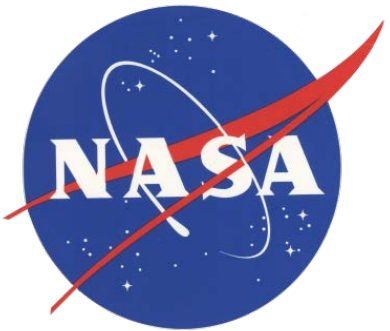


The NASA RECOVER DSS

Keith T. Weber¹, GISP and PI NASA RECOVER

Kindra Blair¹, John Schnase², Mark Carroll², Roger Gill²,

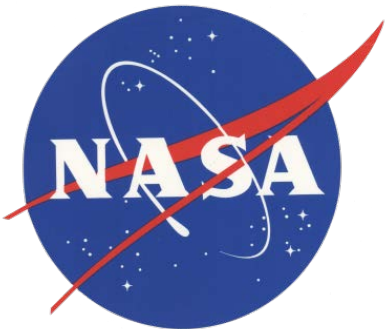


1- Idaho State University- GIS TReC

2- NASA Goddard Space Flight Center

What is RECOVER?

- Customer-driven, Customer-centric*
- Decision Support System (DSS)
 - Rapid assembly of site-specific data
 - Delivered in customized GIS analysis environment
 - Wildfire focus



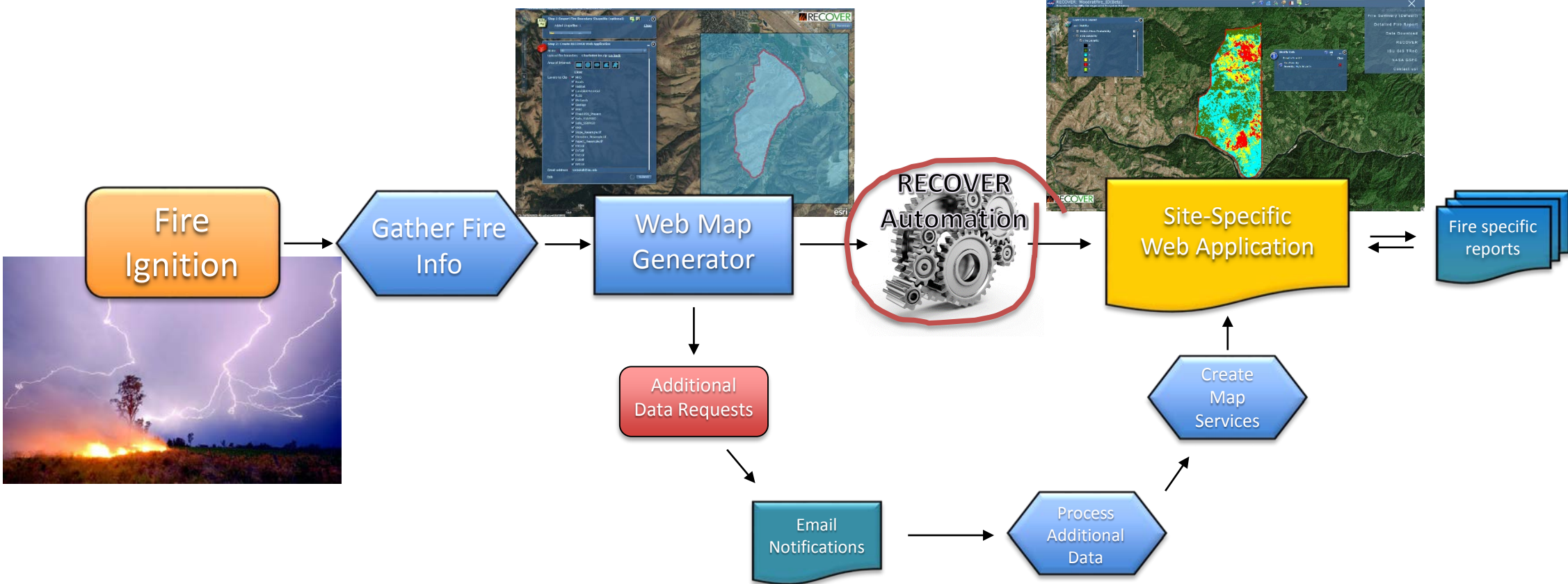
* Our “customer” is currently, any agency/organization managing wildfires (BLM, NPS, USFS, etc.)

Data Architecture

- RECOVER covers the Western US
- Esri ArcGIS
- File Geodatabase
 - Vector and raster data
 - Automated Map Services (python)



How Does it Work?

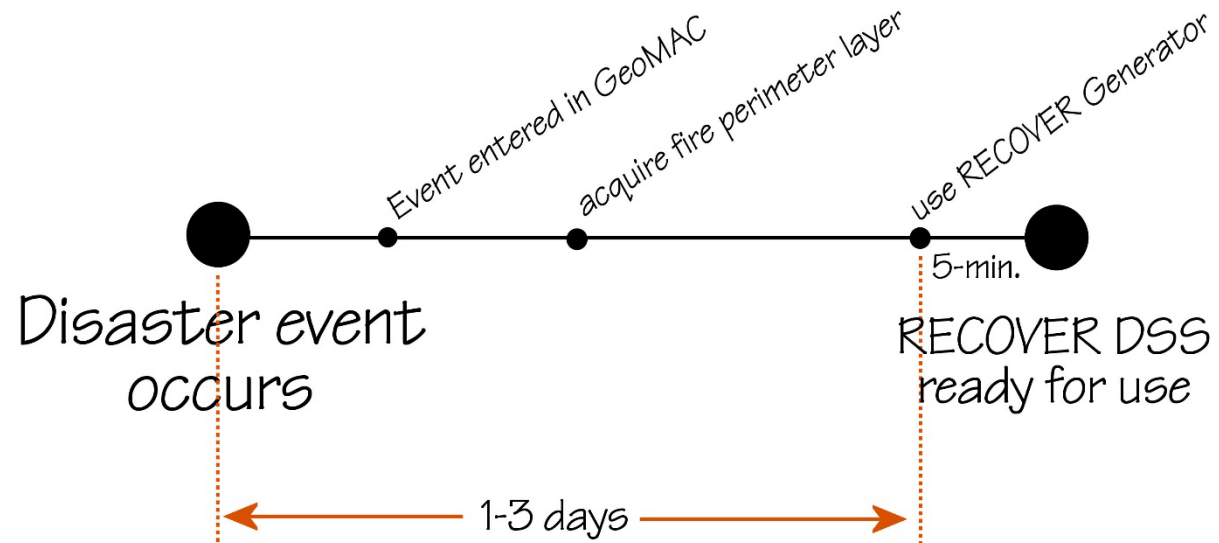


Done in 5-minutes!



- Once submitted from our Generator, the web map will be ready in about 5-minutes

Readiness...



- New automation processes will decrease response time by changing the trigger

GIS Layers

- By default each RECOVER web map contains...
 - 26 base layers automatically clipped to fire extent
 - Real-time data streams (Collector)
 - Fire-specific reports

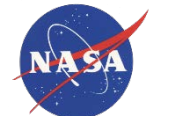
FireLines	FirePoints
Aerial Hazard - Solid Red line	Aerial Hazard
Air Tanker Foam	Airstrip or Airport
Air Tanker Retardant	Camp
Completed Dozer Line	Drop Point
Completed Line	Fire Origin
Completed Line Break	Fire Station
Explosive Line	First Aid Station
Fire Spread Prediction	Heat Source
Hand Line - Solid black line	Heat Source - Outside of Line
Heat Line (RIN)	Helibase
Helitanker Foam	Helispot
Helitanker Water	Hot Spot
Other	IR Downlink
Planned Fire Break	Incident Base
Planned Fire Line	Incident Command Post
Planned Secondary Line	Lookout
Plow Line	Miscellaneous
Proposed Dozer Line	Mobile Weather Unit
Ridge / Geographic Feature	Mud Pit
Uncontrolled Fire Edge	Repeater
Unknown	Retardant Pickup
AssignmentBreaks	Safety Zone
Sector	Spot Fire
Division	Staging Area
Branch	Telephone
Zone	Unknown
	Water Source
	Wind Speed



Naming convention of RECOVER Base Layer data

The following list describes the RECOVER base layers available to our partners along with the standard naming convention applied to the web services hosted at ISU's GIS TRC (please note the exact name including capitalization and the use of underscores).

- Geology
- Habitat
- LandslidePotential
- NHD
- PLSS
- Roads
- SMA
- Soils_SSURGO
- Soils_STATSGO
- Soils_STATSGO_KFactor
- WatershedsWBD
- Wetlands



Best fire datasets

Vegetation datasets

Topography datasets

USGS USA Contiguous Albers Equal Area Conic USGS version,

Fire-specific Reports

Soda Fire - Summary Report

Administration Agency	Acres
BLM	227,635
BOR	196
PVT	42,824
ST	12,741
Total Acres	283,396

Soda Fire - Detailed Report

Admin. Unit Name	Area Symbol	Map Unit Symbol	Acres
Bureau of Land Management	ID665		
	ID675		

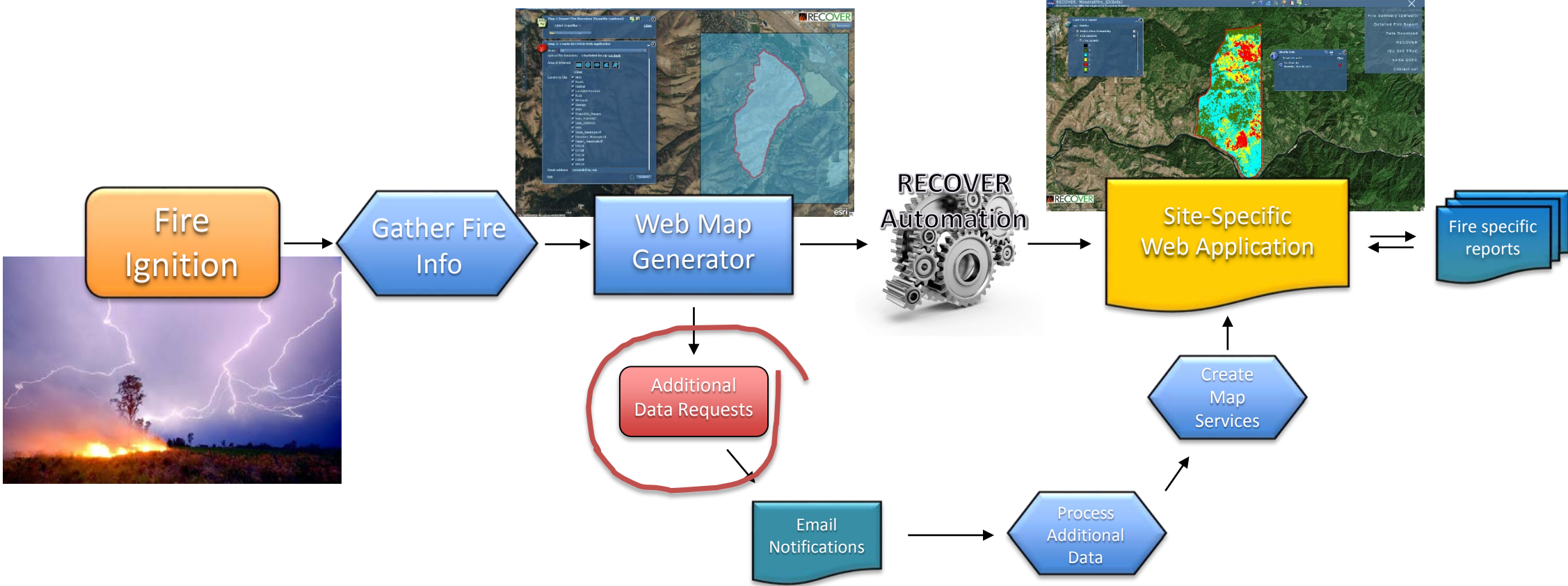
Ecological Site/Plant Association and Vegetation (ID)

Owyhee County Area, Idaho

[Composition of forest understory vegetation is based on canopy cover. Composition of rangeland vegetation is based on dry weight]

Map symbol and soil name	Ecological site or plant association	Common trees	Forest understory or rangeland characteristic vegetation	Composition	
				Forest	Range
<i>Pct</i>					
1:					
Acrelane	LOAMY 11-13 ARTRT/PSSPS (R025XY043ID)	---	bluebunch wheatgrass basin big sagebrush antelope bitterbrush other shrubs other perennial forbs other perennial grasses	---	50 20 5 5 5 5
Rock outcrop	---	---	---	---	---

How Does it Work?



Step 1: View Fire perimeter (optional)

PLEASE READ THE FOLLOWING INSTRUCTIONS

A zipped folder containing the fire perimeter can be loaded to the map using this tool.

Loading the perimeter using this utility is for VIEWING purposes only!!!!

If you have the fire perimeter you must also upload it in step 2 (below) to add it to your site-specific application!!!!

There must be AT LEAST 4 files in the zipped shapefile folder,

[Load Local Shapefile...](#)

Step 2: Create RECOVER Web Application

Fire Name

State

Upload fire boundary or

Check if fire is contained

Area of Interest

Layers to Clip

- NHD
- Roads
- Habitat
- LandslidePotential
- PLSS
- Wetlands
- Geology
- WatershedsWBD
- SMA
- Soils_SSURGO
- Soils_STATSGO
- Soils_STATSGO_KFactor
- HistoricFires
- HistoricFires_PastDecade
- Ecosystem_Resilience_Resistance
- FRG_FireRegimeGroup
- EVT_ExistingVegetationType
- EVC_ExistingVegetationCover
- ESP_EnvironmentalSitePotential
- BPS_BioPhysicalSetting
- Elevation
- Steep_Slopes_GTE30deg
- Aspect
- HillShade
- Slope_degree
- Slope_percent

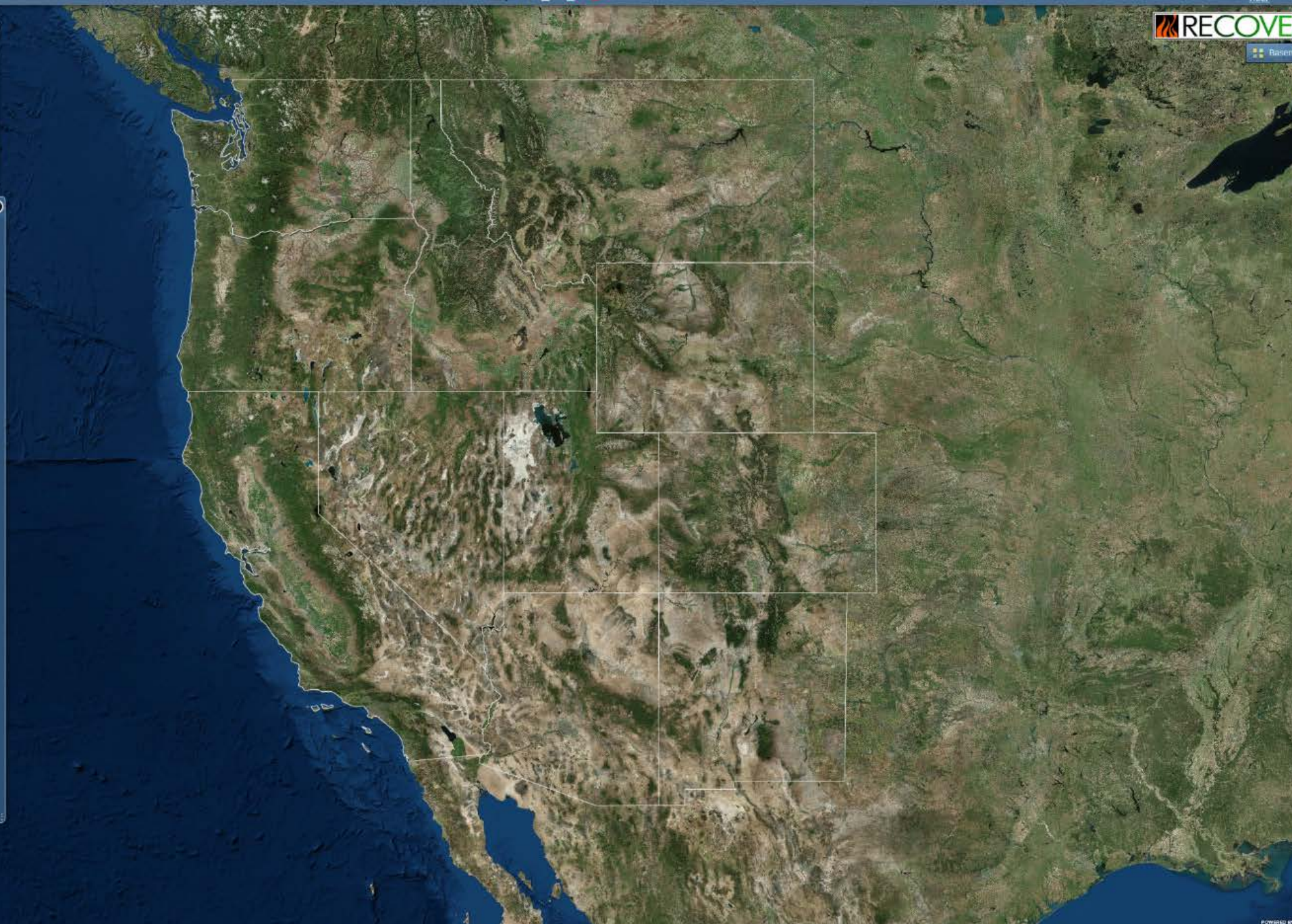
Email address

Request dNBR Fire Affected Vegetation

Request Debris Flow

Request pre-fire vegetation monitoring

Help



Demo

- https://recover.giscenter.isu.edu/recover3/exerciseFire_UT/



Layer List & Legend

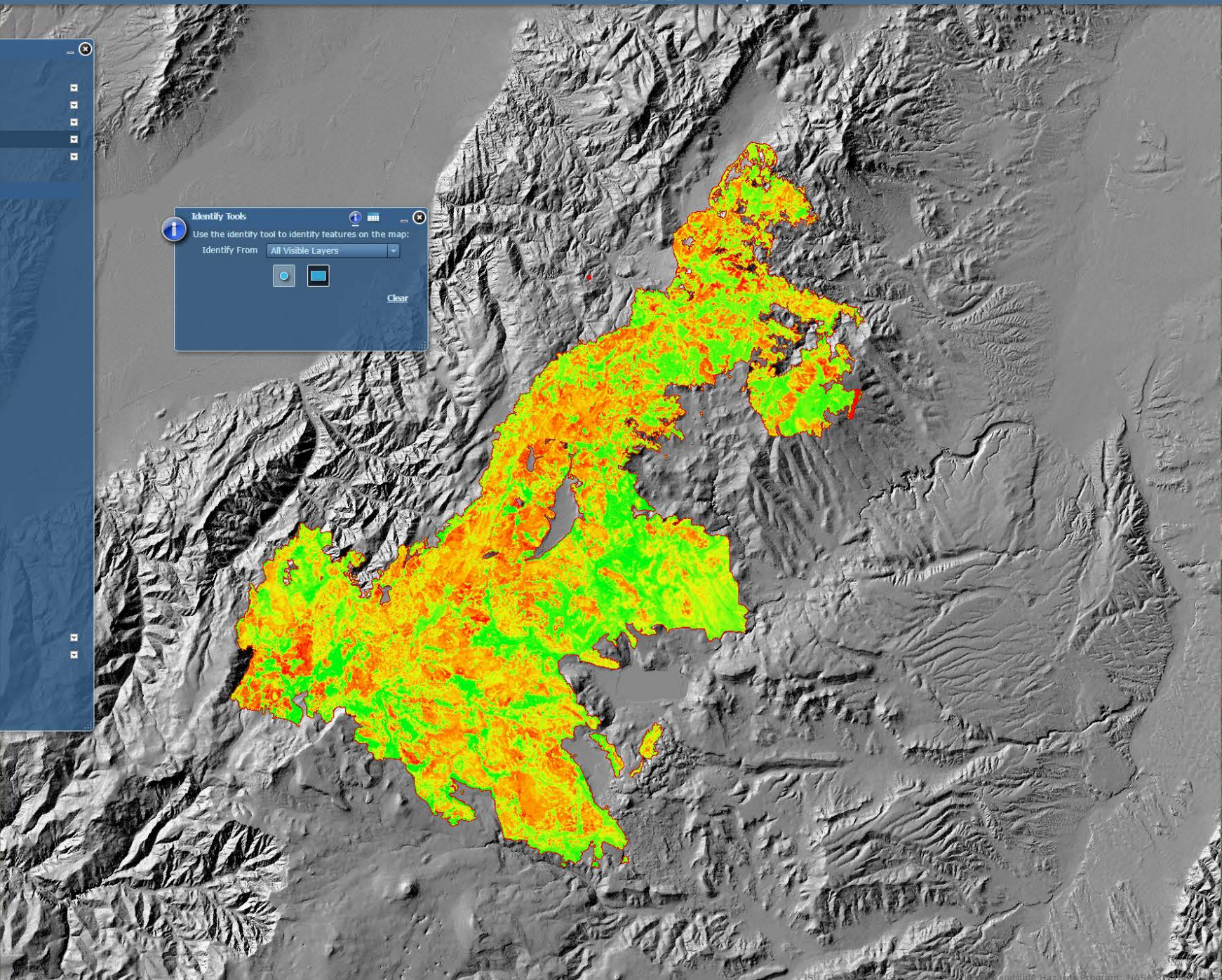
Layer Visibility

- Real Time Fire Severity
- Real Time Field Records
- Real Time Fire Line
- Fire Affected Vegetation (dNBR)
- RECOVER Baselayers
 - Fire Boundary
 - Roads
 - NHD
 - Habitat
 - Wetlands
 - PLSS
 - SMA
 - Geology
 - Watersheds WBD
 - Soils_SSURGO
 - Soils_STATSQO
 - Soils_STATSQO_Kfactor
 - Landslide Potential
 - HistoricFires
 - HistoricFires_PastDecade
 - Ecosystem Resilience and Resistance
 - FRG_FireRegimeGroup
 - BPS_BioPhysicalSetting
 - ESP_EnvironmentalSitePotential
 - EVC_ExistingVegetationCover
 - EVT_ExistingVegetationType
 - Steep_Slopes_GTE30deg
 - Elevation
 - Aspect
 - HillShade
 - Slope_degree
 - Slope_percent
 - NDVI Departure
 - Debris Flow Probability

Identify Tools

Use the identify tool to identify features on the map:

Identify From:



[Home](#) [Reports](#)

[Data Download](#)

[Disclaimer](#)

[RECOVER Website](#)

[ISU GIS TRC](#)

[NASA GSFC](#)

[Contact us!](#)



Additional data requests

- Fire-affected Vegetation (dNBR)
- Debris-flow probability (AKA mudslide or landslide)
- NDVI vegetation anomaly

Fire-affected Vegetation (dNBR)

- “Fire severity”
- Calculated using Landsat or Sentinel satellite imagery

$$\mathbf{NBR = (NIR-SWIR)/(NIR+SWIR)}$$

- Landsat 8: $\mathbf{NBR = (B5-B7)/(B5+B7)}$
- $\mathbf{dNBR = Prefire_NBR - Postfire_NBR}$

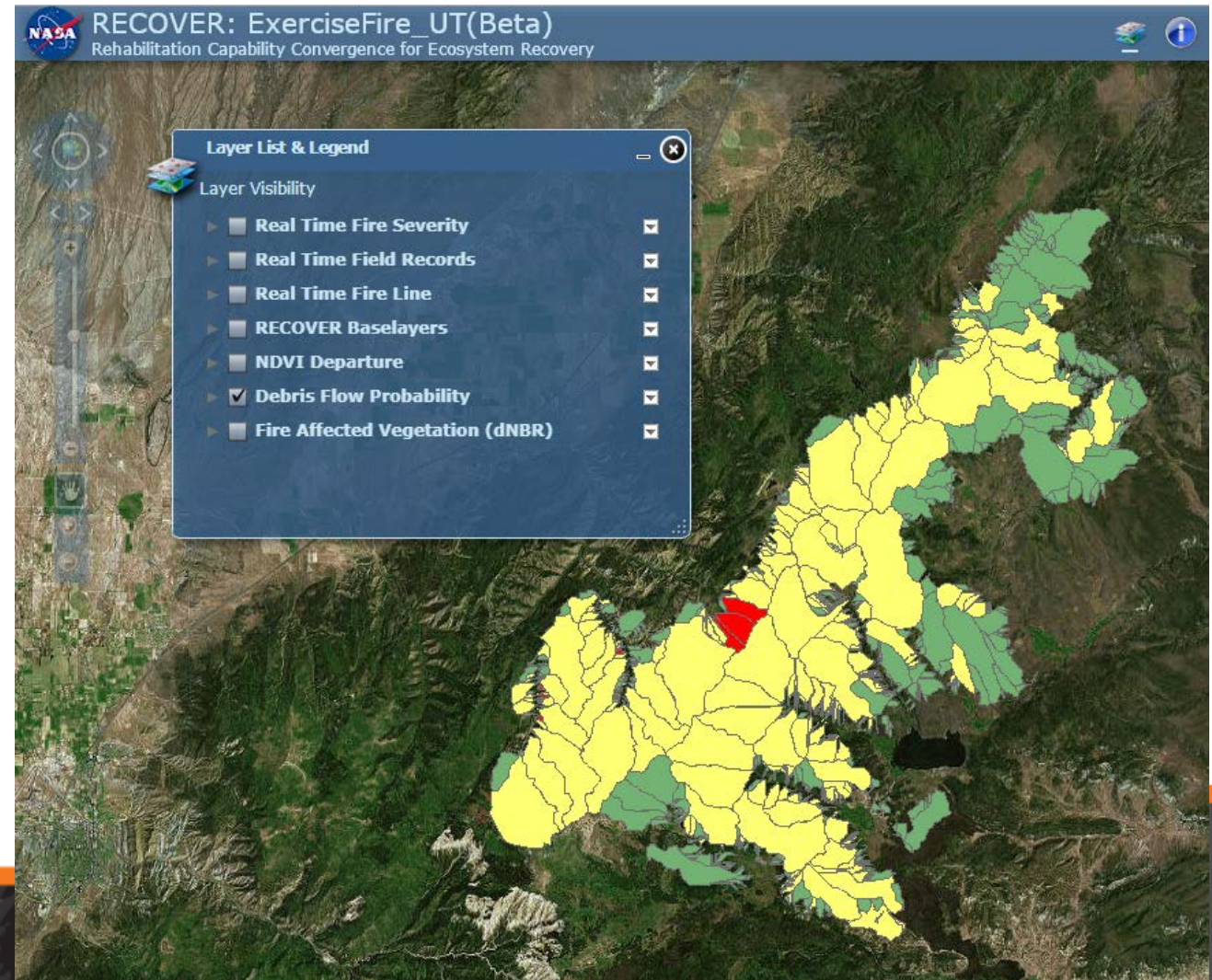
Debris-flow Probability

- Uses the dNBR data layer, calculated as a Burned Area Reflectance Classification (BARC) product

Severity Level	dNBR Range	Value
Unburned	-148 – 100	1
Low Severity	101 - 305	2
Moderate Severity	306 - 550	3
High Severity	551 - 1115	4
Increased Greenness	-LOW - -150	5

Debris-flow Probability (cont'd)

- Michigan Tech University
- USGS Landslide Hazards Program



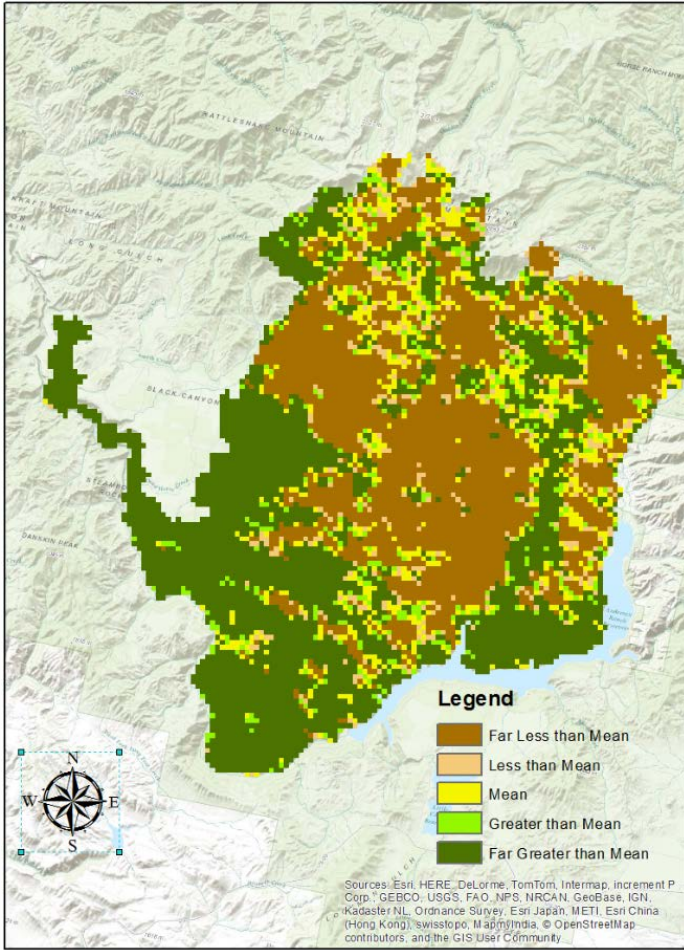
Long-term NDVI Trend

- MODIS_NDVI_Anomaly
 - Associated_Files
 - Daily_CellStatistics_V006
 - NDVI_V006

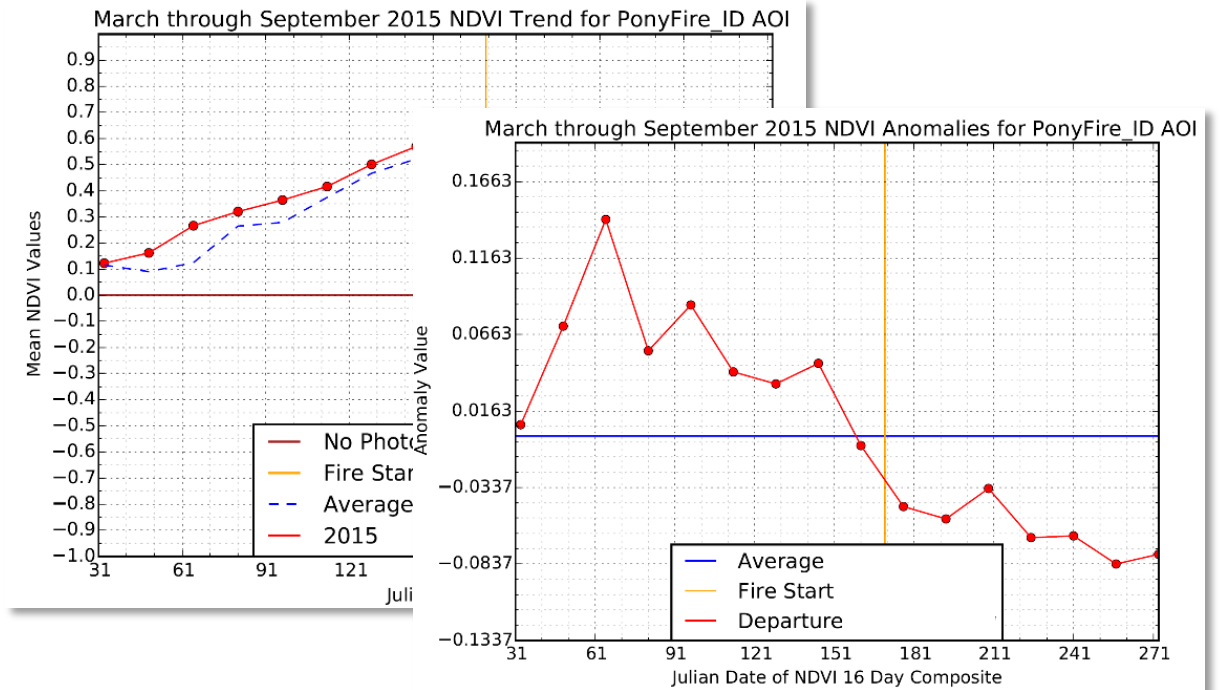
- What does it tell the manager?
- How is it calculated?
 - 16-day MODIS (satellite) NDVI-composite imagery
 - Long-term average NDVI (2001-present) dataset
 - Current fire season compared against long-term trend

NDVI Anomaly Layer

Map layer



Charts



Why RECOVER?

- GIS professional
- Users of GIS (everyone else)
- How do we connect?

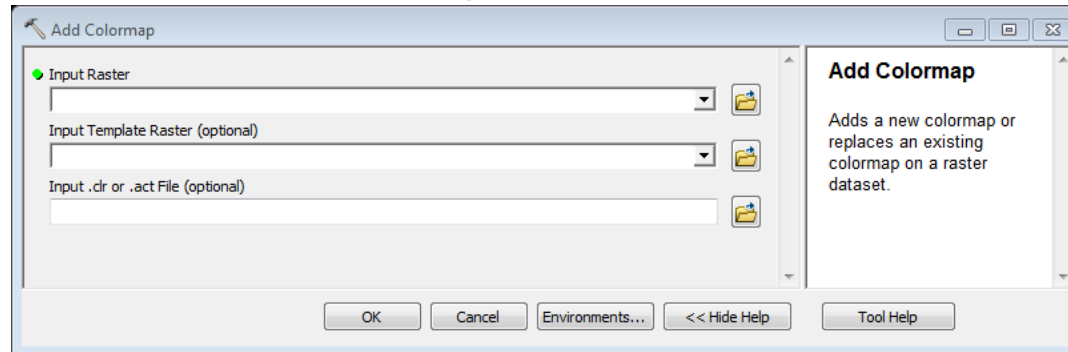


GIS Tips and Tricks

- Consider performance
- Leverage GIS as best possible
 - fGDB instead of shapefiles (relationship classes, aliases, attribute domains)
 - TIFF images and the Mosaic Dataset
 - Services (map services, image services)
 - Raster function chains

Transform Data into Actionable Information

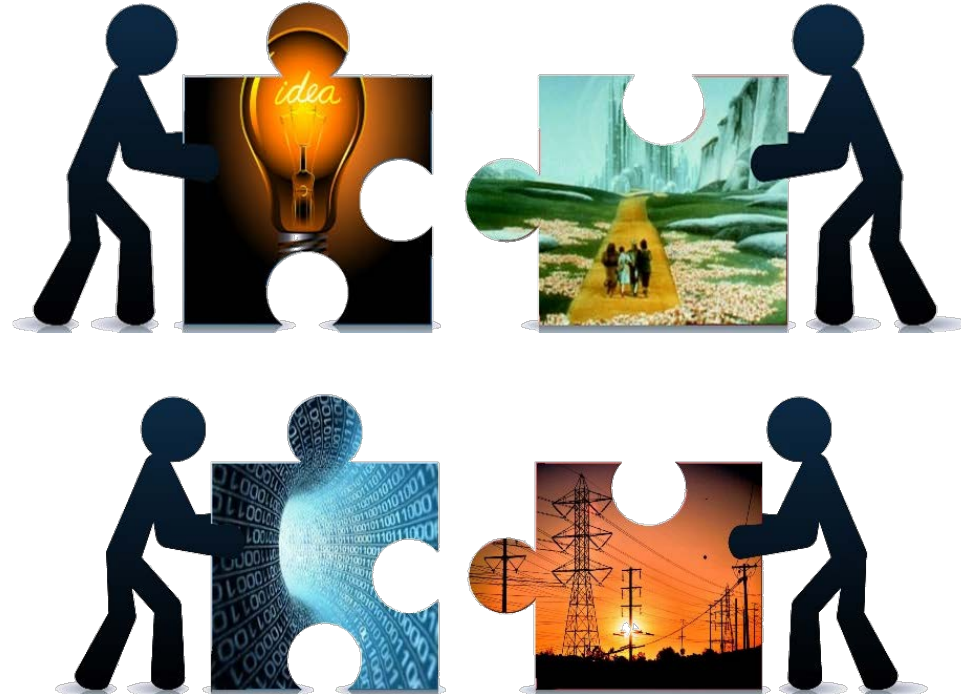
- Help your data speak to the user
 - Authoritative source data
 - Common sense Colormaps (raster)



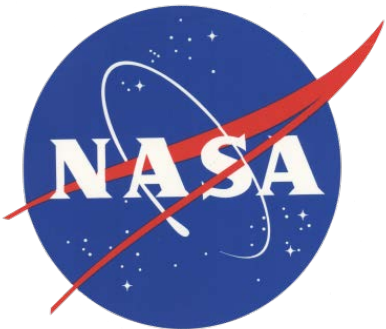
- Accepted symbology (Map service and Layer files)
- Meaningful units (m² or acres?)

Assemble a Great Team

- Idea
- Plan
- Infrastructure
- Data
- **People**



Questions?



RECOVER is a NASA Applied Sciences sponsored project. K. T. Weber (PI), J. Schnase (Co-PI) and M. Carroll (Co-PI), Goddard Space Flight Center