Bandelier Ecological Conservation

Mapping Invasive Species Along the Rio Grande Corridor in Bandelier National Monument

Project Synopsis

Bandelier National Monument has experienced invasive species spread along the Rio Grande, which has negatively impacted native species and the overall biodiversity of the region. In partnership with the National Park Service, this project used supervised classification algorithms applied to hyperspectral and multispectral satellite data from 2019 to 2023 to map the extent of invasive species within the region. The resulting maps and associated time series will inform the park staff about sites for environmental remediation to protect the area's ecosystems from invasive species.

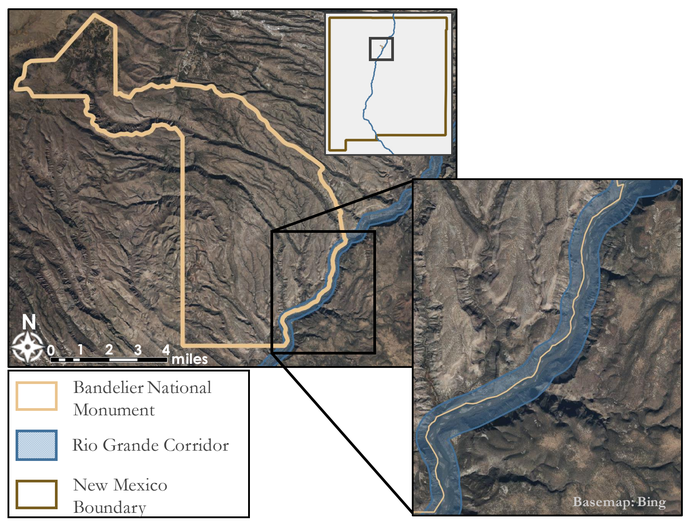
Objectives

- **Determine** the spatial extent of Russian Olive, Siberian Elm, and Saltcedar trees in the Rio Grande corridor of Bandelier from January 2018 to June 2023
- **Assess** the feasibility of using hyperspectral data to classify species
- **Create** detailed and accessible vegetation maps
- **Visualize** vegetation changes using a time series

Project Partners

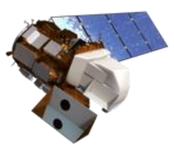
National Park Service,
Bandelier National Monument

Study Area



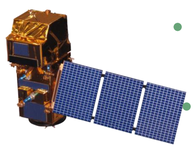
Earth Observations

Landsat 8 OLI



- **30 m** spatial resolution
- **11** spectral bands

Sentinel-2 MSI



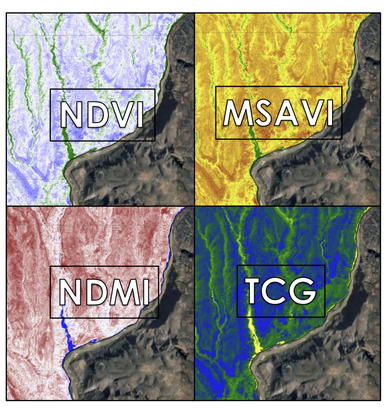
- **10 m** spatial resolution
- **13** spectral bands

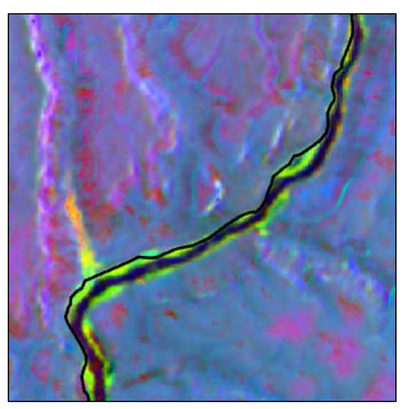
ISS DESIS

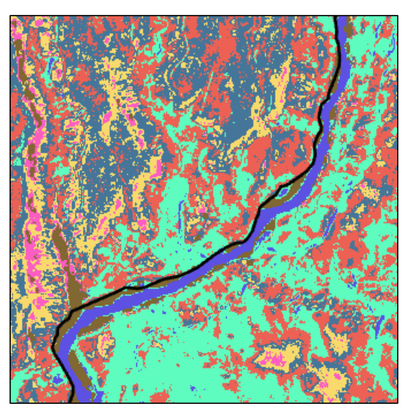
- **30 m** spatial resolution
- **235** spectral bands

Methodology

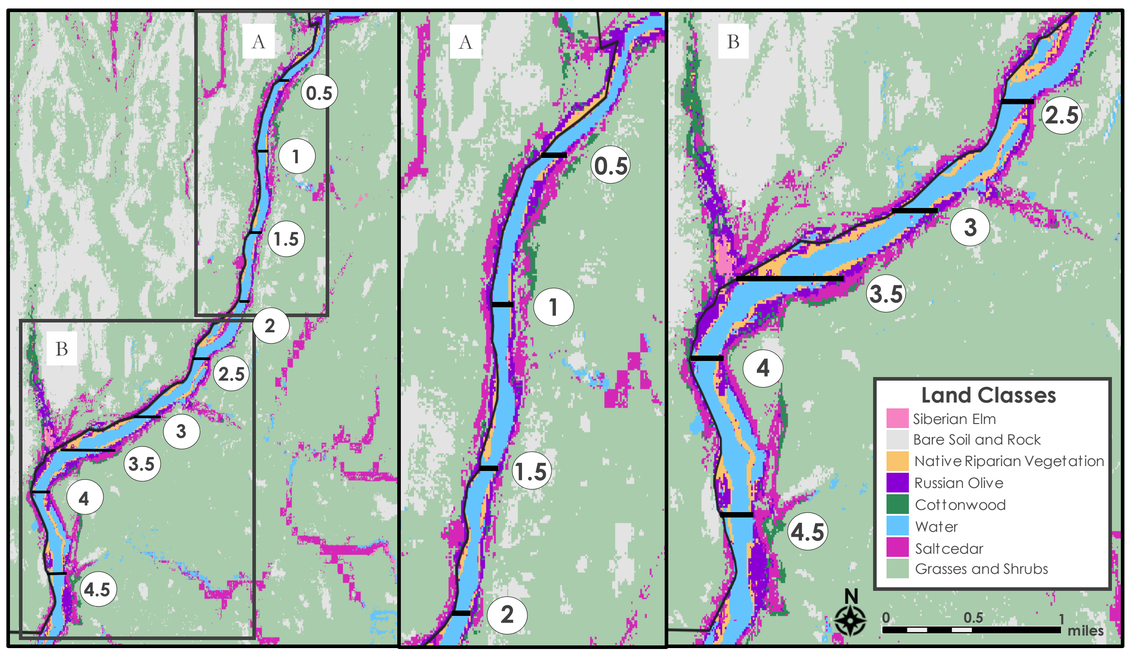
Obtain Data → Pre-process → Predictors → PCA → Classified





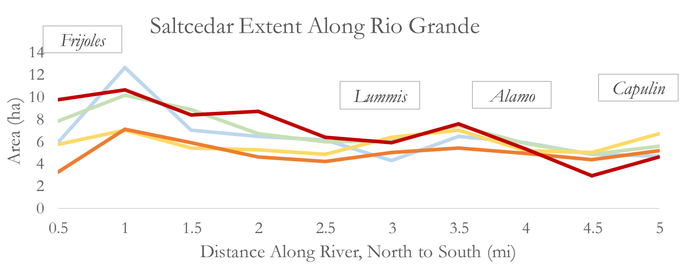


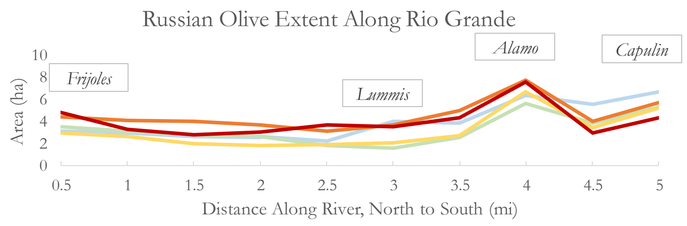
Results

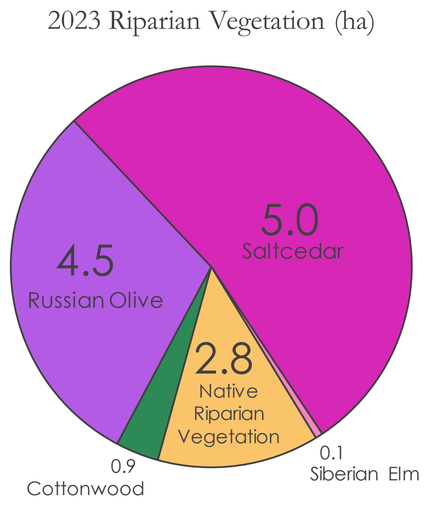


2023
2022
2021
2020
2019

Canyons







Conclusions

- **Principal Component Analysis** effectively reduces inputs for classification of vegetation
- **Supervised classifications** using remotely collected training data can identify distinct species of vegetation with **greater than 50% validation accuracy**
- The time series analysis shows that the extent of invasive riparian species in BAND has **increased** by **5.7%** between 2019 and 2023
- Based on vegetation classifications, the abundance of invasive species **peaks** in areas where canyons meet the Rio Grande corridor

25TH DEVELOP ANNIVERSARY

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