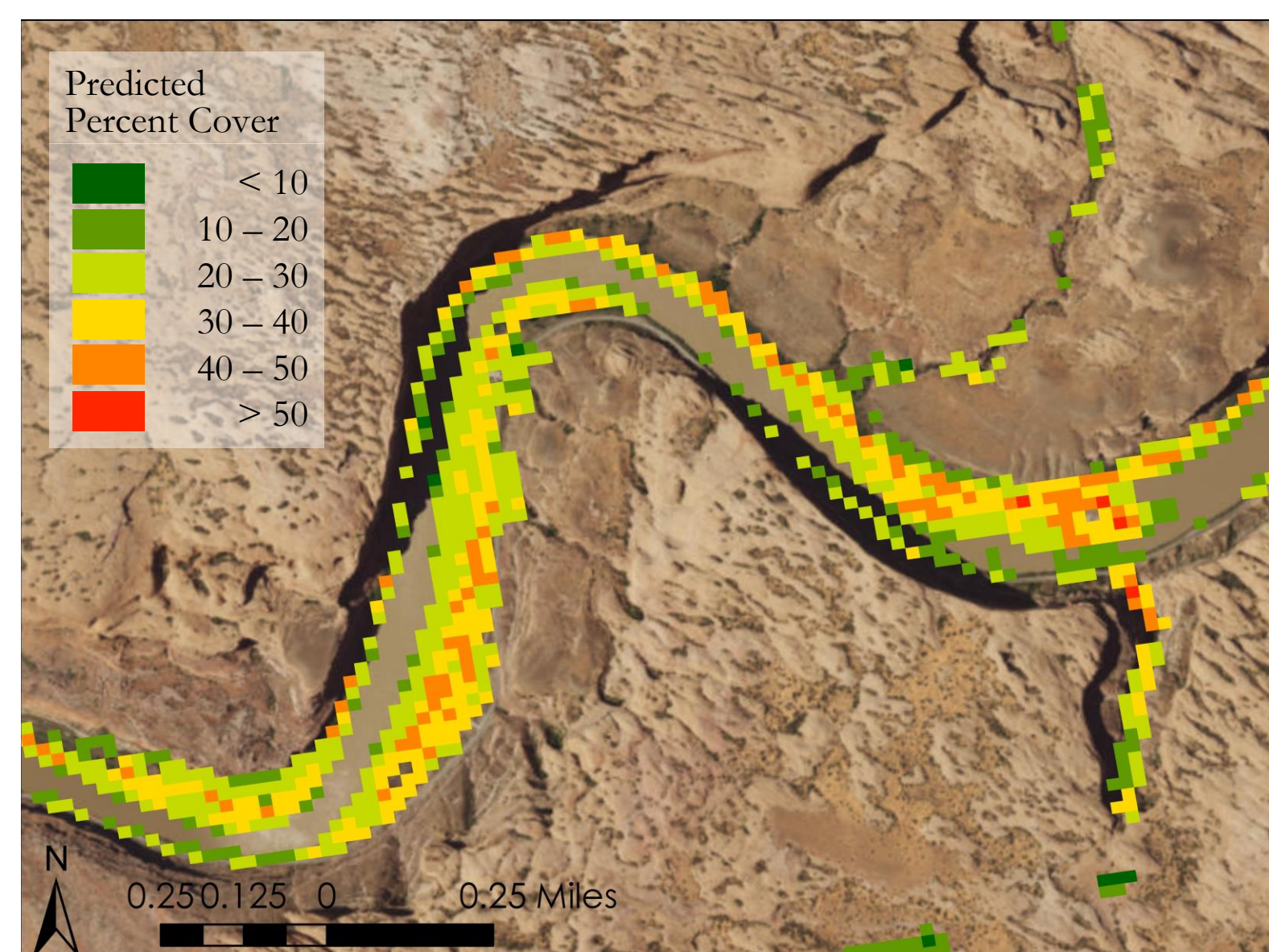
Earth Observations



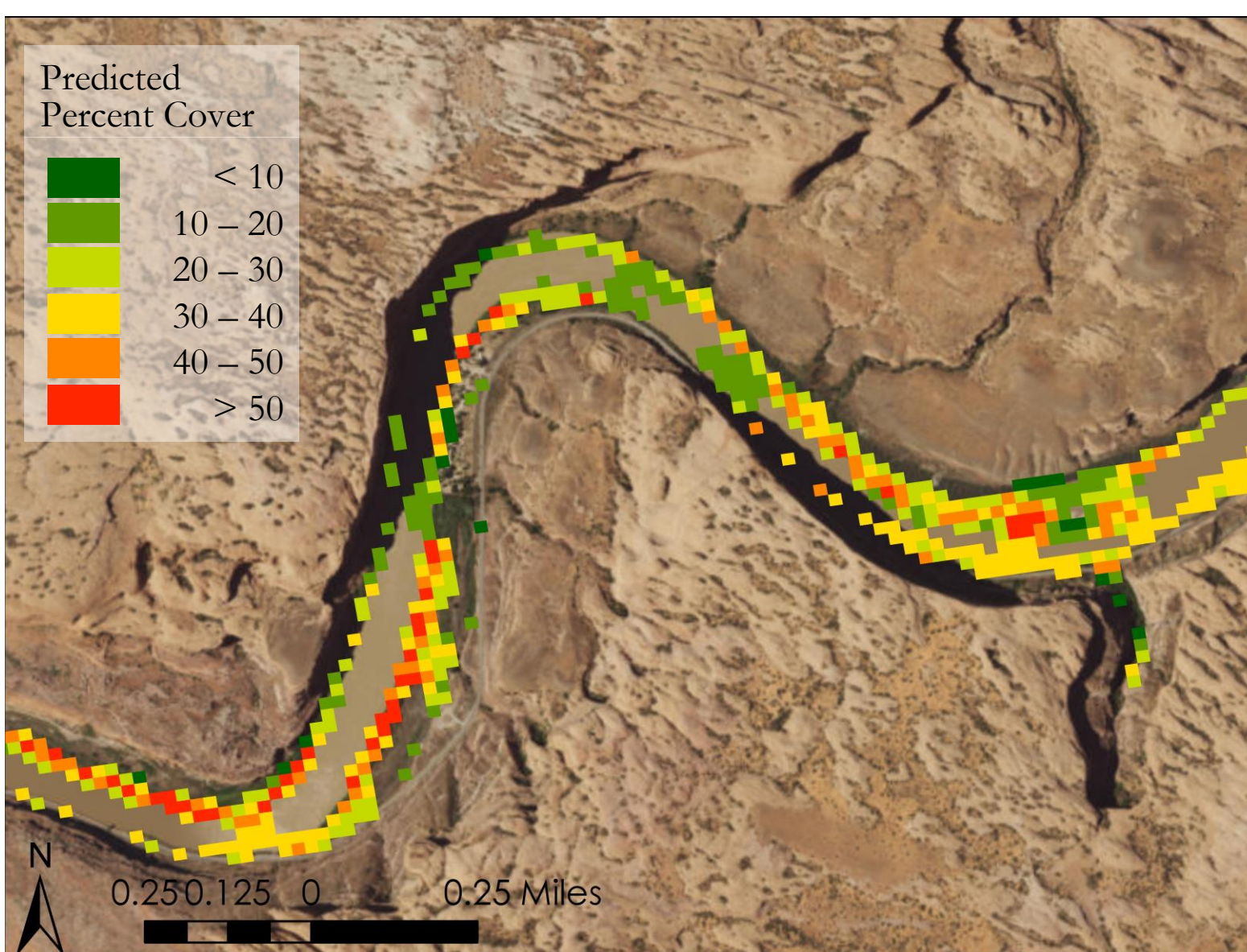
Results

Tamarisk Cover on the Green River

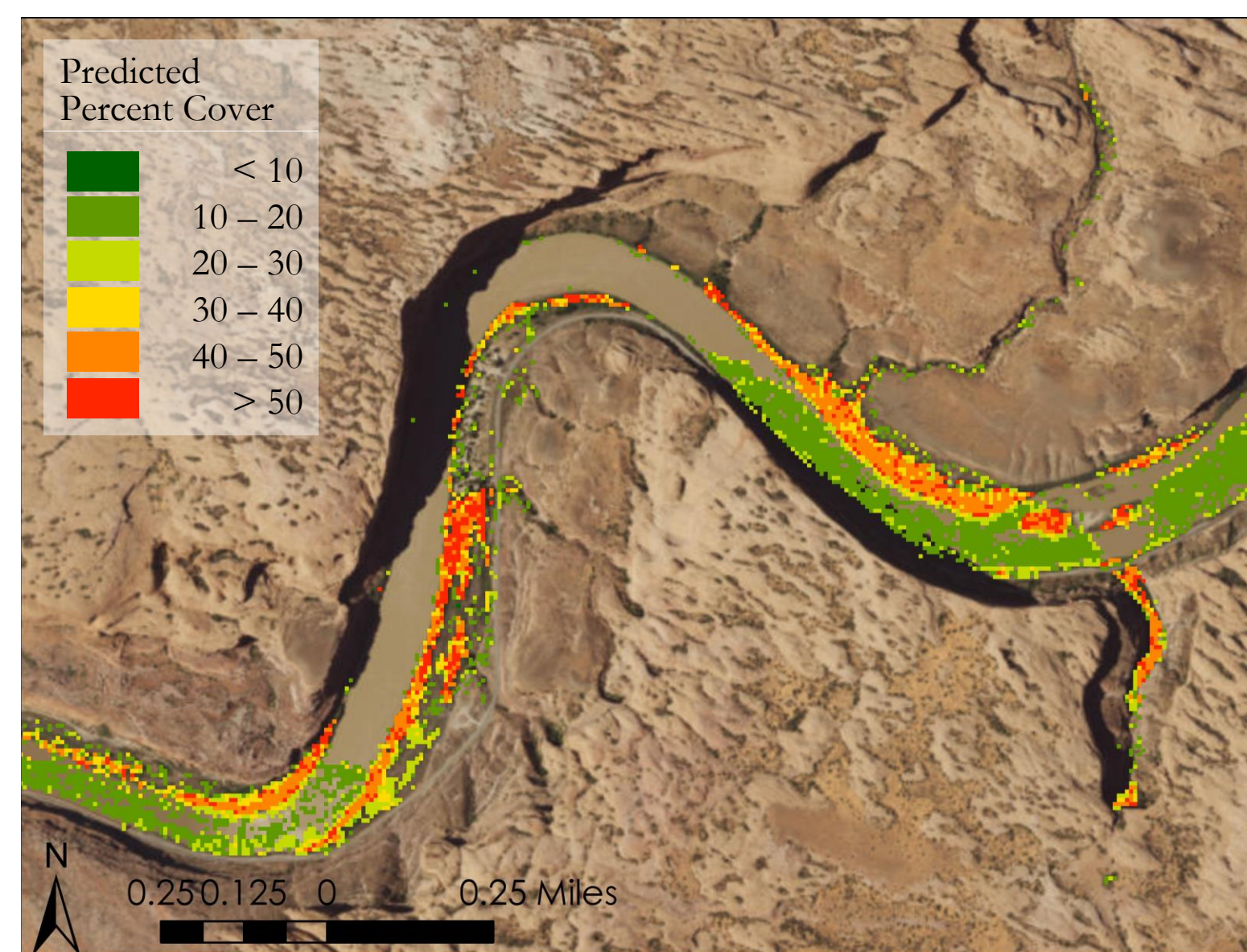
Landsat 5 – 2006



Landsat 8 – 2016



Sentinel-2 – 2016



Team Members



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Conclusions

- ▶ We identified change in tamarisk cover over the ten year study period; however, Landsat 8 imagery was more effective at capturing tamarisk cover than Landsat 5 imagery.
- ▶ Preliminary model results suggest using only 10m resolution Sentinel-2 bands (i.e. red, green, blue, NIR) was not as effective at identifying tamarisk as compared to the 30m Landsat products.

Acknowledgements

We thank the following individuals for providing mentorship for this project:

Colorado State University, Natural Resource Ecology Laboratory: Dr. Paul Evangelista, Dr. Amanda West, Anthony Vorster, and Nicholas Young
NASA DEVELOP: Brian Woodward (Center Lead)
USGS: Dr. Catherine Jarnevich and Gabriel Senay
Walton Family Foundation: Peter Skidmore

