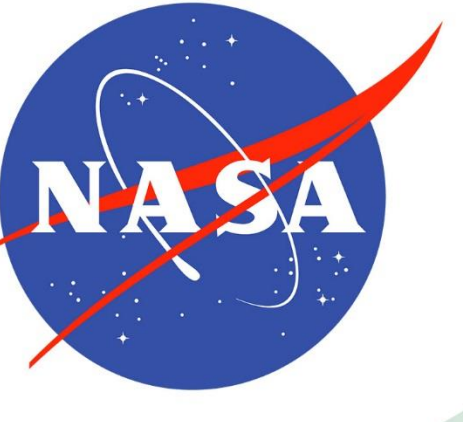




# Identifying Early Season Invasives for Monitoring and Management in the Colorado National Monument



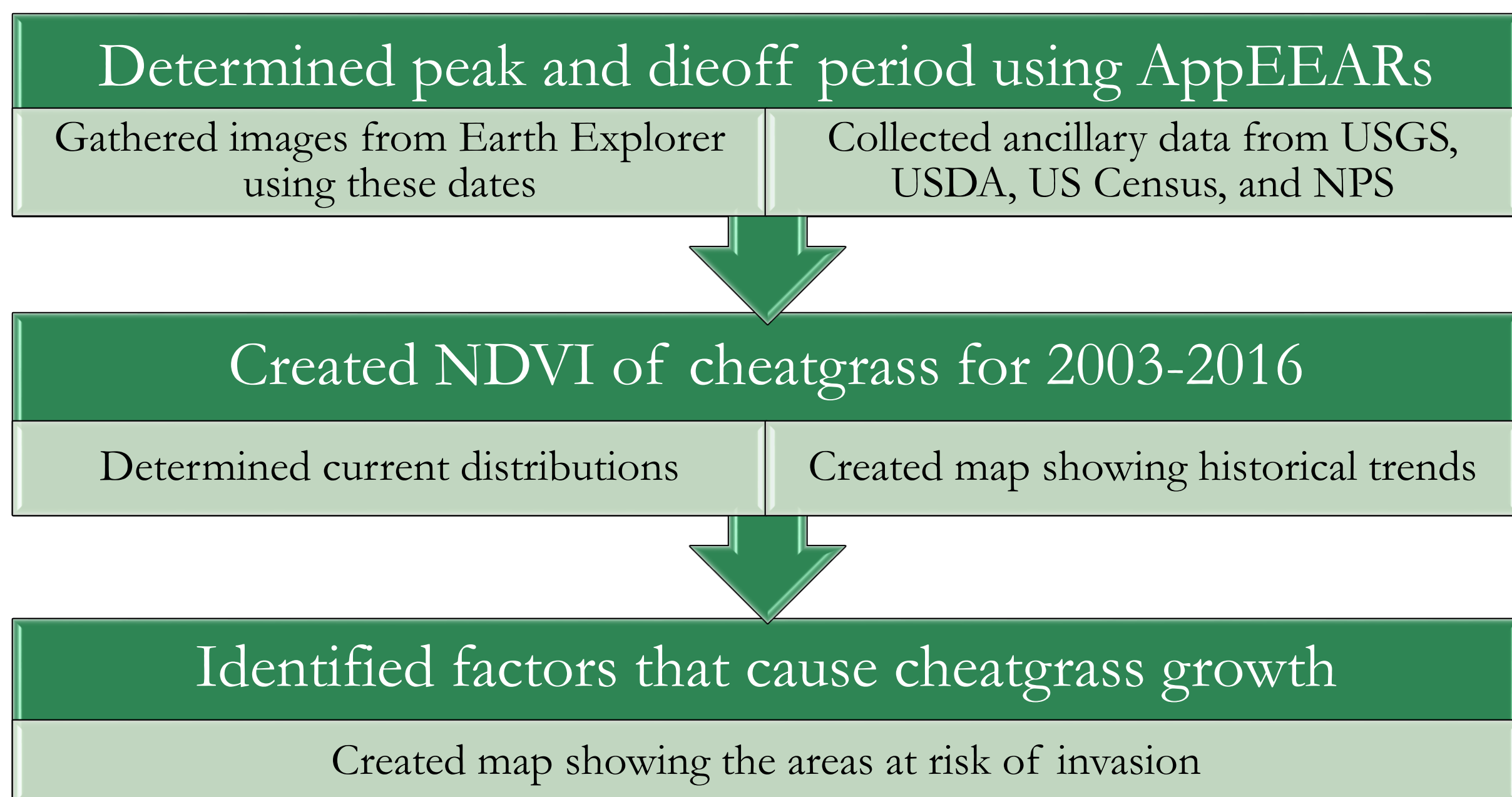
## Abstract

*Bromus tectorum*, otherwise known as cheatgrass, is an invasive grass from Europe that has increased its presence all over the world by out-competing native grasses due to its adaptability and lifecycle. During the end of its life cycle, typically occurring in the summer, its flammable remains often create the conditions for forest fires to start early in the season. This alters native wildlife's previous response to wildfires and increases the overall frequency of fires. As a result, cheatgrass often disrupts the necessary recovery time for native wildlife after habitat destruction. This NASA DEVELOP project utilized Landsat 5 TM, Landsat 8 OLI and TIRS, Terra MODIS, and Sentinel-2 MSI data to study the spread of cheatgrass throughout the Colorado National Monument and the surrounding area to determine locations at risk of being invaded by cheatgrass. The results of the study included historical and current cheatgrass population maps, multi-criteria evaluation (MCE), MCE analysis, and forecasted cheatgrass spread. The MCE analysis assessed the factors and constraints that contribute to the vulnerability to cheatgrass invasion. The results from this project will assist the National Park Service in improving their monitoring and management efforts and help contribute to the prevention of cheatgrass in Colorado National Monument.

## Objectives

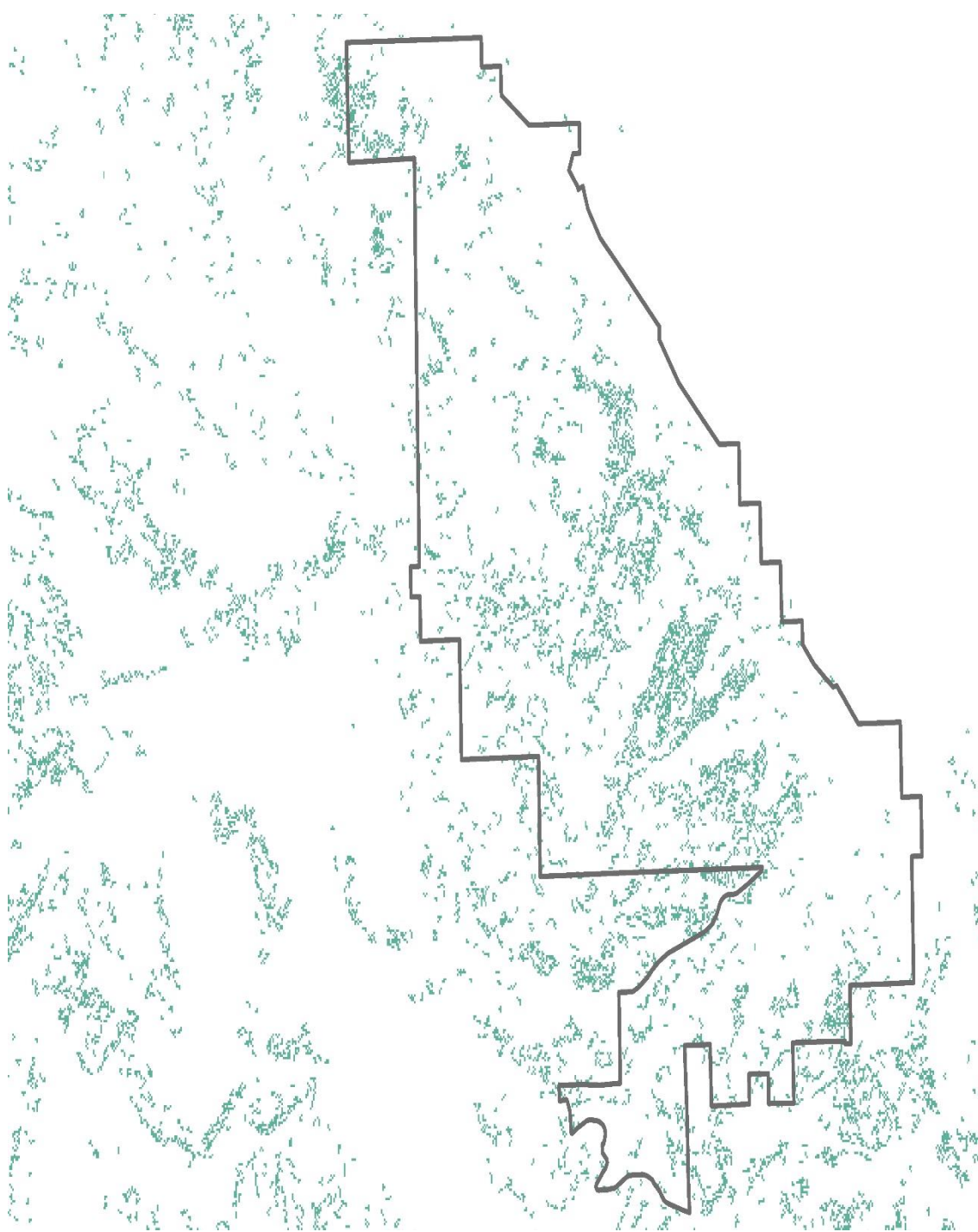
- ▶ Evaluate the vulnerability of the landscape to cheatgrass invasion
- ▶ Create historic and current distribution maps of cheatgrass
- ▶ Identify cheatgrass movement during the study period and near future
- ▶ Generate a forecast map for cheatgrass distribution

## Methodology

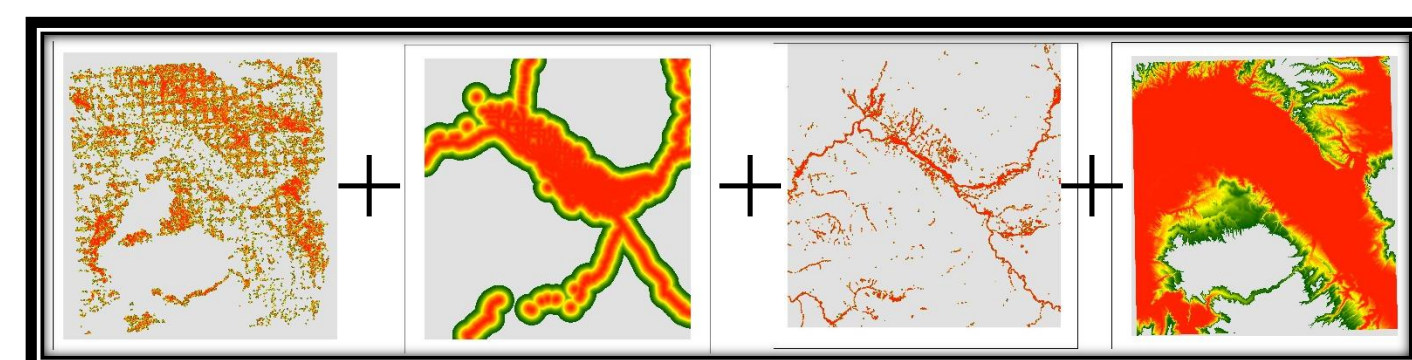


## Results

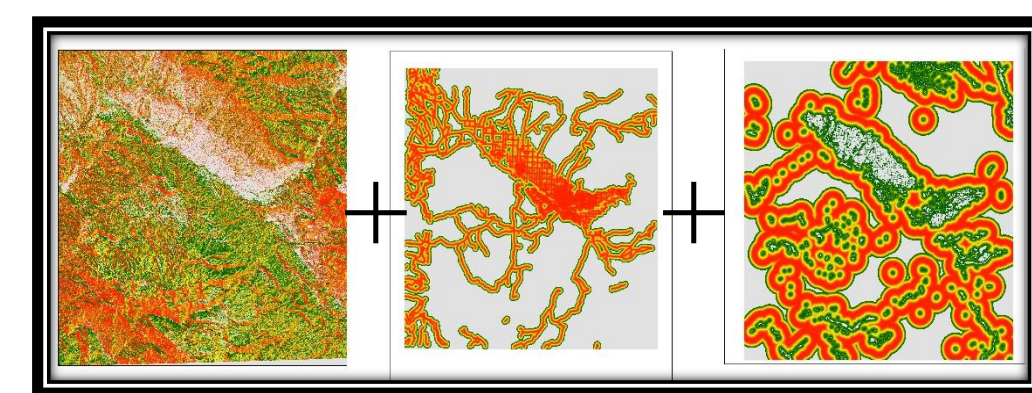
2017 Early Season NDVI Activity



Factors Used to Assess Cheatgrass Vulnerability

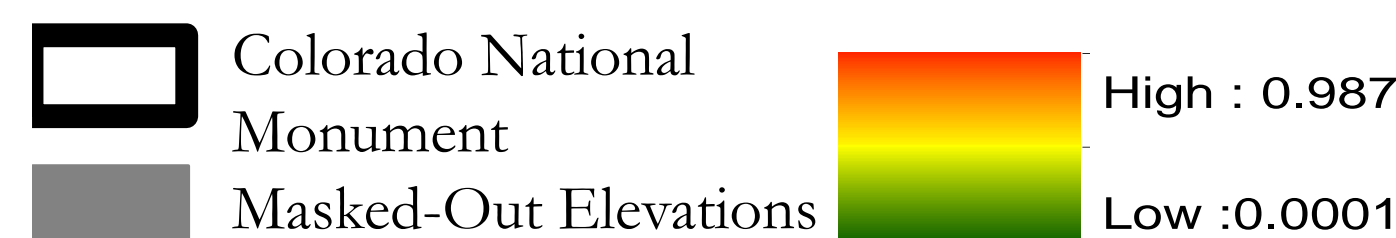


Early Season Activity + Developed Areas + Hydrographic Channels + Elevation



Aspect + Roads + Crops

Multi-Criteria Evaluation



## Team Members



Zachary Peloquin (Project Lead)



James Ficklin

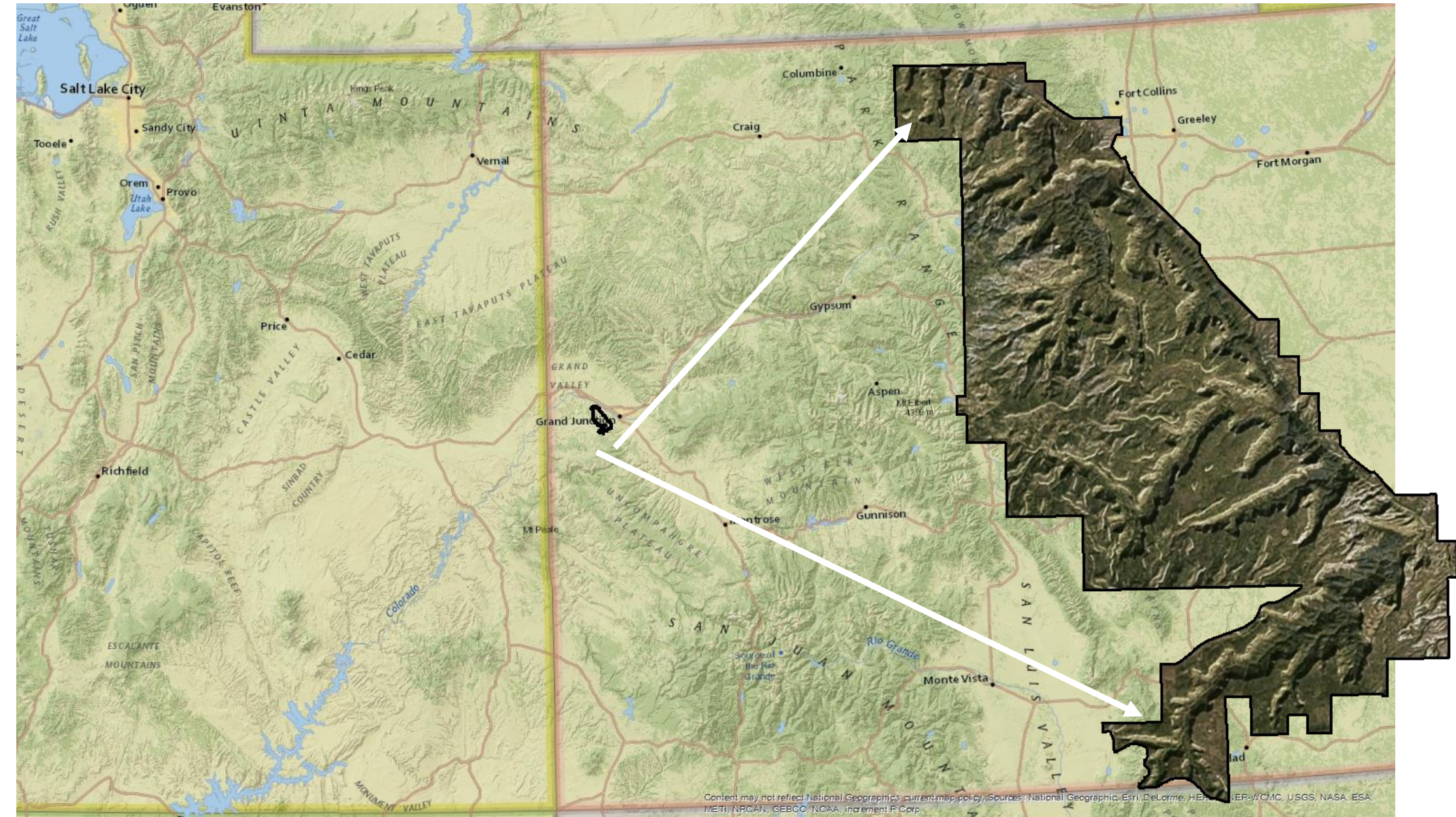


Kayla Rini

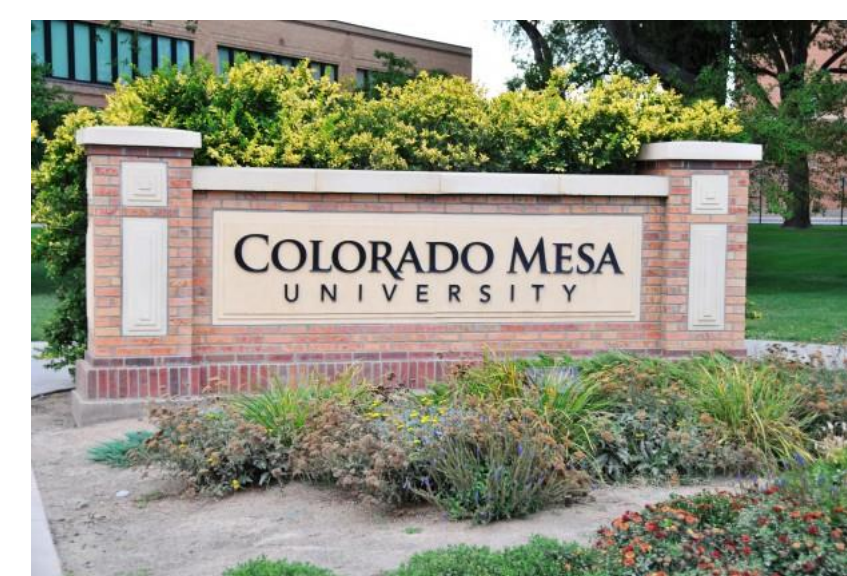


Owen Cox

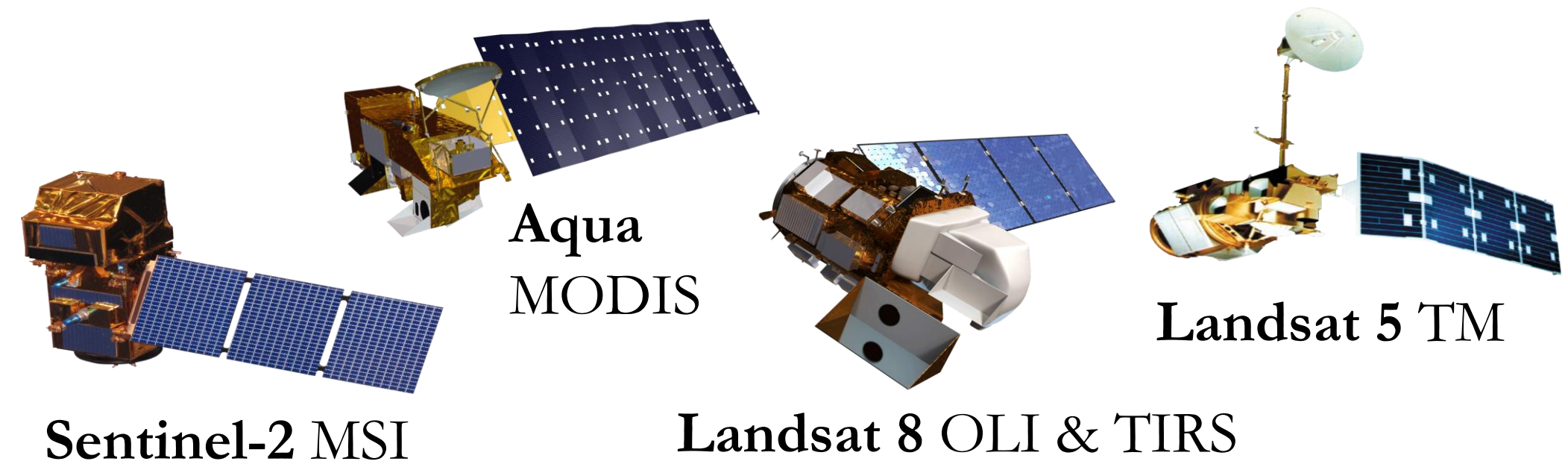
## Study Area



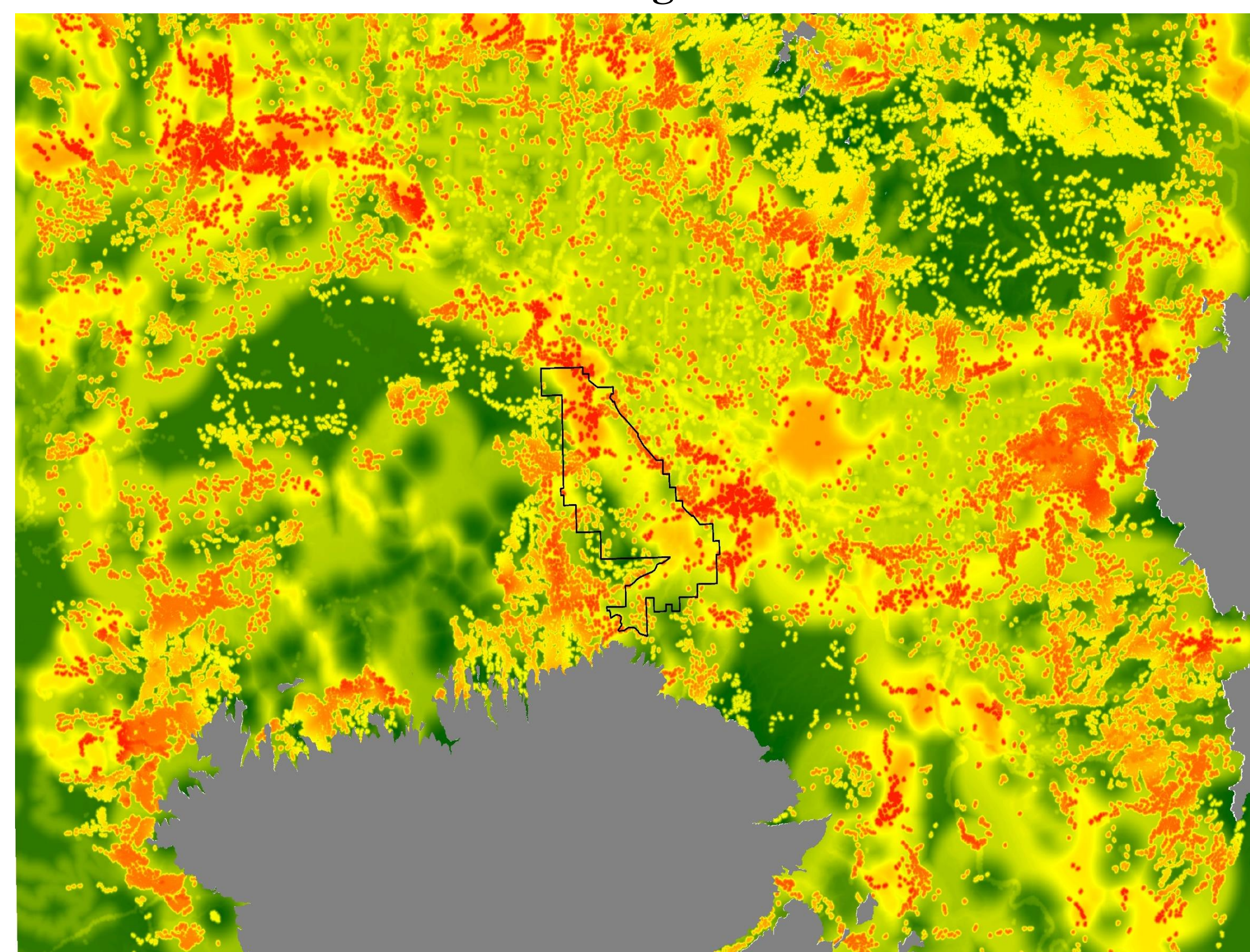
## Project Partners



## Earth Observations



## Multi-Criteria Evaluation to Cheatgrass Invasion



## Conclusions

- ▶ There are several areas of concentrated early season activity to the southwest of the park.
- ▶ Not all early season activity detected by satellite imagery is cheatgrass. Ground truthing is needed to confirm that cheatgrass is present in that area.
- ▶ The MCE shows that the areas of greatest vulnerability to invasion are located slightly east and southwest of the park.

## Acknowledgements

Thank you to **Ann Rodman** and **Molly Murphy** from the National Park Service, **Dr. Deborah Kennard** of Colorado Mesa University, **Dr. Kenton Ross**, and the amazing DEVELOP support team for their help and collaboration.

