



LANDFIRE 2010 Disturbance Mapping

Joel Connot

**SGT, Inc., contractor to the U.S. Geological Survey (USGS) Earth
Resources Observation and Science (EROS) Center
Sioux Falls, South Dakota**

Work performed under USGS



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Disturbance Product

- Informs updates to LANDFIRE products
 - Management Activities
 - Natural Disturbance
- Provides temporal and spatial information related to landscape change

Disturbance Product

- Identifies Changed Pixels Only - 1 Product / year
 - 2008, 2009, 2010
- Legend
 - 160 Codes
 - 19 Causes / Events
 - 2 Type Confidences
 - 3 Severity Levels
 - 3 Severity Confidences

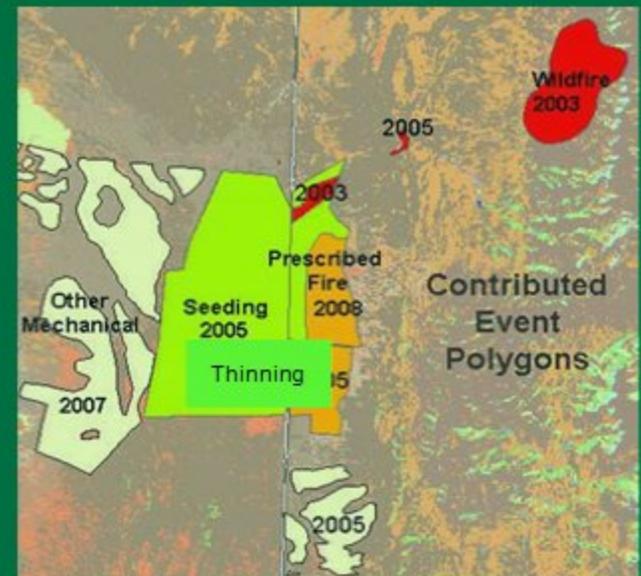
Disturbance Sources

- Disturbance

- Spectral – Landsat
- Burn Severity from Wildfire mapping programs (MTBS, BAER, RAVG)
- LF Events →

- Causality

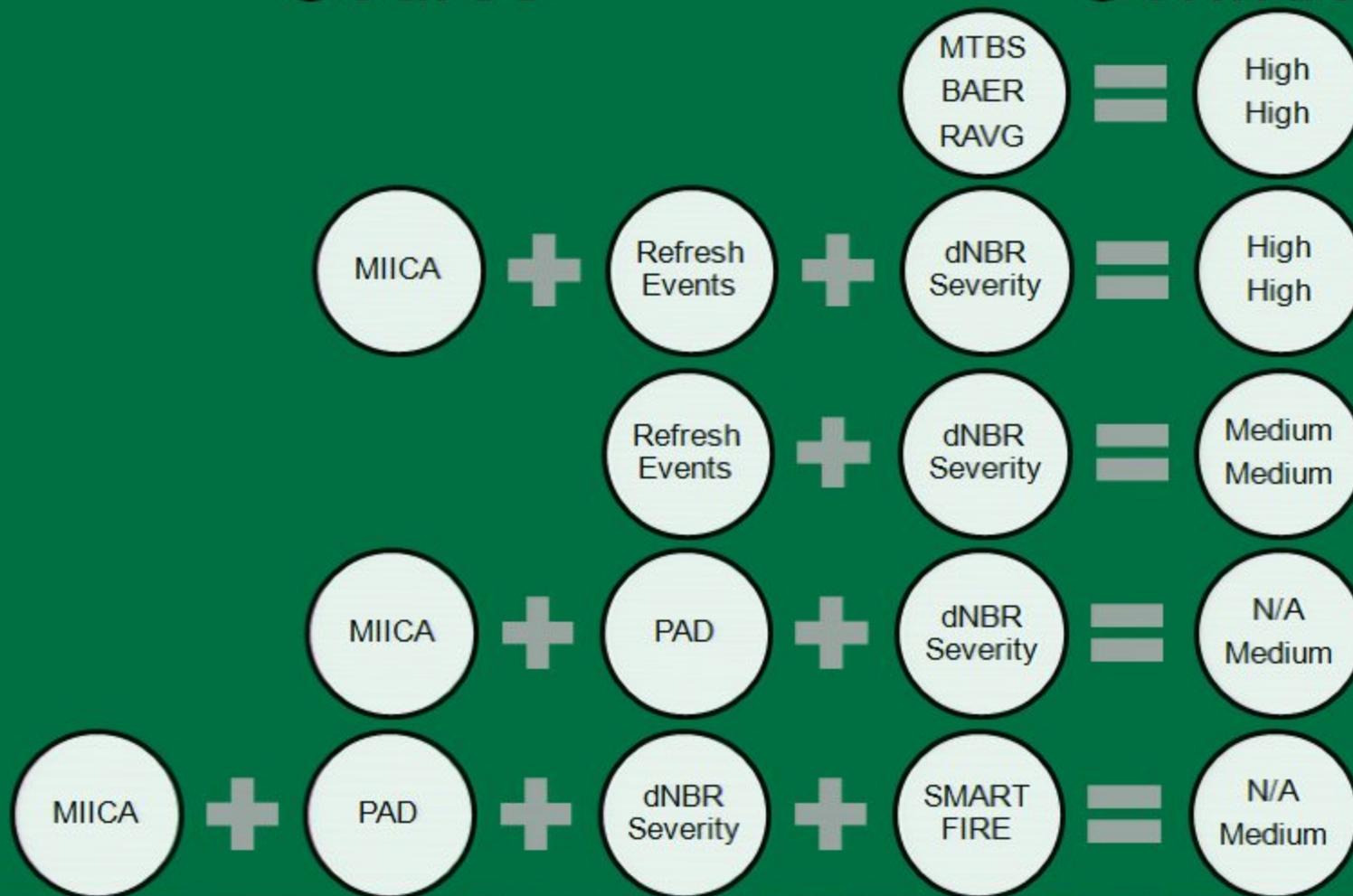
- SMARTFIRE
- Protected Area Database (PAD)



Disturbance Legend

Source

Confidence



Spectral

- **From: LF 2008 – Vegetation Change Tracker**

(Huang et al. 2010)

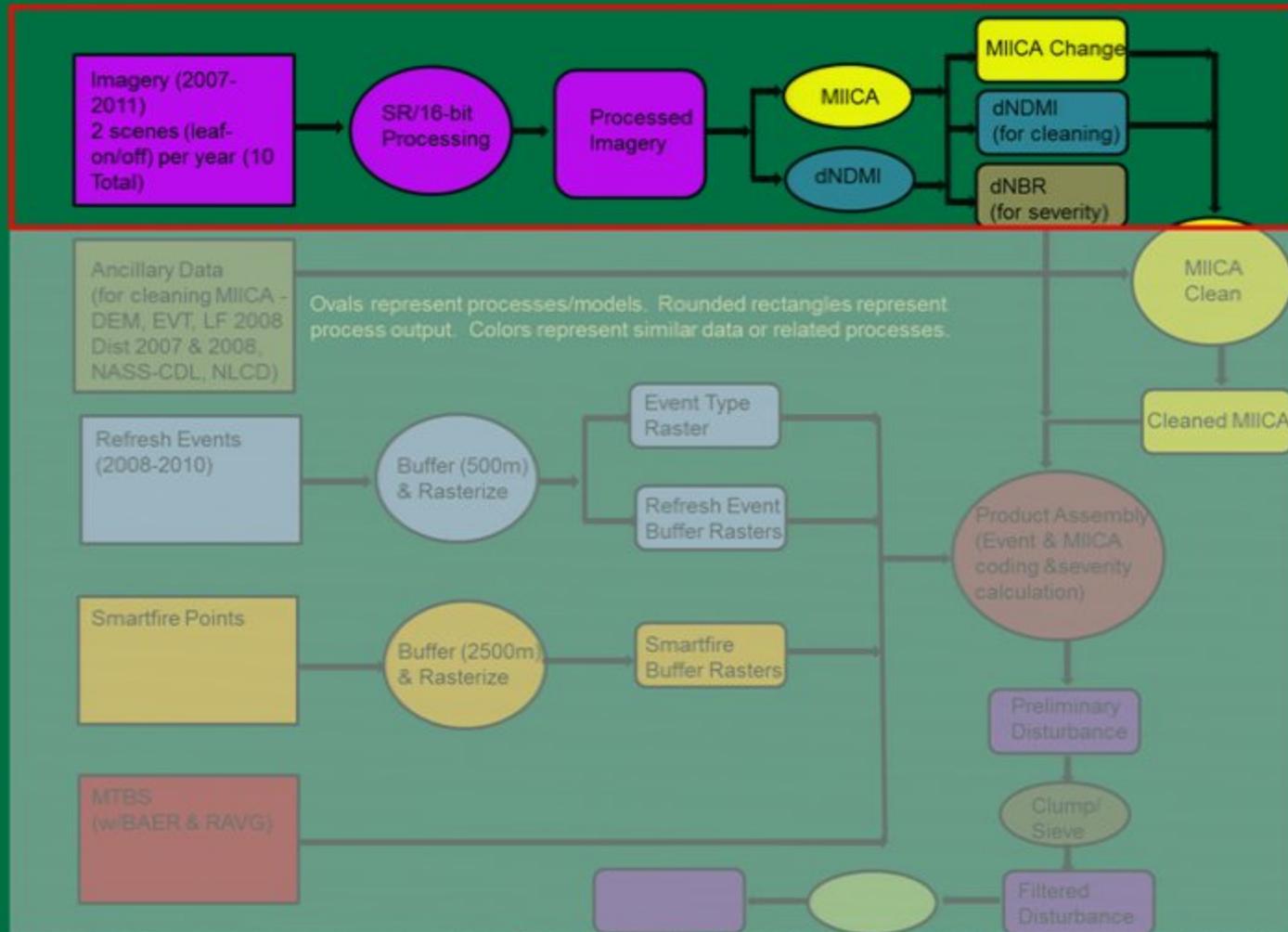
- **To: LF 2010 – Multi-Index Integrated Change Analysis (MIICA)**

(Jin, S., L. Yang, G. Xian, P. Danielson, and C. Homer, (in preparation).)

- **Why:**



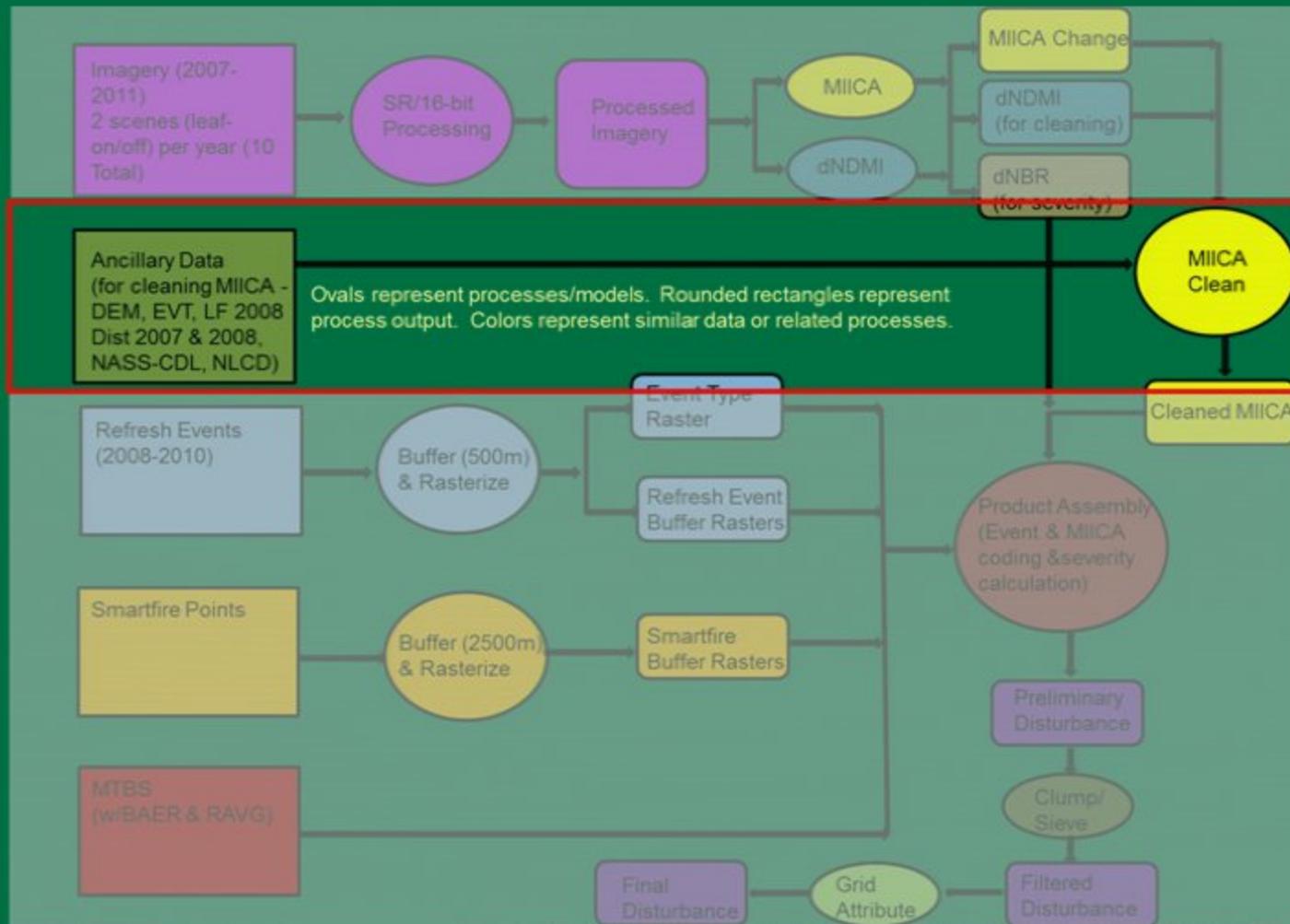
Flow Diagram



Spectral Change Detection

- Landsat TM Imagery – Stacks consisting of 10 images for 438 path rows
- Landsat ETM – When necessary
- Image Preprocessing – LEDAPS Surface Reflectance
- Cloud/Shadow, Snow/Ice Masking – (LEDAPS with modifications)
- MIICA – NLCD with modifications
 - Identifies changed pixels and severity of change

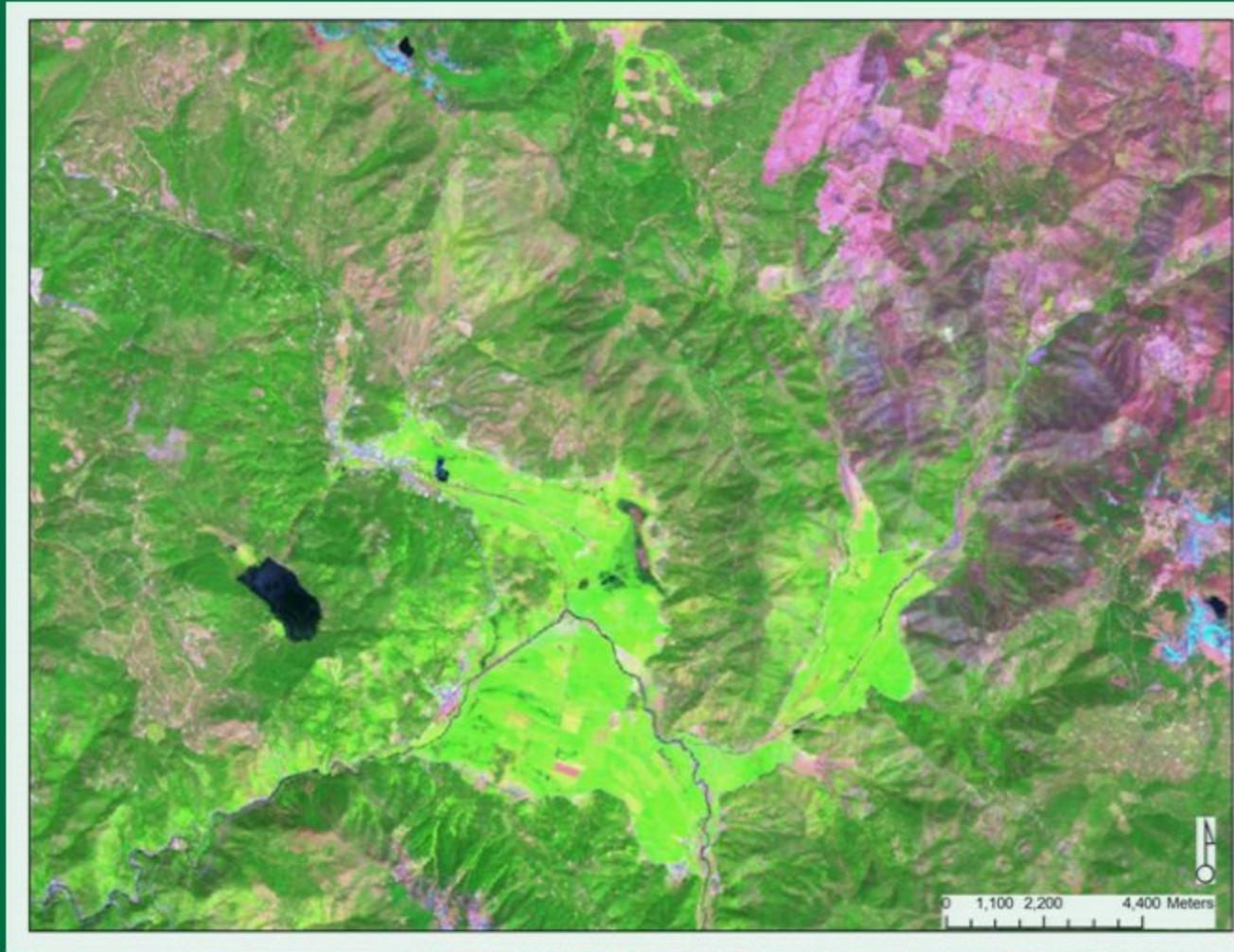
Flow Diagram



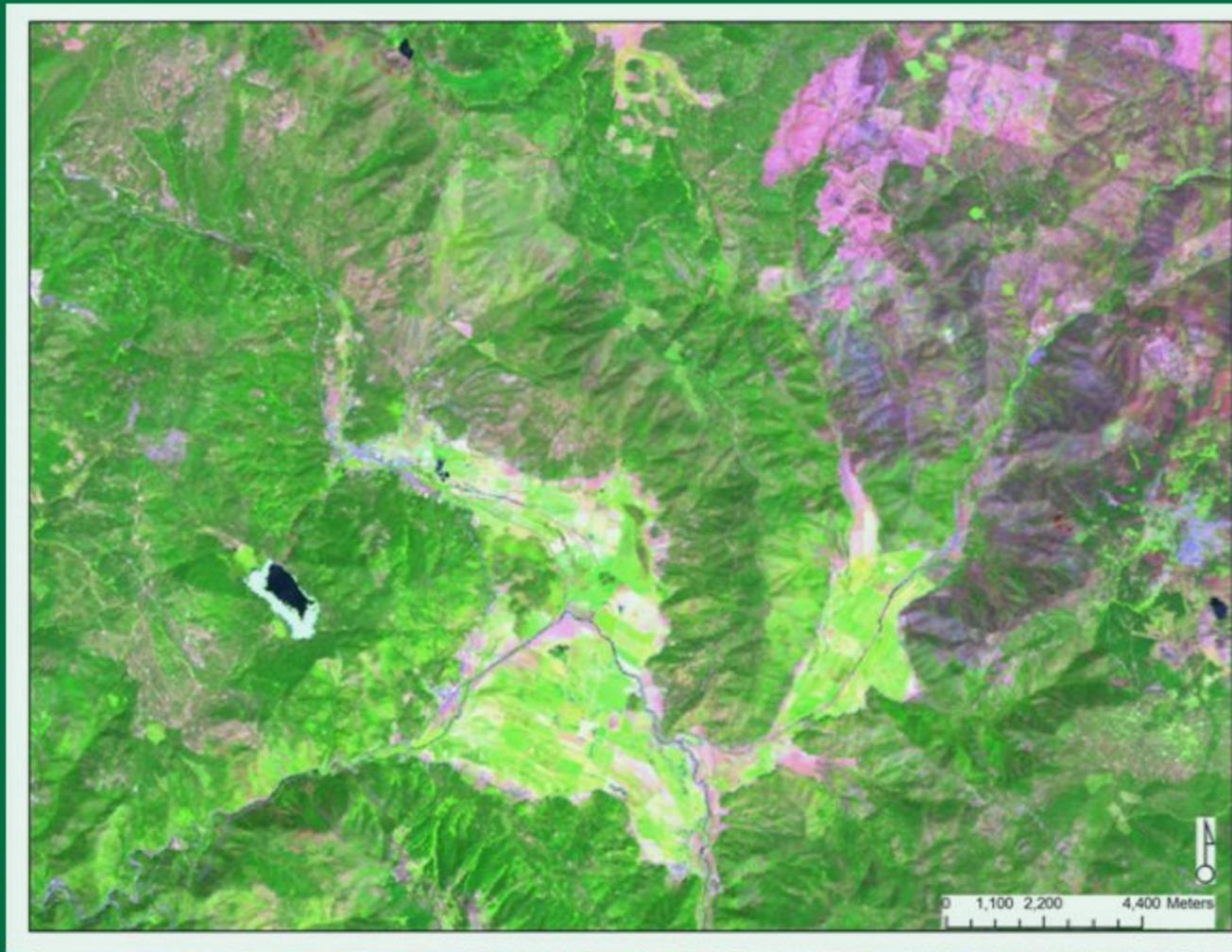
Mapping Process: Cleaning

- **Remove False Positives:**
 - **Problematic Land Cover Types**
 - NLCD, NASS-CDL, DEM, LF EVT 2008
 - LF 2008 Disturbance for 2007 and 2008
- **Combine annual MIICA with 2-year MIICA**
- **Thresholds of dNBR, dNDMI , dNDVI**
- **Add disturbances missed by MIICA**

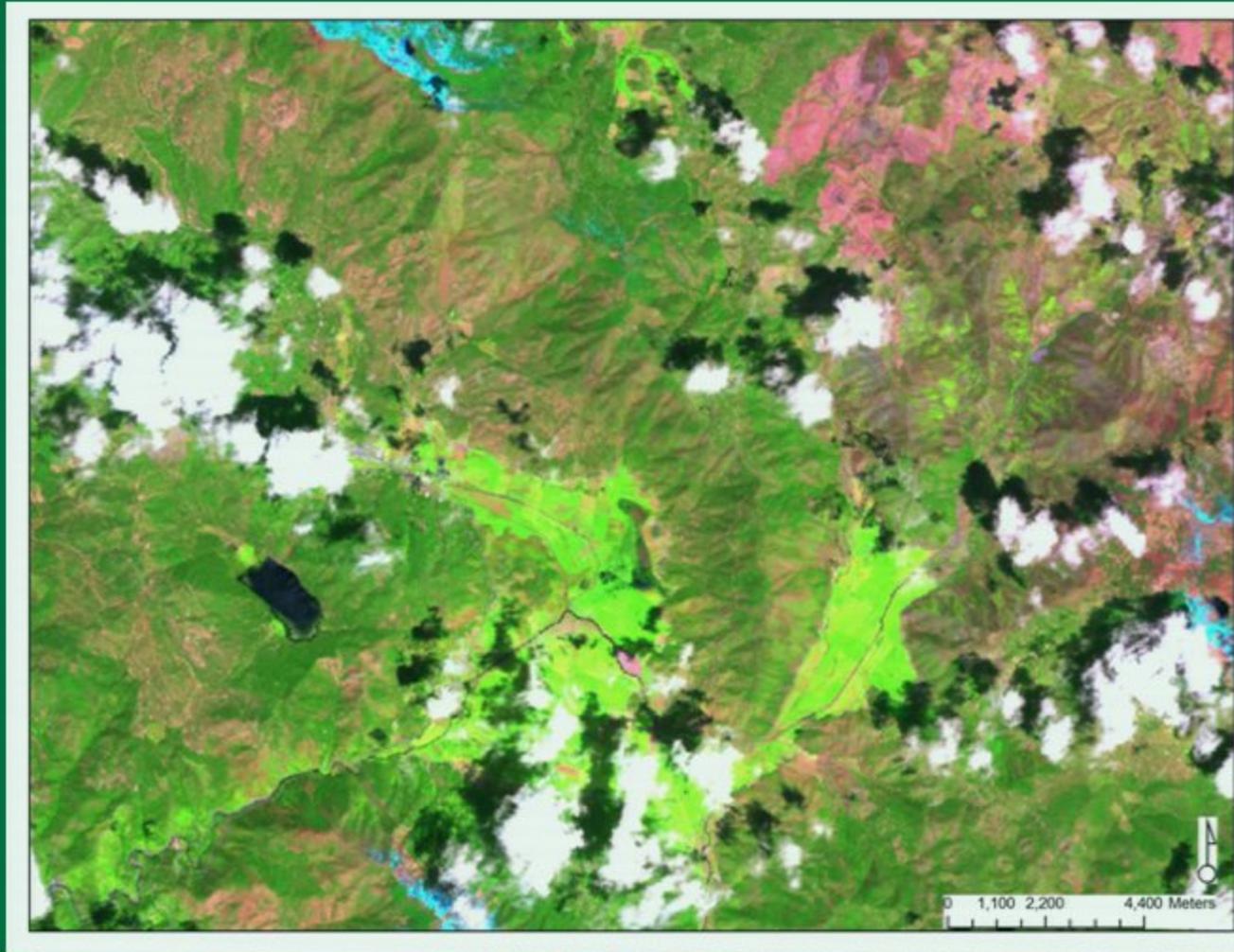
Mapping Process: Cleaning



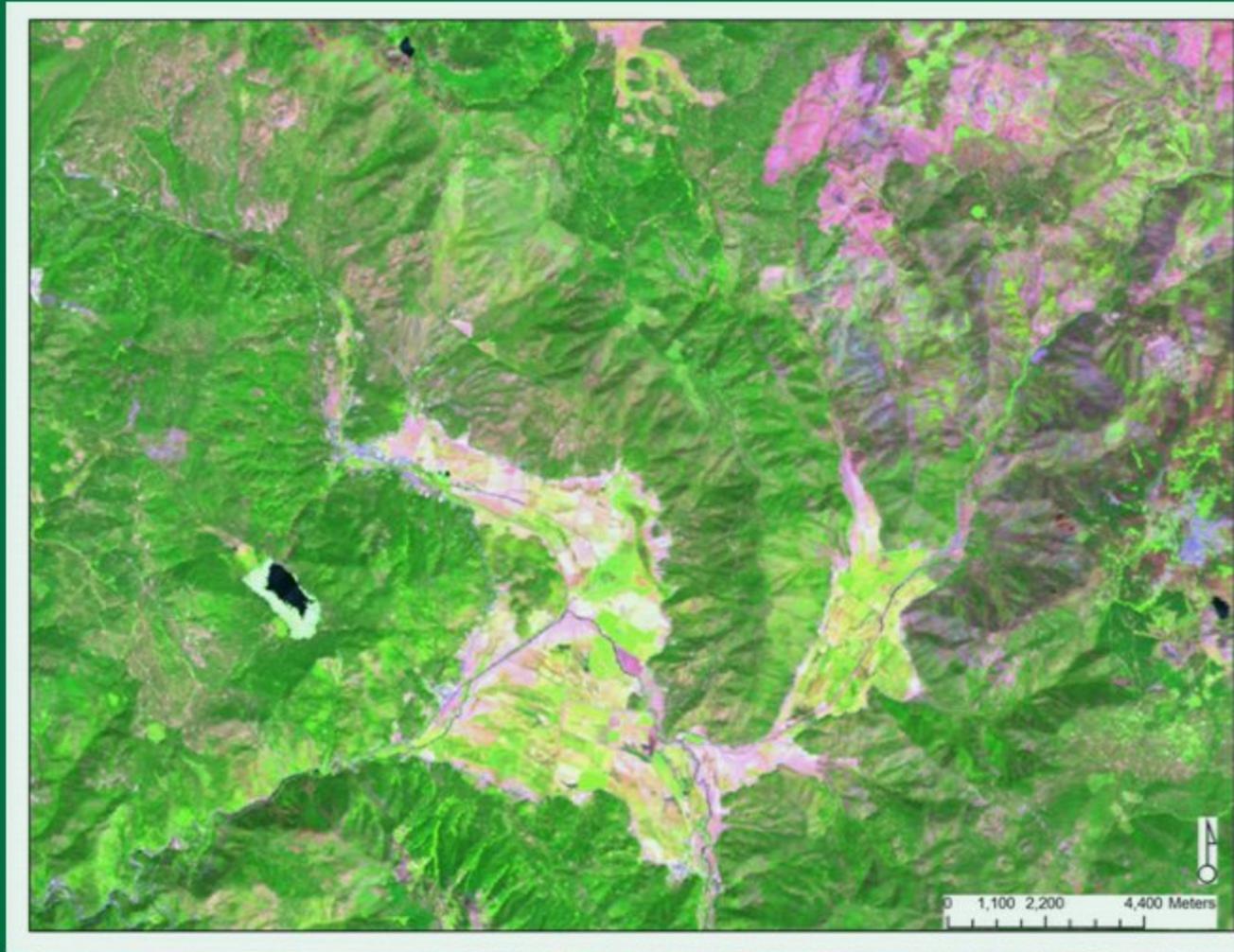
Mapping Process: Cleaning



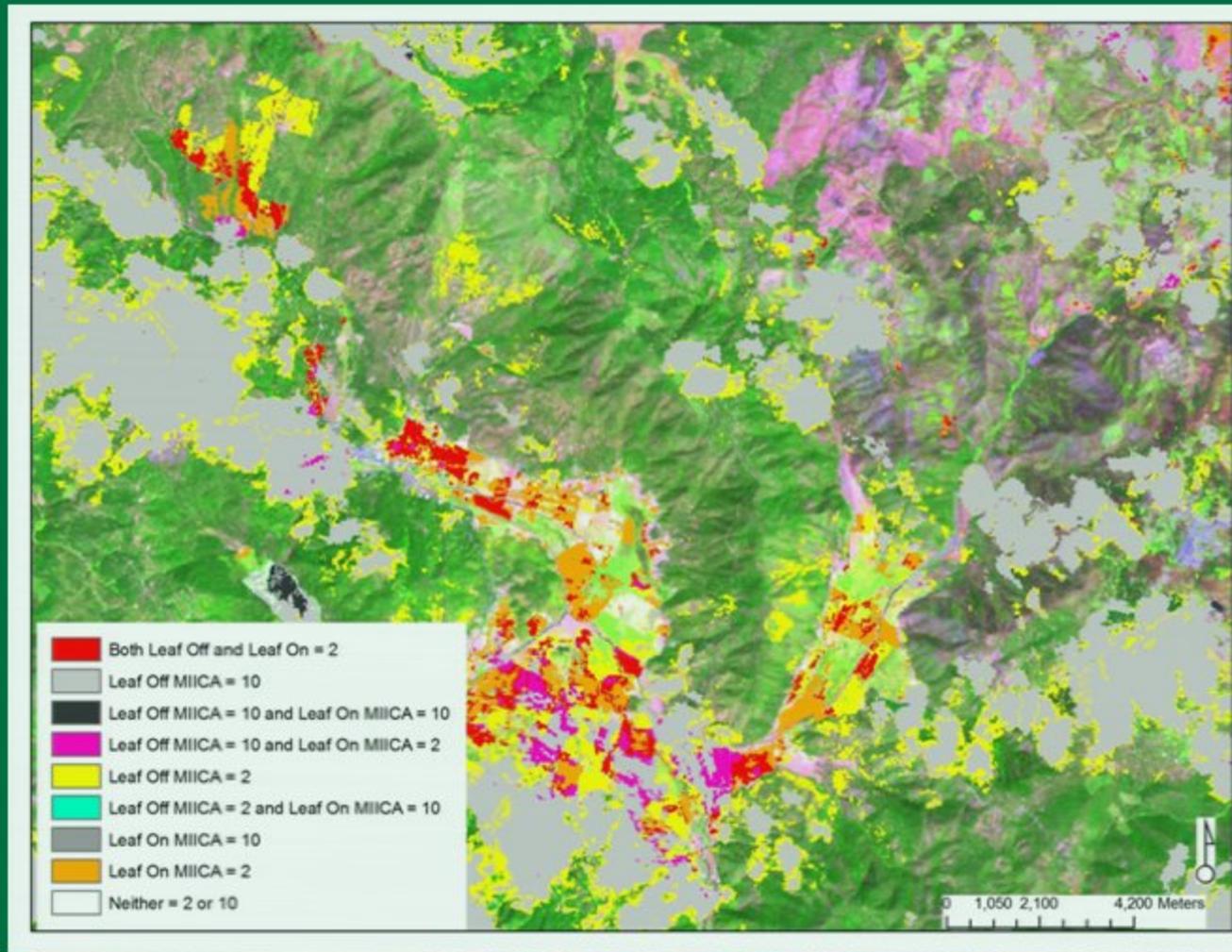
Mapping Process: Cleaning



Mapping Process: Cleaning

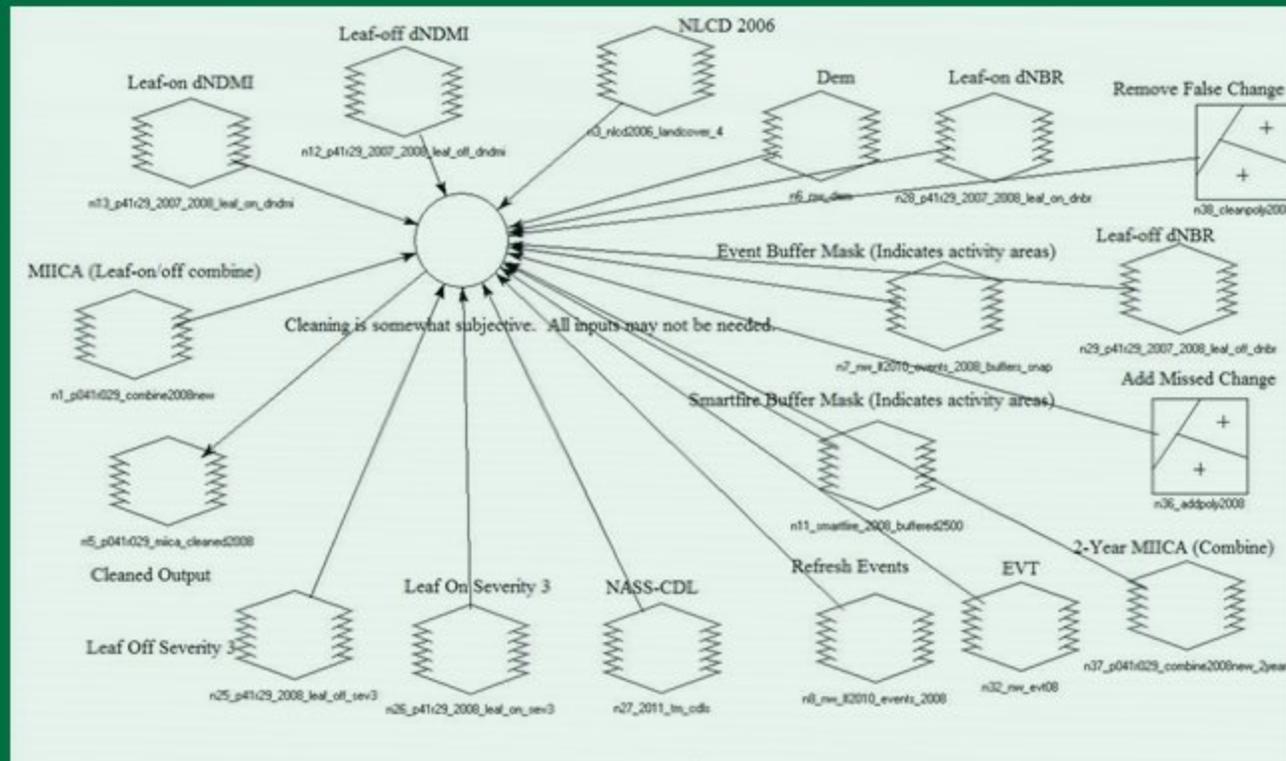


Mapping Process: Cleaning

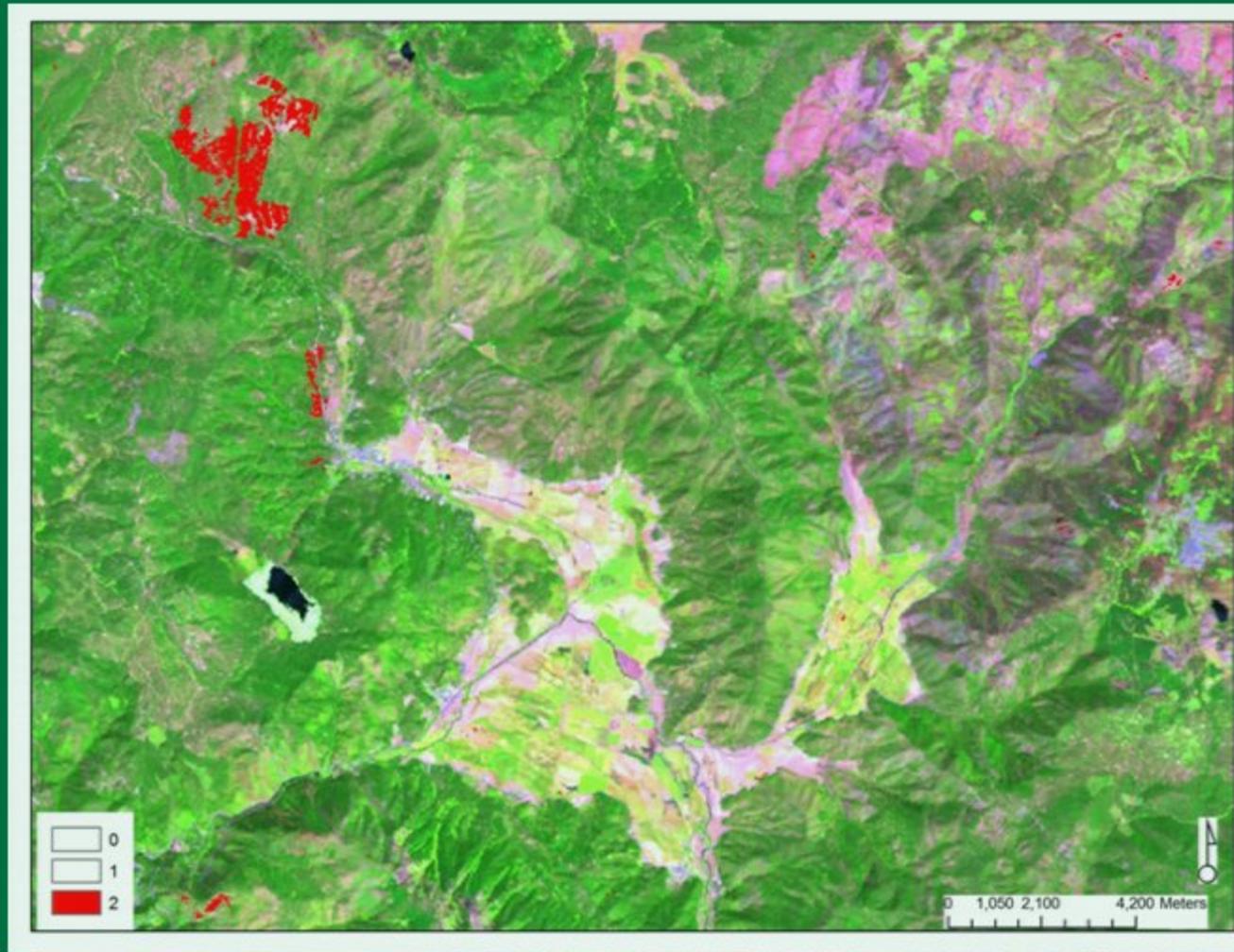


Mapping Process: Cleaning

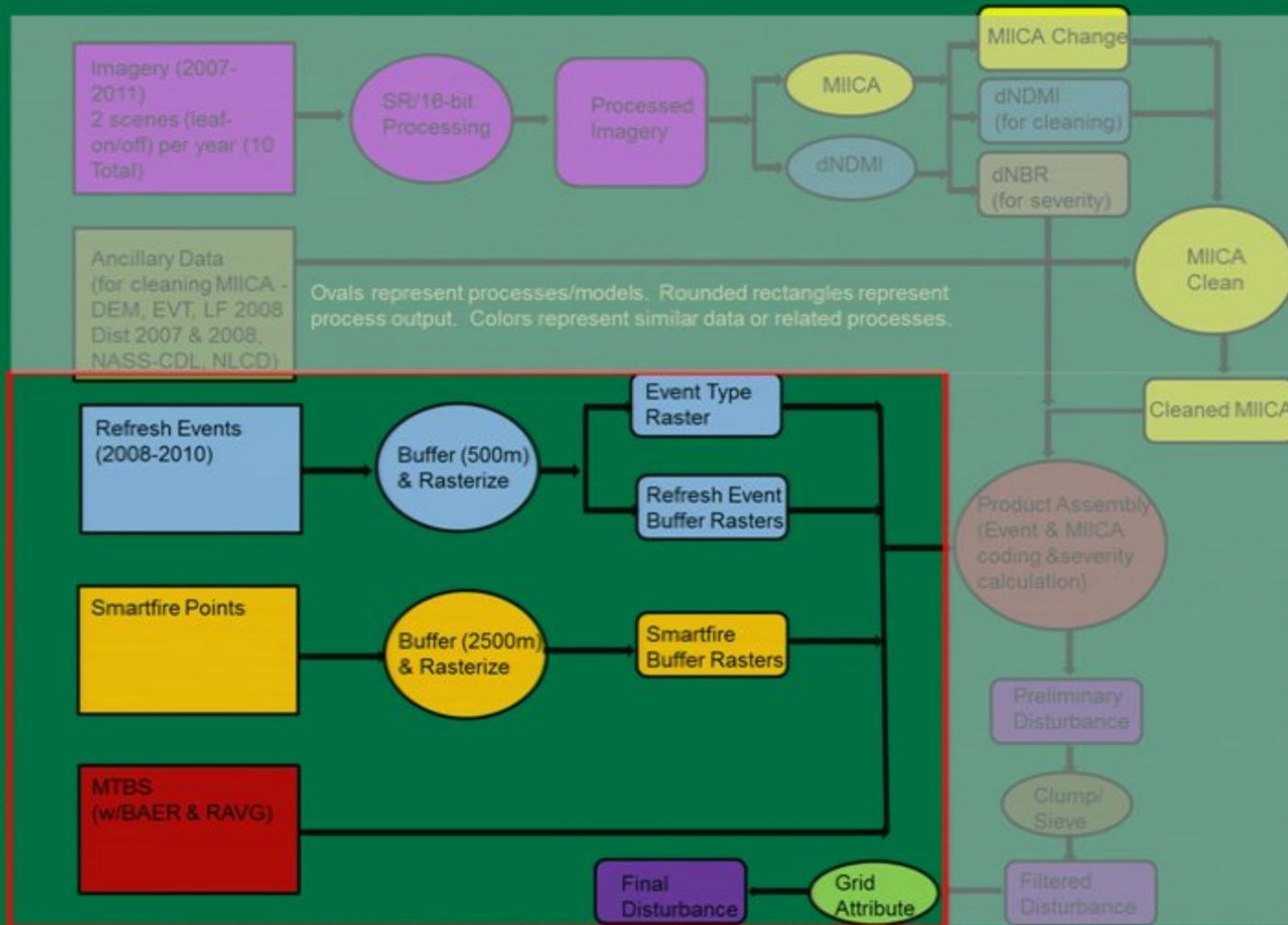
- Utilize Imagine Modeler and multiple conditional statements



Mapping Process: Cleaning



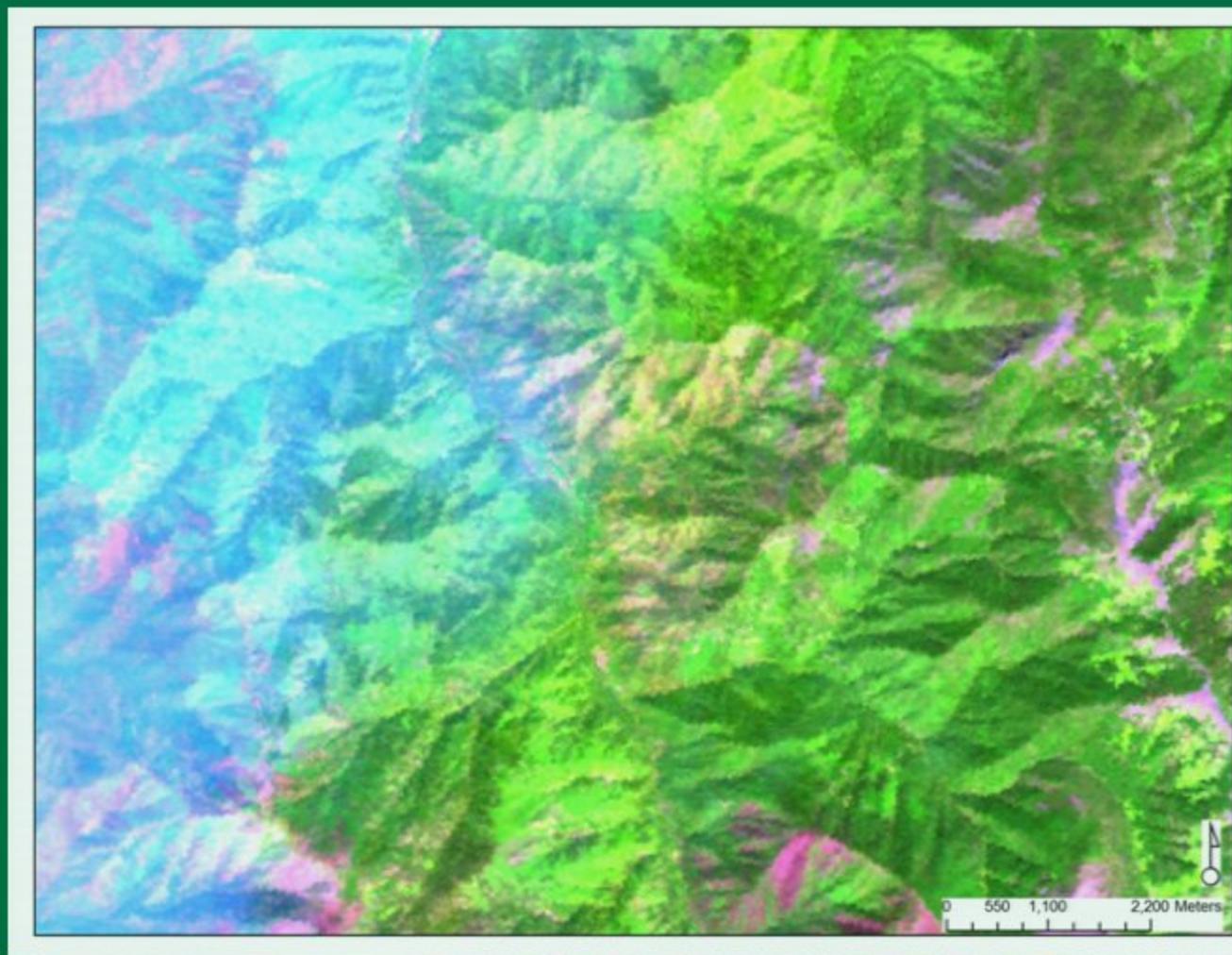
Flow Diagram



Sources: How do we use them?

- MTBS, BAER, RAVG – used “as is” except for recoding into LF Disturbance Legend
- LANDFIRE Refresh Events –year, causality
- LANDFIRE Refresh Events Buffers (500 meters) – year, possible causality
- SMARTFIRE Point Buffers (2500 meters) – year, possible causality
- Protected Area Database (GAP Status) – possible causality

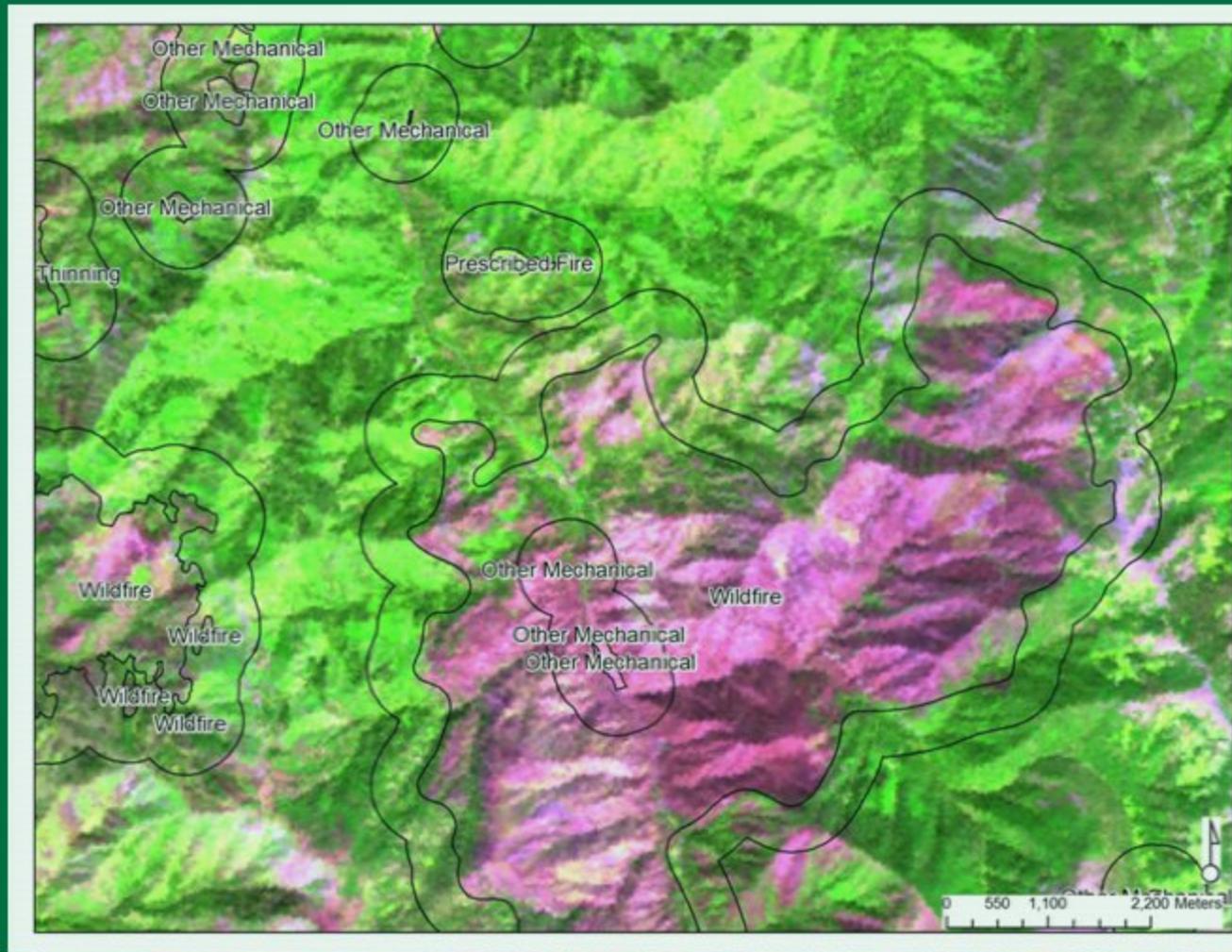
MTBS, BAER, RAVG



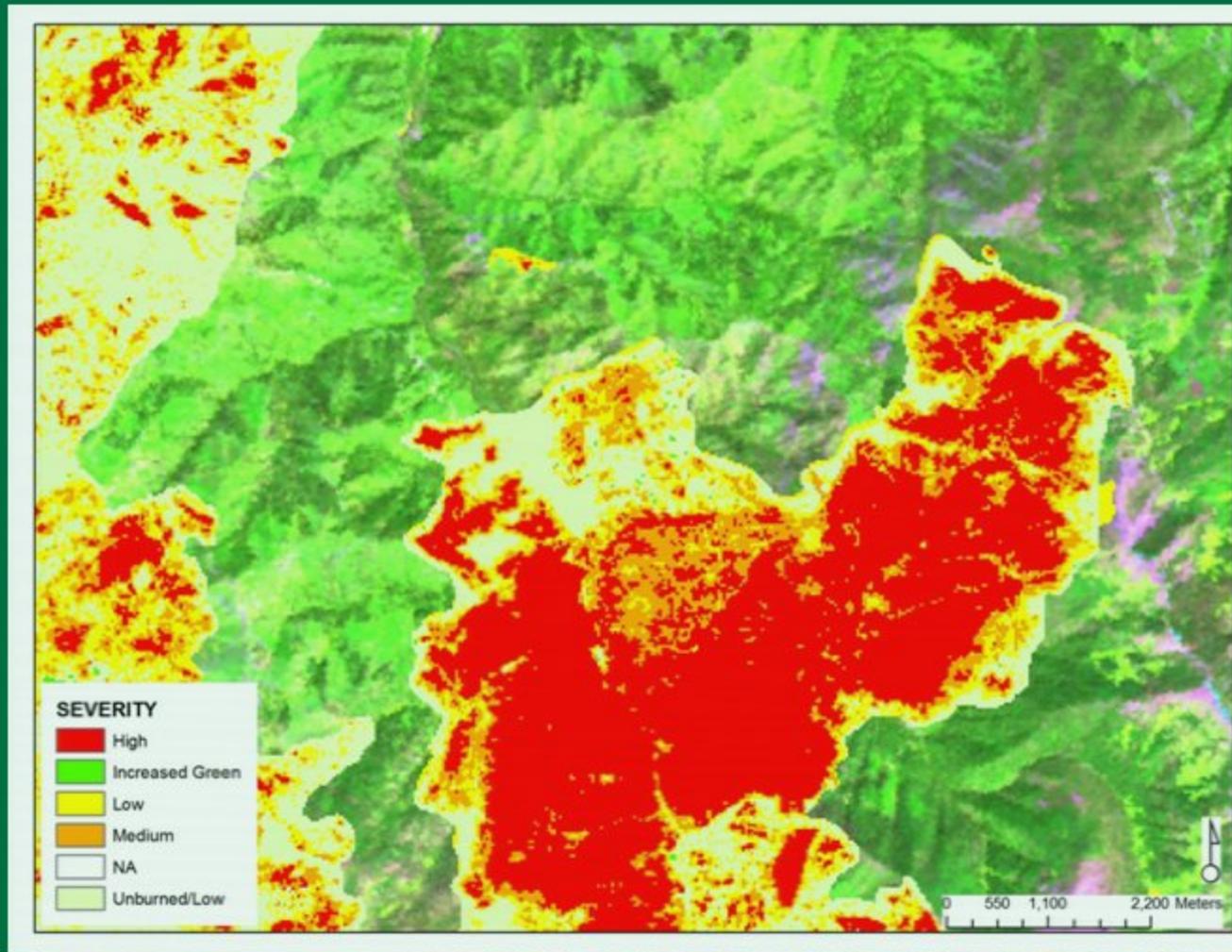
MTBS, BAER, RAVG



MTBS, BAER, RAVG



MTBS, BAER, RAVG

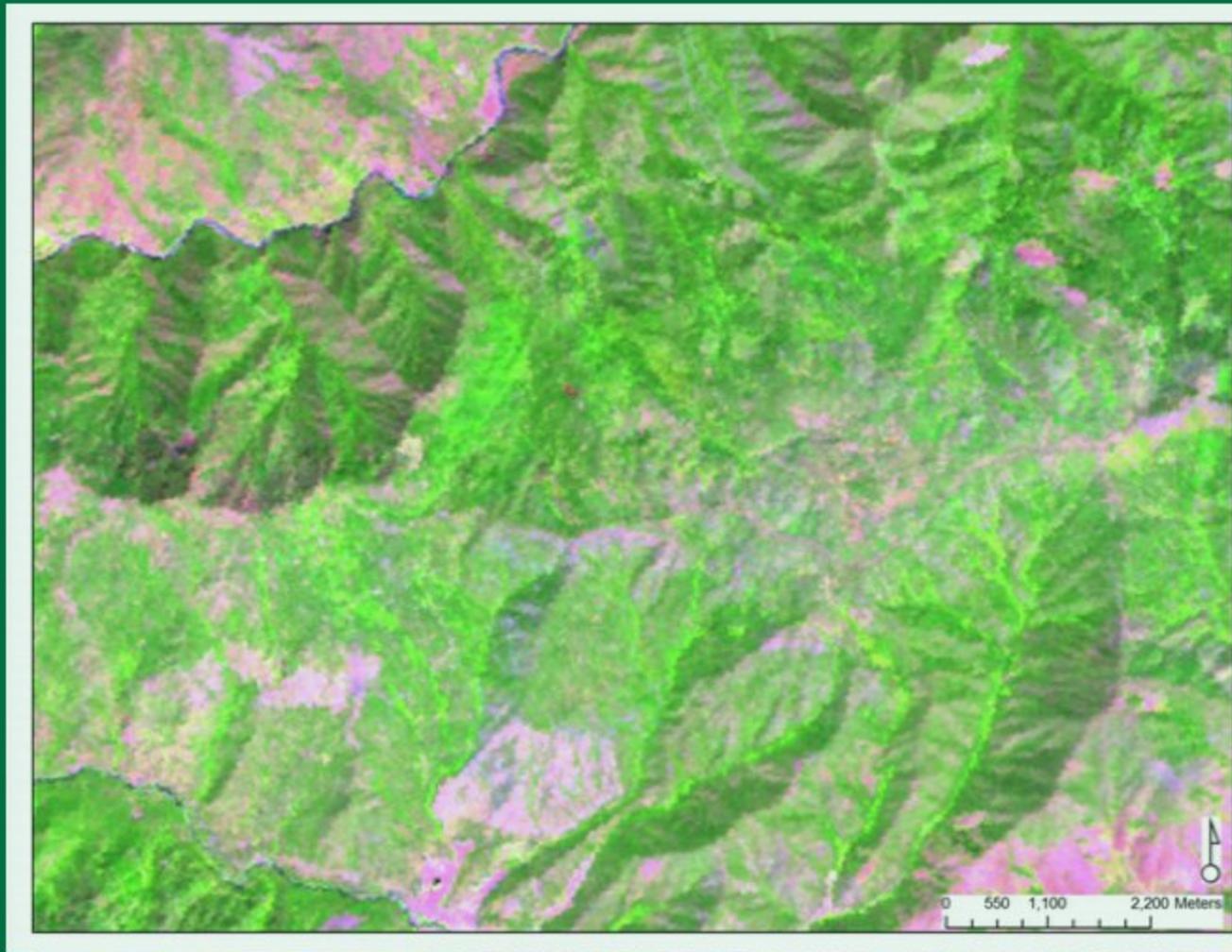


LANDFIRE Refresh Events

- Event Type Prioritization

Event Code	Event Description
1	Development
2	Clearcut
3	Harvest
4	Thinning
5	Mastication
6	Other Mechanical
7	Wildfire
8	Wildland Fire Use
9	Prescribed Fire
10	Wildland Fire
11	Weather
12	Insecticide
13	Chemical
14	Insects
15	Disease
16	Insects/Disease
17	Herbicide
18	Biological

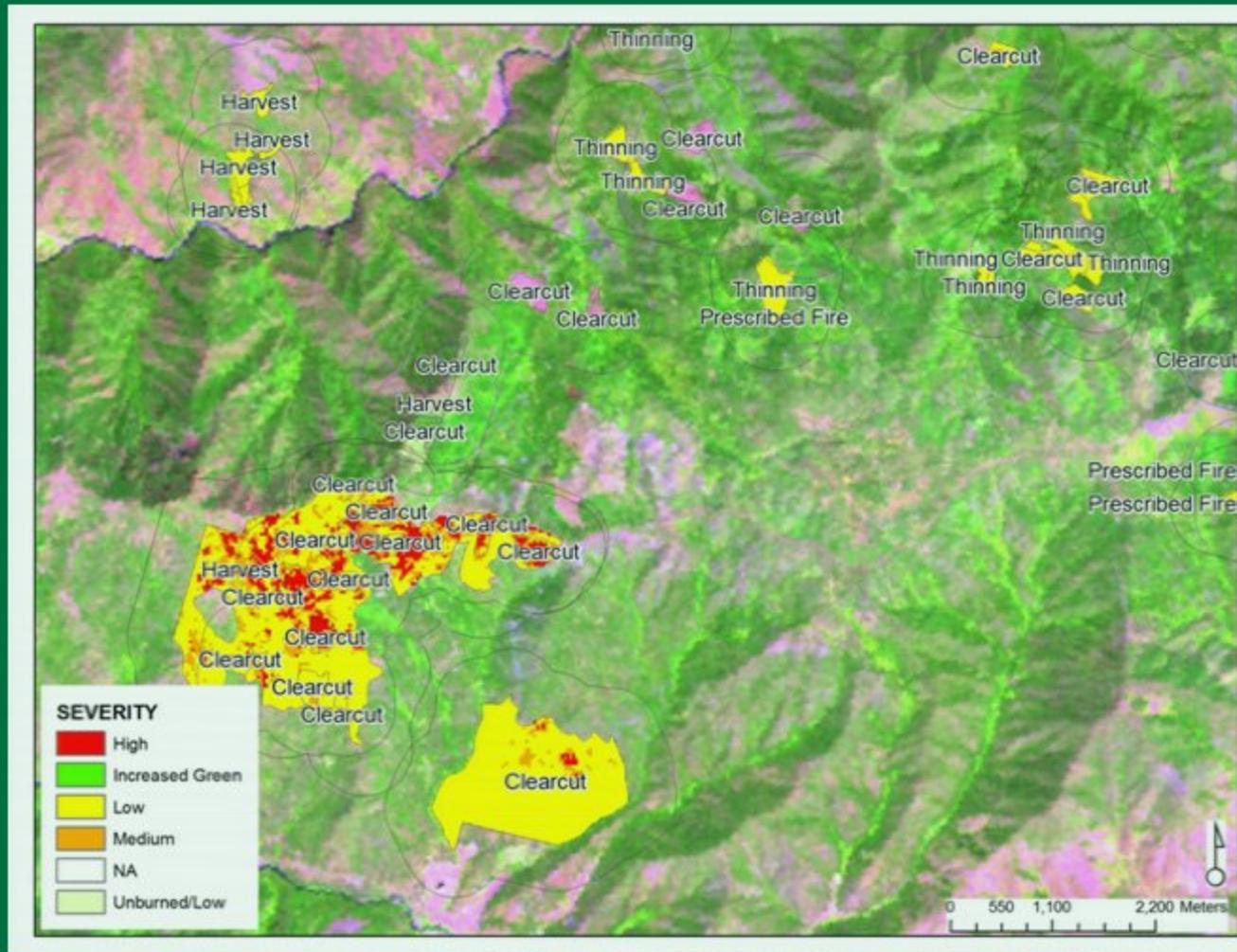
LANDFIRE Refresh Events



LANDFIRE Refresh Events



LANDFIRE Refresh Events



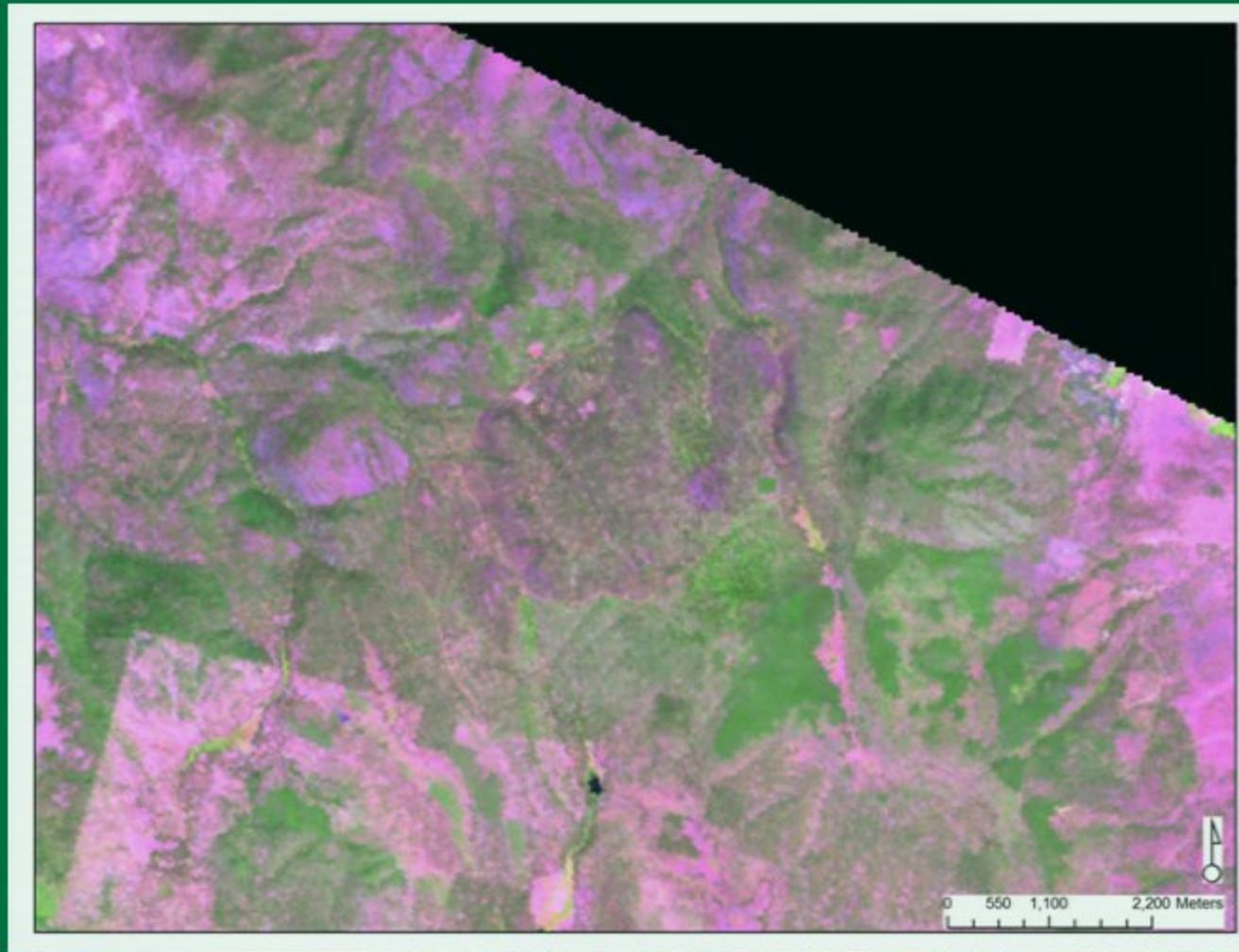
SMARTFIRE

- Satellite Mapping Automated Reanalysis Tool for Fire Incident Reconciliation
 - (<http://www.getbluesky.org/smartfire/>)
 - SMARTFIRE combines multiple sources of fire information and reconciles them into a unified GIS database

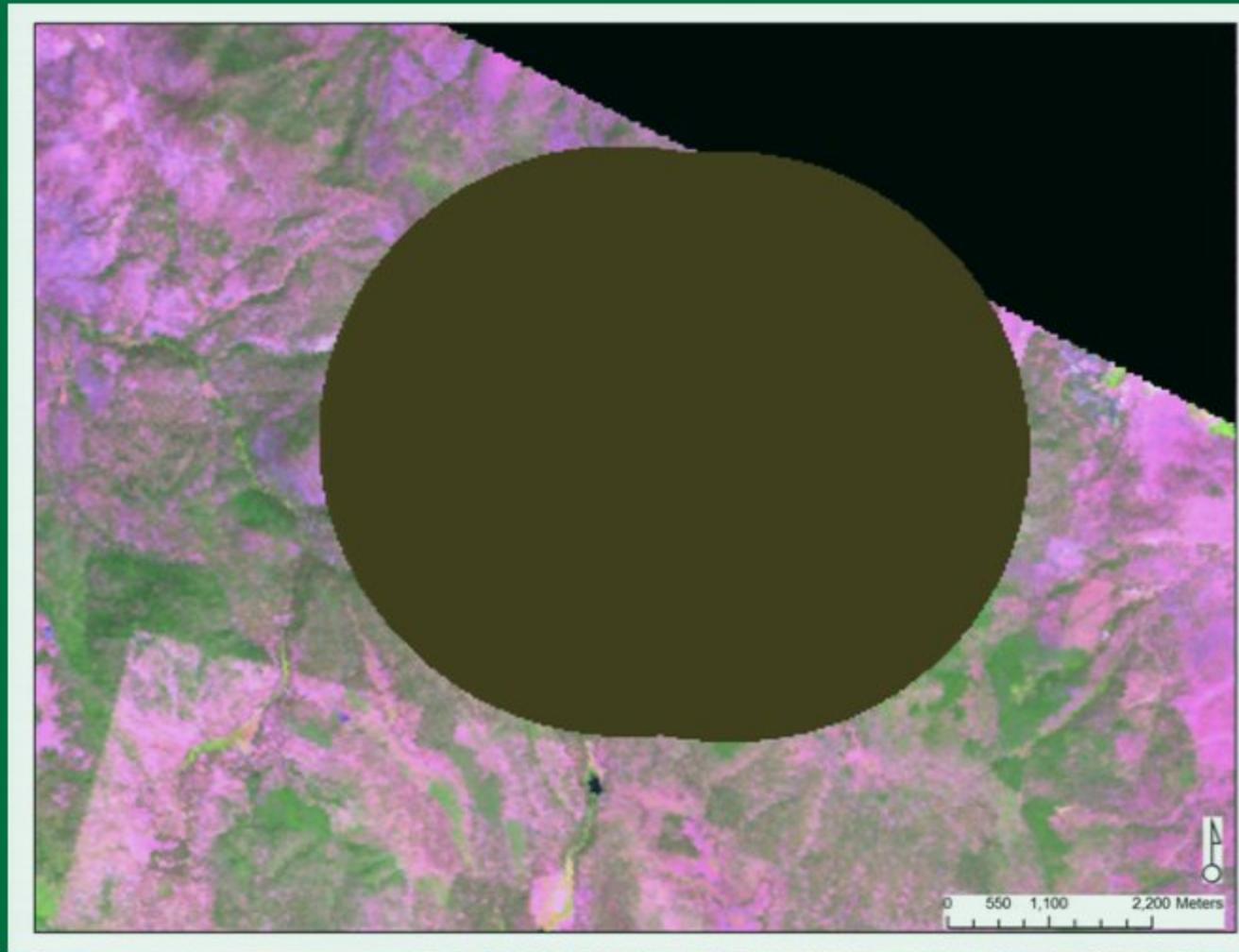
SMARTFIRE



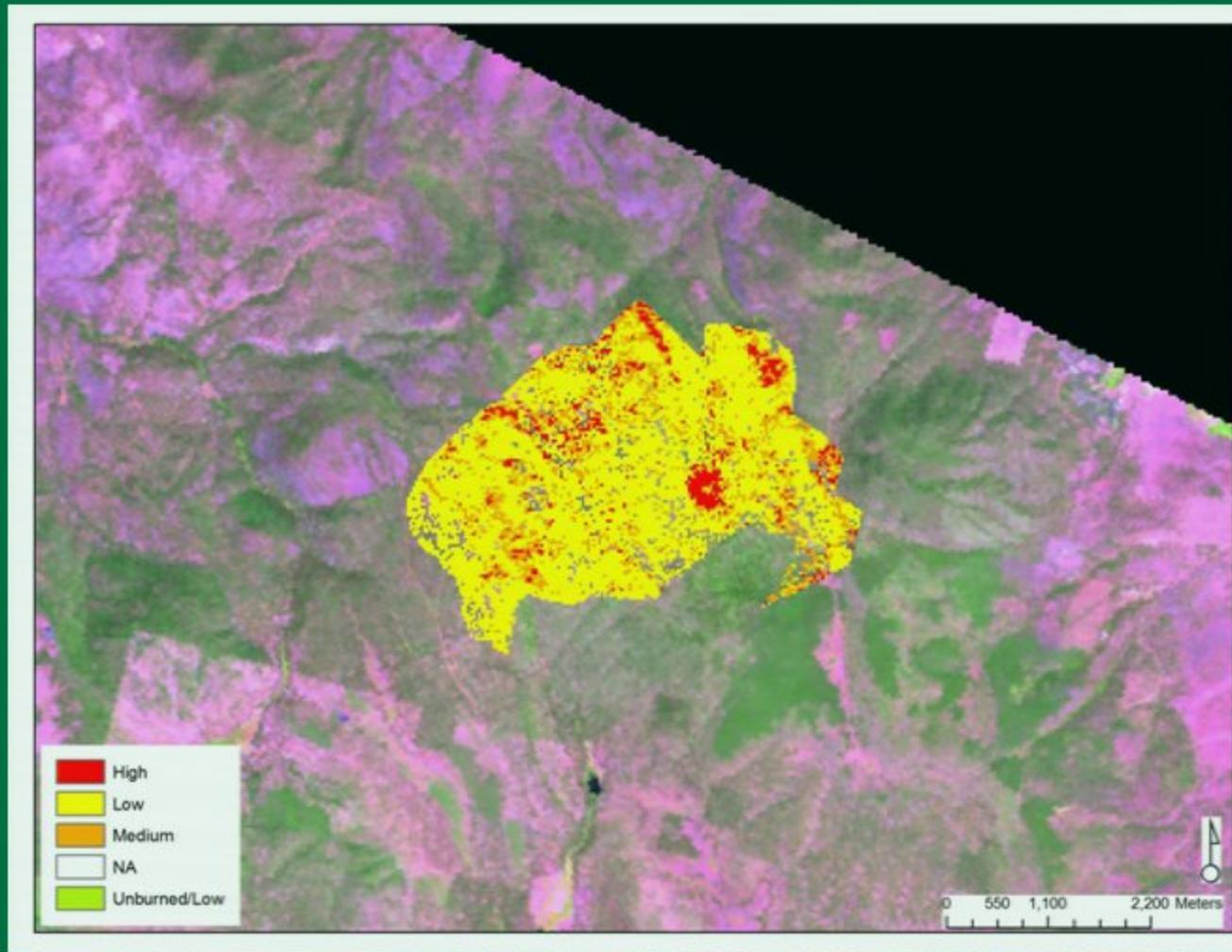
SMARTFIRE



SMARTFIRE



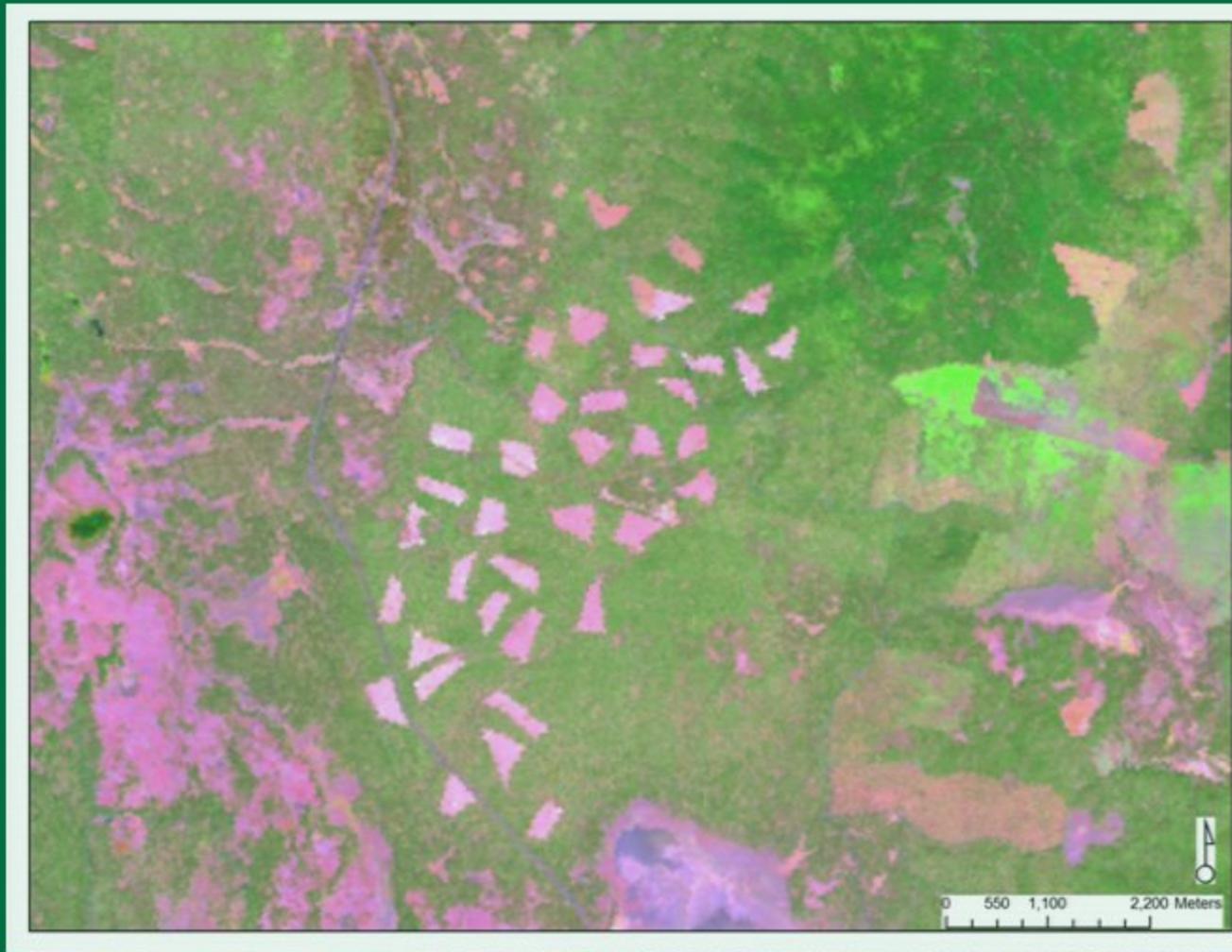
SMARTFIRE



Protected Area Database



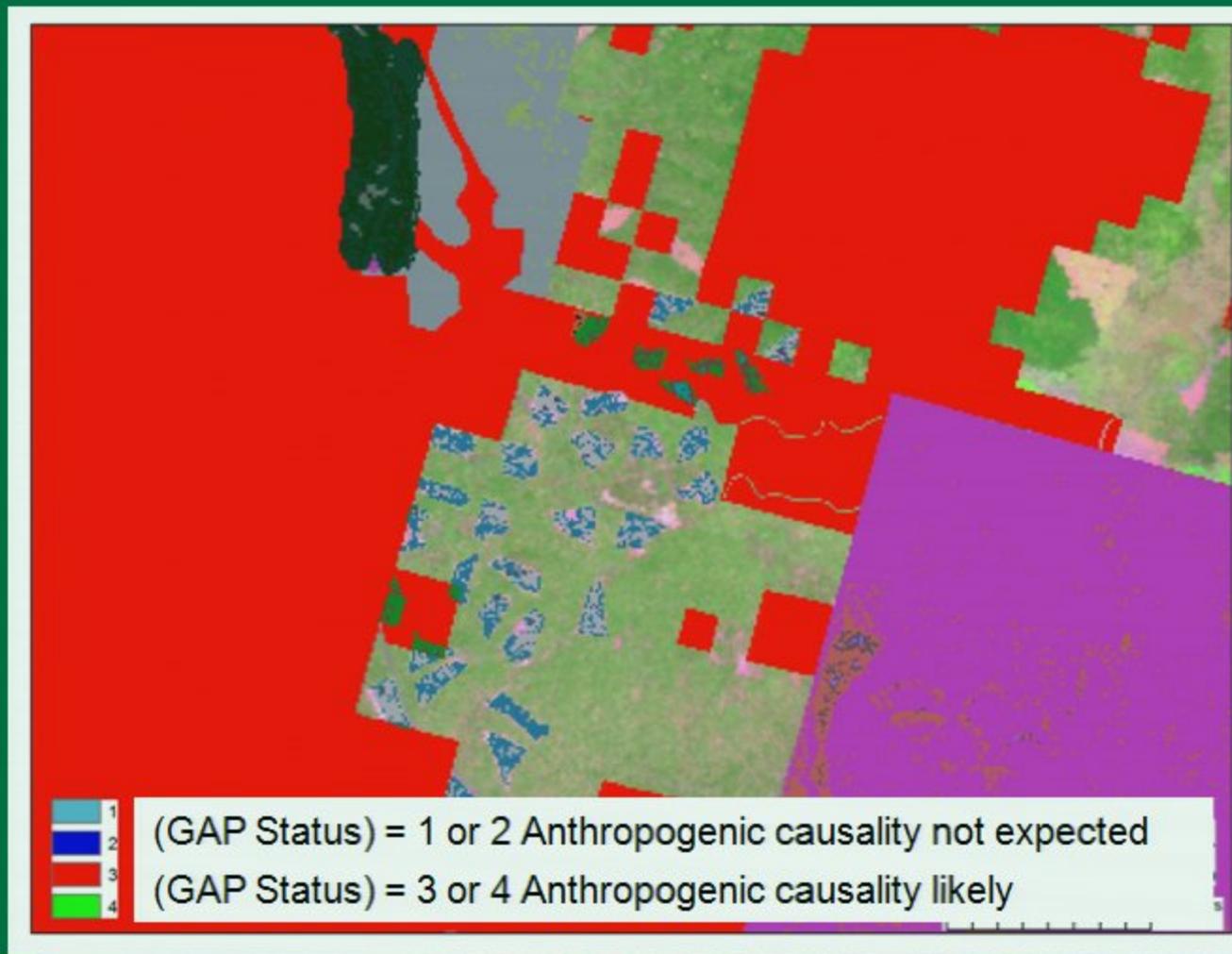
Protected Area Database



Protected Area Database



Protected Area Database



MIICA Only



MIICA Only



MIICA Only



Conclusion

- **LANDFIRE Disturbance Mapping**
 - Time consuming
 - Scene Selection for > 4,000 scenes
 - Mapping > 430 path rows

- Thank you