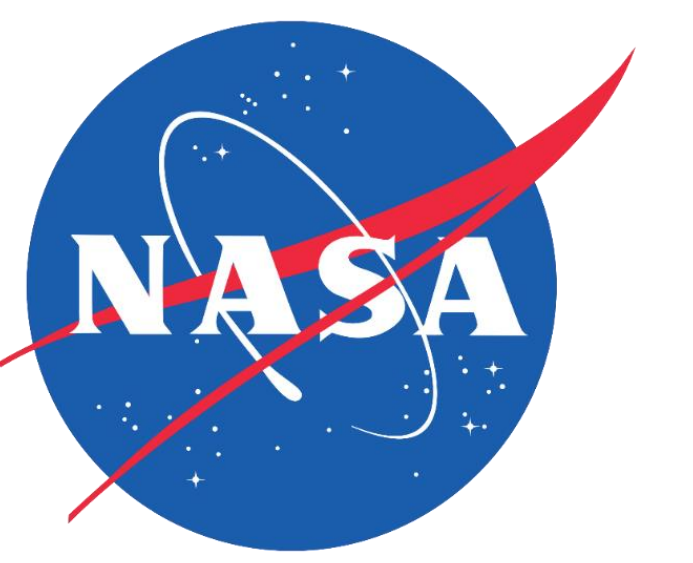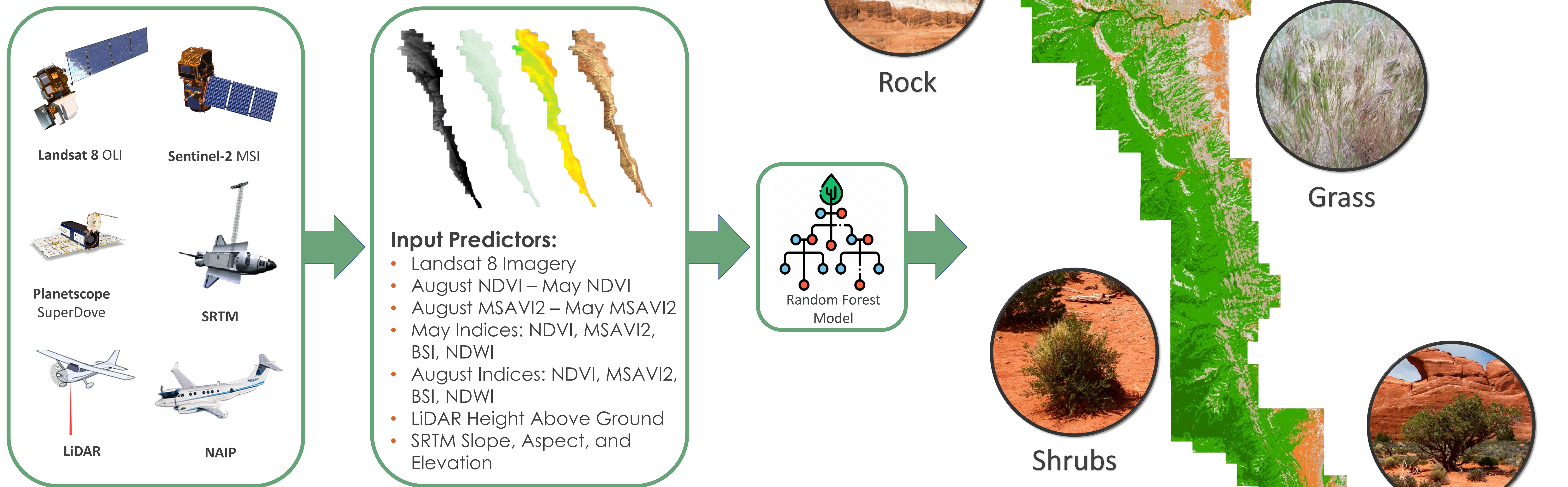# Capitol Reef Ecological Conservation

Mapping Vegetation Functional Groups to Inform Invasive Vegetation Management, Ecological Conservation, and Restoration in Capitol Reef National Park
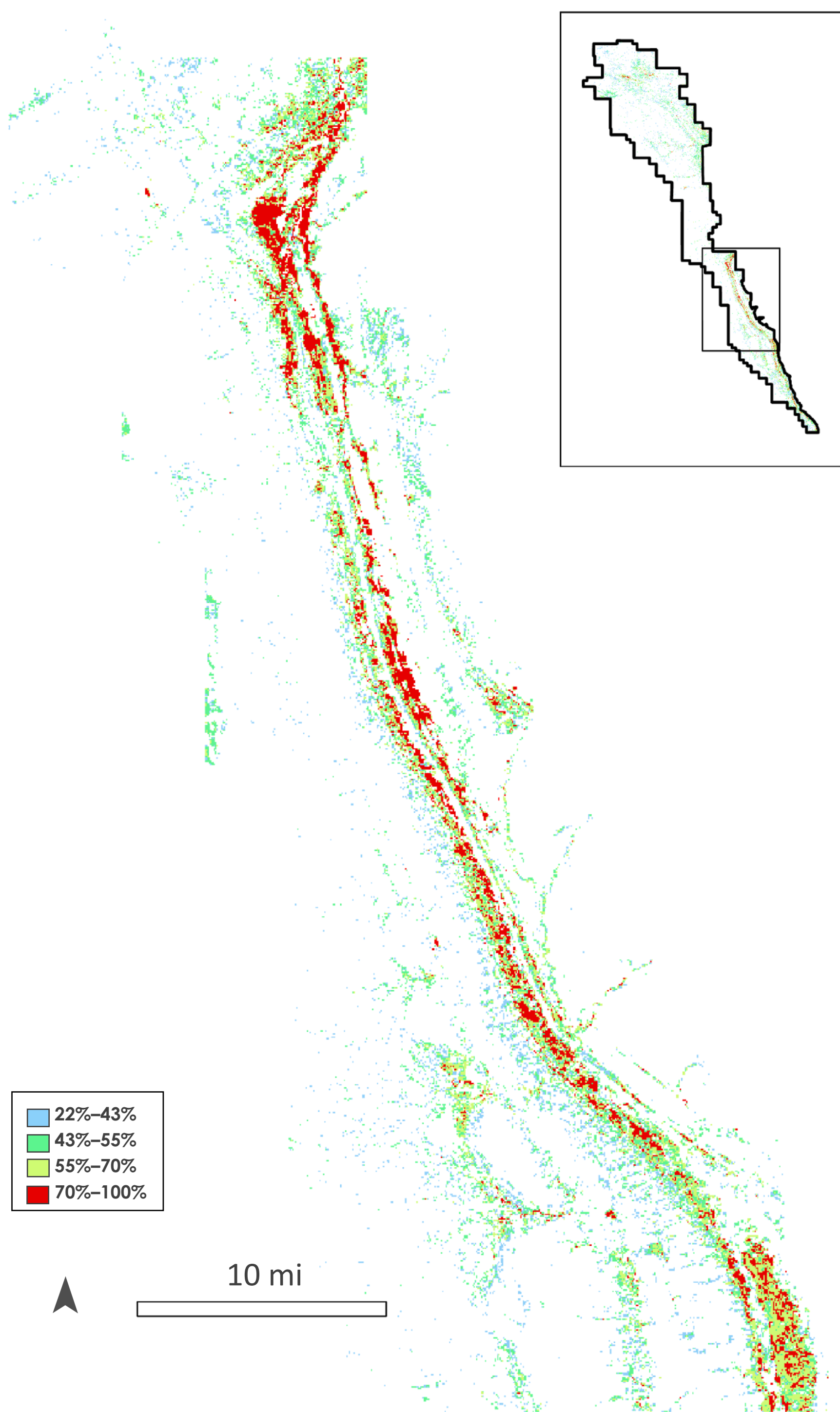
How do we study invasive exotic plants?

Invasive exotic plants are non-native plants that cause harm to an ecosystem. Many invasive plant species produce large quantities of seeds and spread quickly, have aggressive root systems that smother the root systems of native plants, and act as fuel for wildfires. Capitol Reef National Park has determined that intervention is needed in order to encourage native plant communities and to mitigate the harm of invasive plants. This is where remote sensing and satellite observations can help. Remote sensing gives scientists a way to study and monitor invasive plants over very large areas and develop plans for intervention.

Earth Observations & Methods

Landsat 8 OLI
Sentinel-2 MSI
Planetscope SuperDove
SRTM
LiDAR
NAIP

Input Predictors:
- Landsat 8 Imagery
- August NDVI – May NDVI
- August MSAVI2 – May MSAVI2
- May Indices: NDVI, MSAVI2, BSI, NDWI
- August Indices: NDVI, MSAVI2, BSI, NDWI
- LiDAR Height Above Ground
- SRTM Slope, Aspect, and Elevation

Random Forest Model

Rock

Grass

Shrubs

Trees

Bare Soil

Functional Classes
- Grass
- Bare Soil
- Rock
- Shrub
- Tree

Images (top to bottom: S. Clyde, NPS, pxful, Daniel Mayer, Albert Backer)

10 mi

Application

- 22%–43%
- 43%–55%
- 55%–70%
- 70%–100%

10 mi

Annual Grass Probability Map
While detailed probability mapping of specific invasive species within CARE wasn't feasible due to project constraints, we successfully produced a 2022 grassland probability map. Leveraging the Random Forest model, this map estimates the likelihood of each pixel belonging to the grassland class, incorporating votes from decision trees. Regions with higher values or those shaded in red signify a stronger presence of annual grass. Notably, these areas are concentrated in the southeastern section of the national park.

Results

92%

Classification accuracy
This means that when comparing the model's predictions to ground truth data, the model was accurate 92% of the time.

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