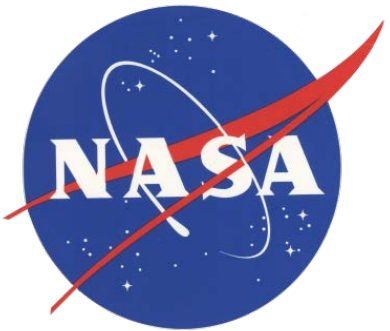# RECOVER

The NASA RECOVER DSS

Keith T. Weber[1], GISP and PI NASA RECOVER

Kindra Blair[1], John Schnase[2], Mark Carroll[2], Roger Gill[2],
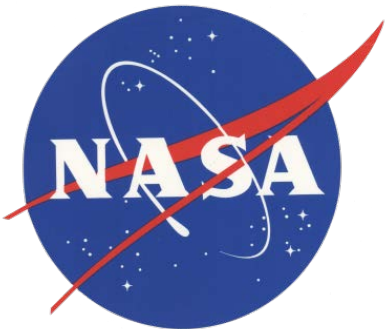
1- Idaho State University- GIS TReC
2- NASA Goddard Space Flight Center

Idaho State
UNIVERSITY

What is RECOVER?

- Customer-driven, Customer-centric*

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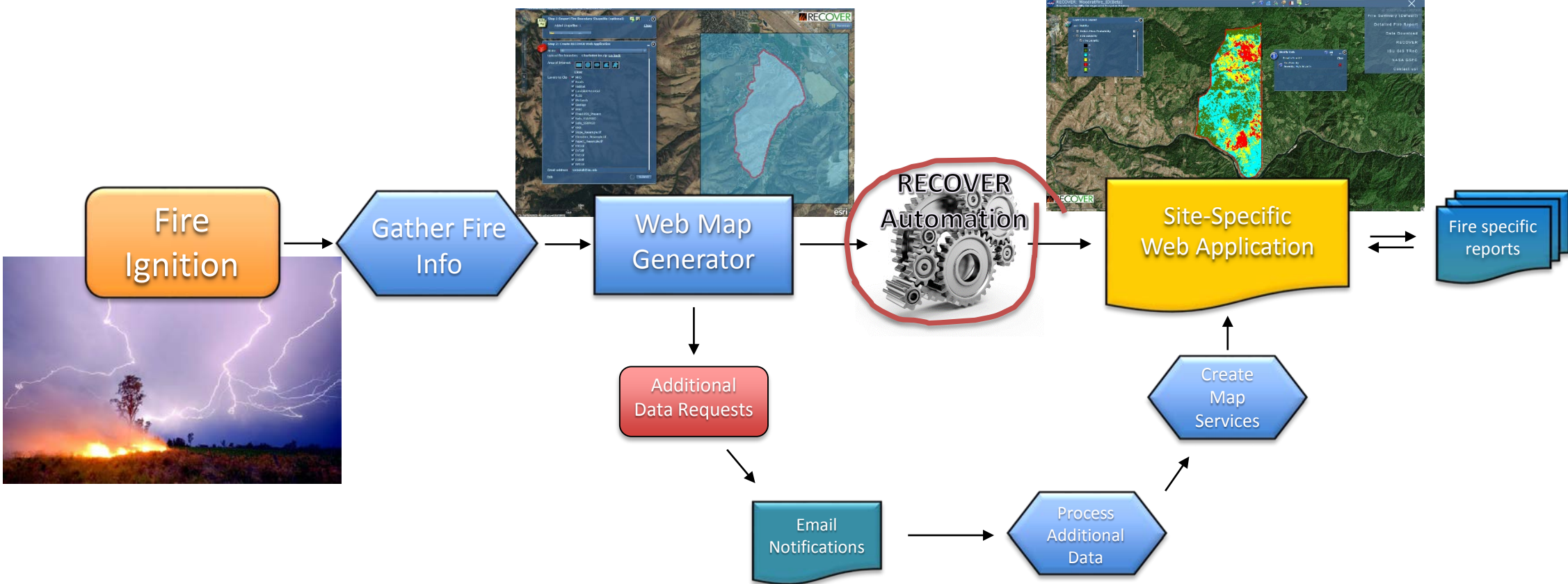 - Delivered in customized GIS analysis environment
  - Wildfire focus

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

Idaho State
UNIVERSITY

Data Architecture

- RECOVER covers the Western US

- Esri ArcGIS

- File Geodatabase
  - Vector and raster data
  - Automated Map Services (python)

Idaho State
UNIVERSITY

How Does it Work?

Fire Ignition → Gather Fire Info → Web Map Generator → RECOVER Automation → Site-Specific Web Application → Fire specific reports

Web Map Generator → Additional Data Requests → Email Notifications → Process Additional Data → Create Map Services → Site-Specific Web Application
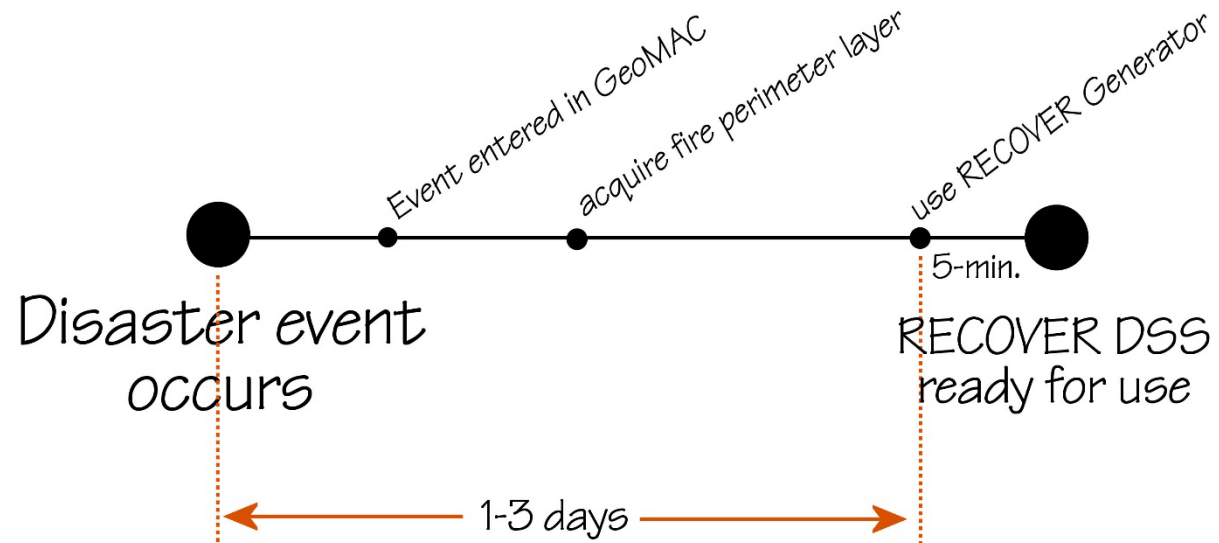
Done in 5-minutes!

- 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
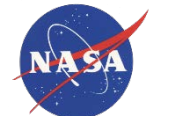 - Real-time data streams (Collector)
  - Fire-specific reports

Idaho State
UNIVERSITY

Pocatello | Idaho Falls | Meridian | Twin Falls

Fire-specific Reports

How Does it Work?

Fire Ignition → Gather Fire Info → Web Map Generator → RECOVER Automation → Site-Specific Web Application → Fire specific reports

Web Map Generator → Additional Data Requests → Email Notifications → Process Additional Data → Create Map Services → Site-Specific Web Application

Idaho State
UNIVERSITY

About RECO

HELP

RECOVE

Basem

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 you 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   Upload file   or   By URL

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

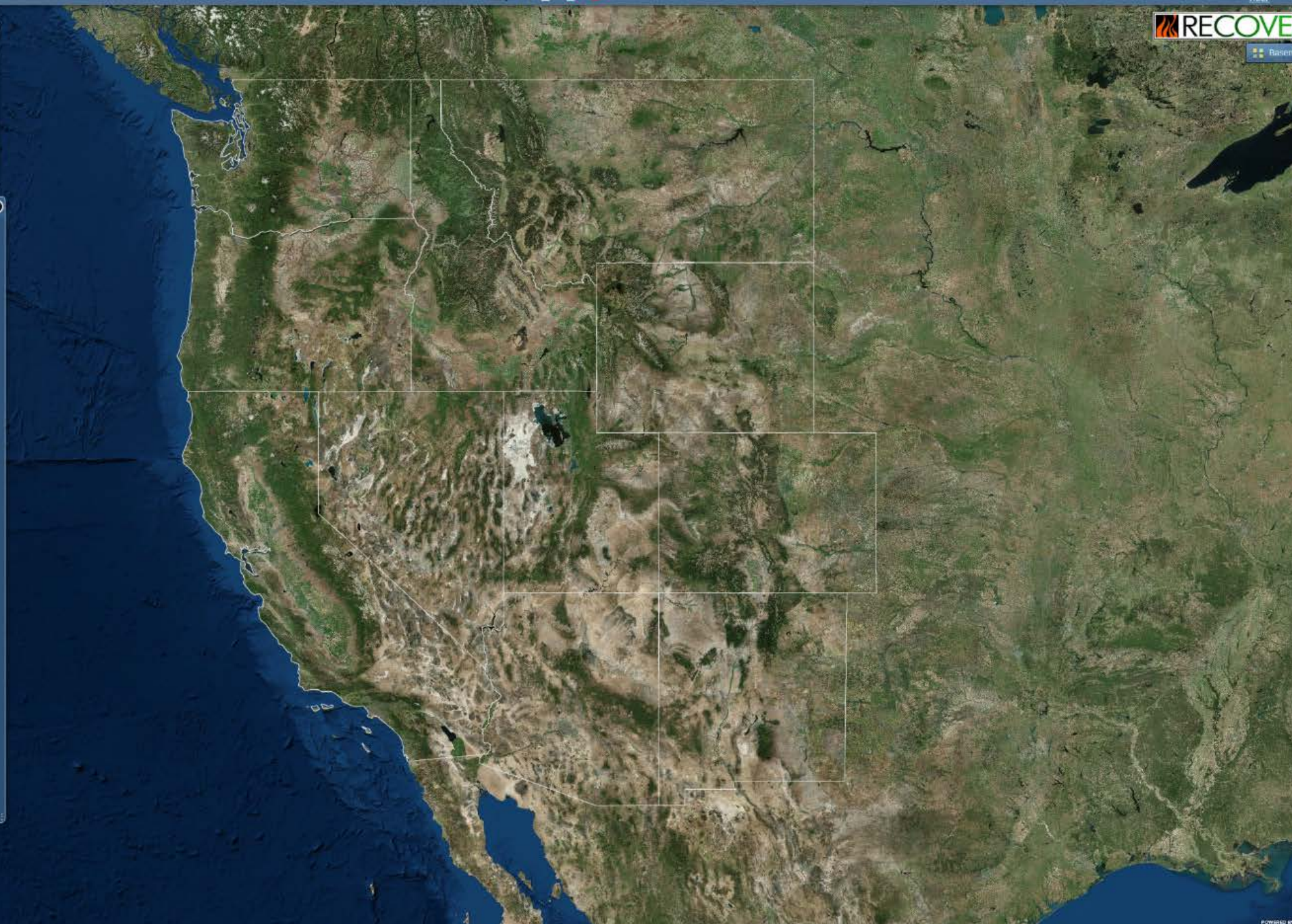Email address

Request dNBR Fire Affected Vegetation ☐

Request Debris Flow ☐

Request pre-fire vegetation monitoring ☐

Help   Submit

500 km

500 mi

Latitude: 42.474321 Longitude: 125.504333

esri

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_STATSGO
  - ▸ ☐ Soils_STATSGO_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   All Visible Layers ▾
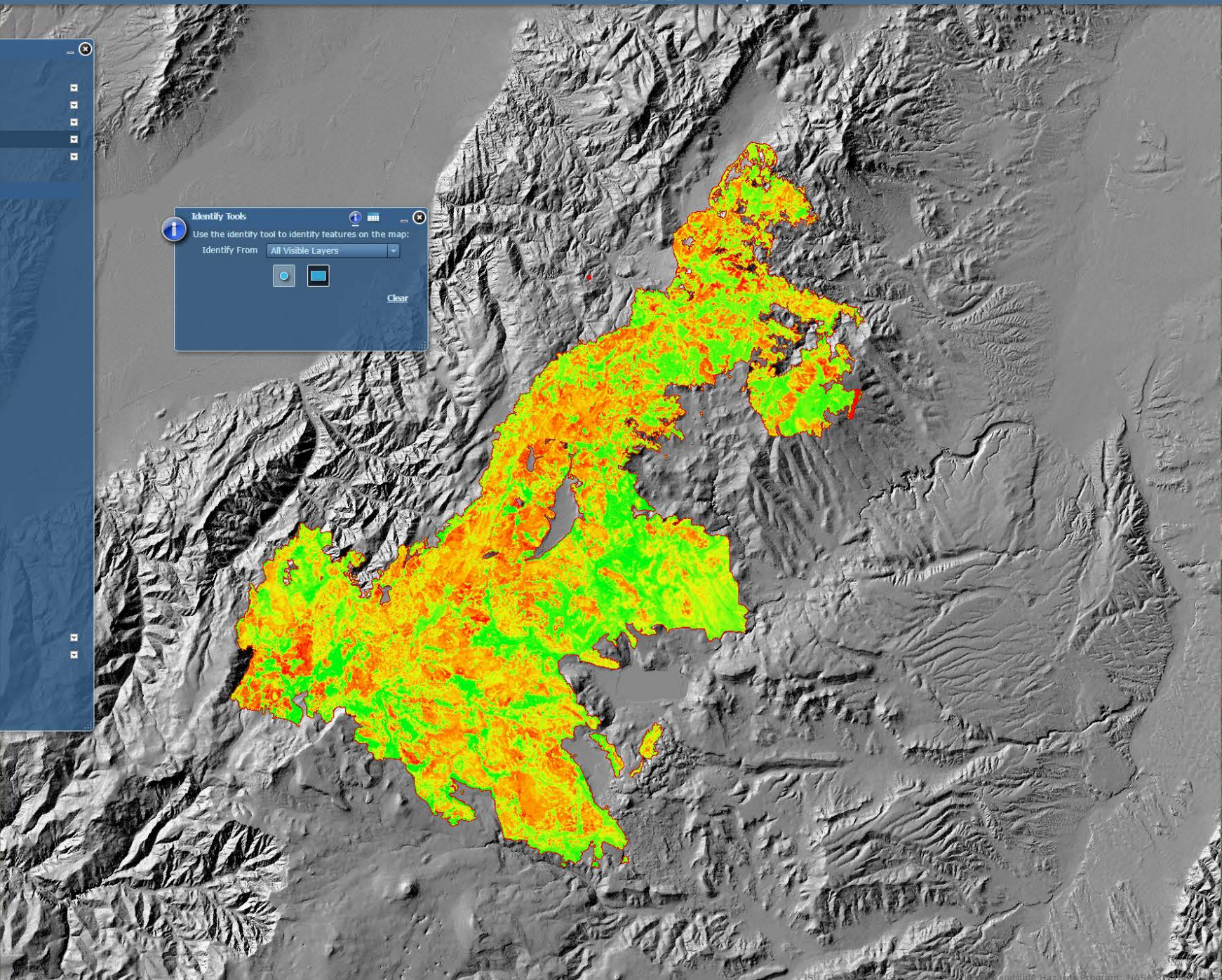
Clear

RECOVER

10 km

Additional data requests

- Fire-affected Vegetation (dNBR)

- Debris-flow probability (AKA mudslide or landslide)

- NDVI vegetation anomaly

Idaho State
UNIVERSITY

Fire-affected Vegetation (dNBR)

- "Fire severity"
- Calculated using Landsat or Sentinel satellite imagery

$$NBR = (NIR-SWIR)/(NIR+SWIR)$$

- Landsat 8: $NBR = (B5-B7)/(B5+B7)$

- $dNBR = Prefire\_NBR - Postfire\_NBR$

Idaho State
UNIVERSITY

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
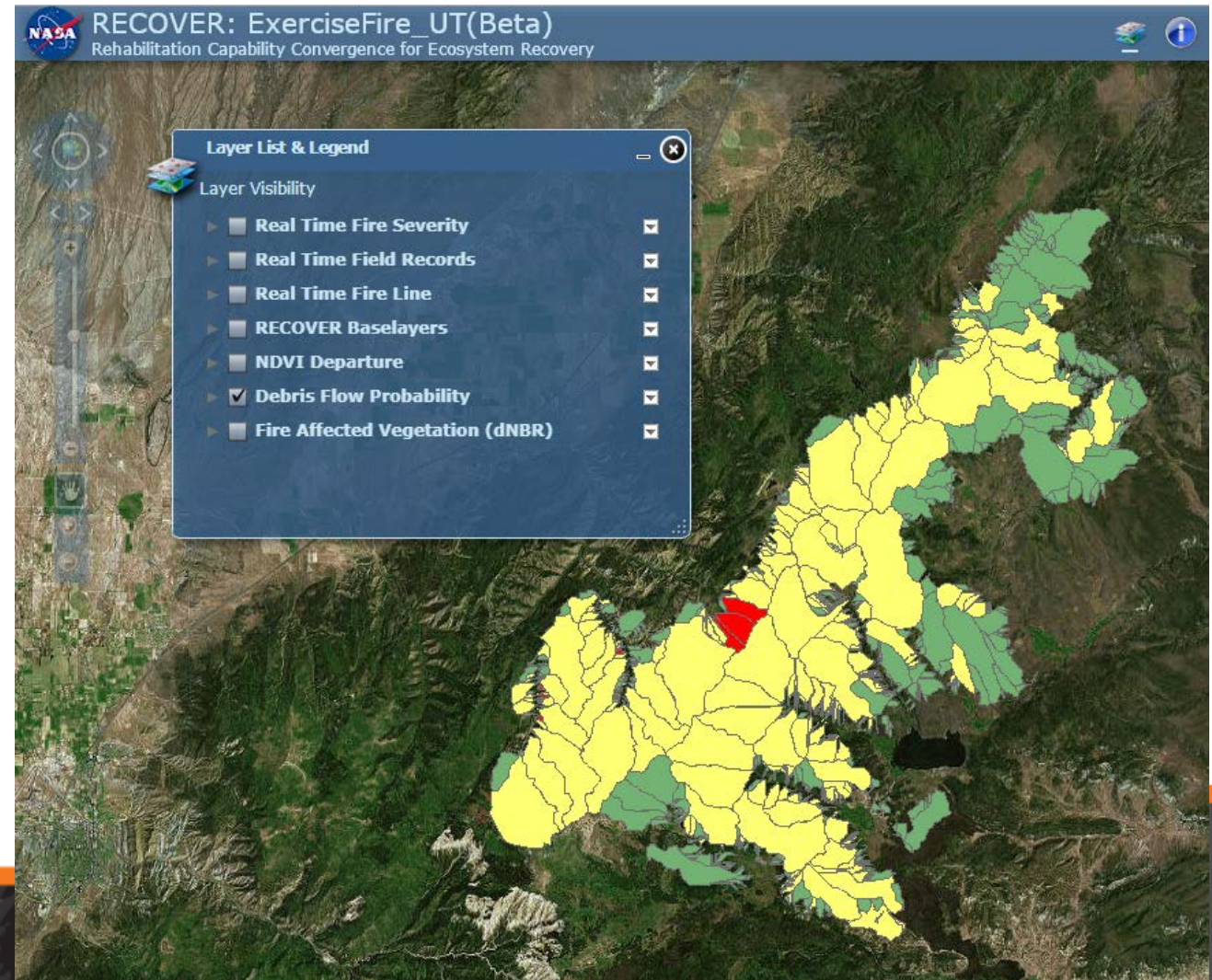
Long-term NDVI Trend

MODIS_NDVI_Anomaly
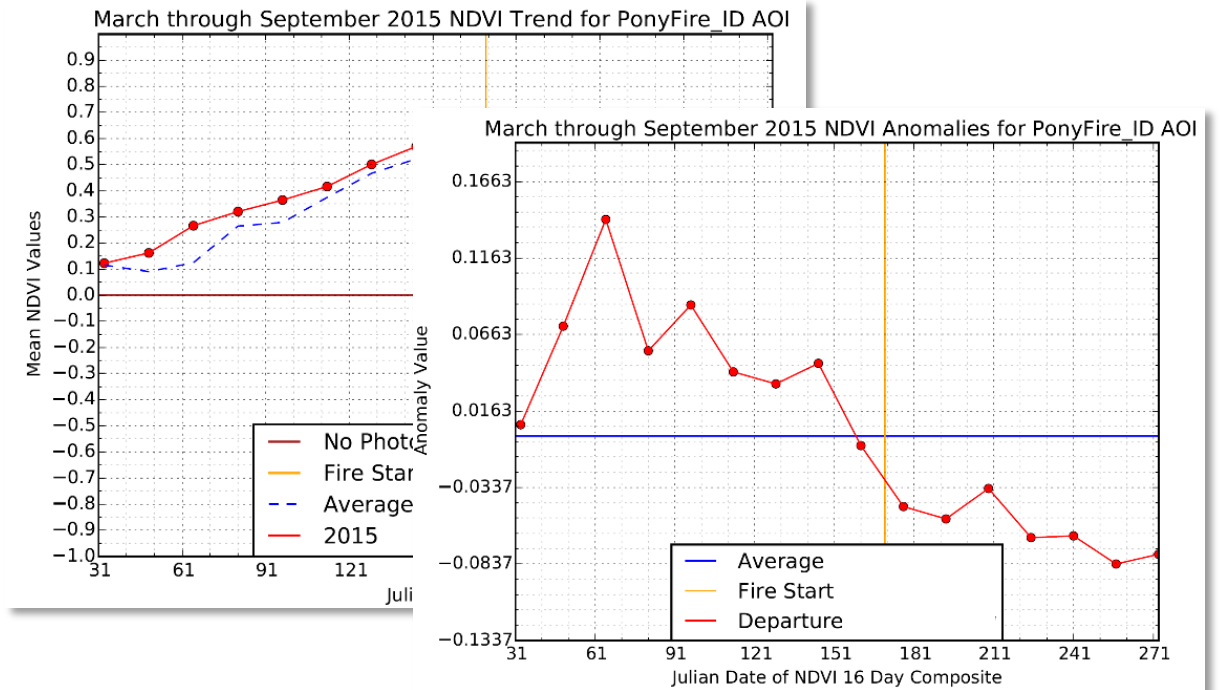- Associated_Files
- Daily_CellStatistics_V006
- NDVI_V006

- 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

Idaho State
UNIVERSITY

NDVI Anomaly Layer

Map layer
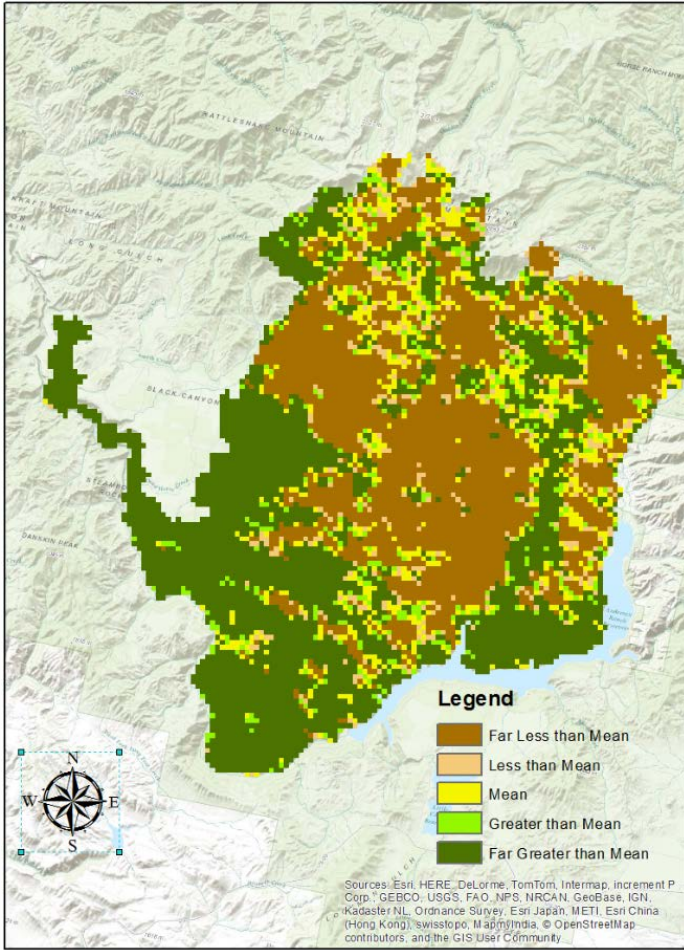
Charts

Why RECOVER?

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

Idaho State
UNIVERSITY

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

Idaho State
UNIVERSITY

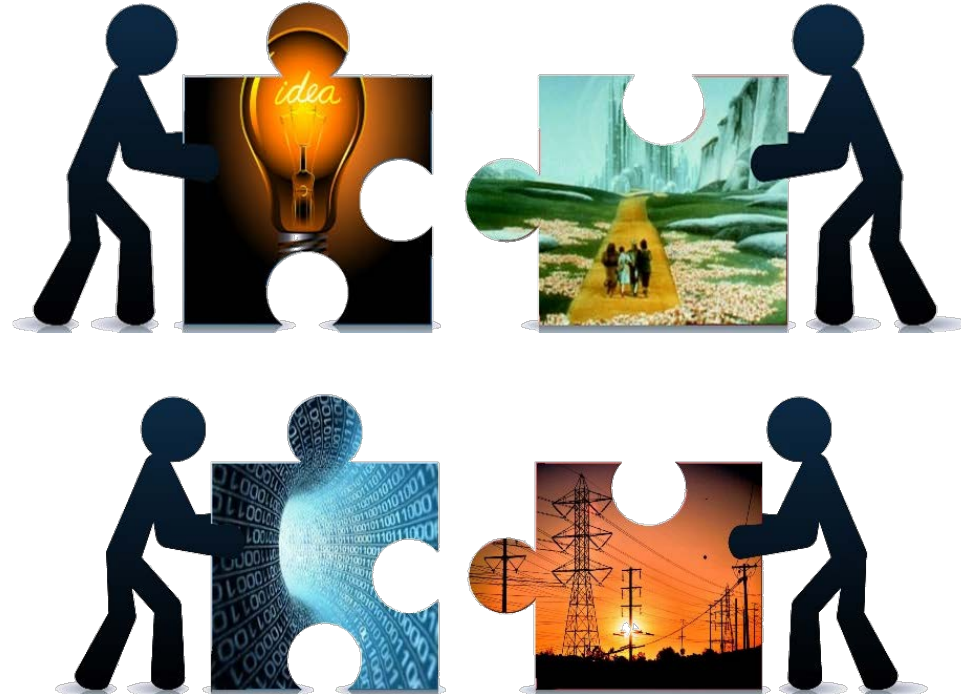# Transform Data into Actionable Information

- Help your data speak to the user
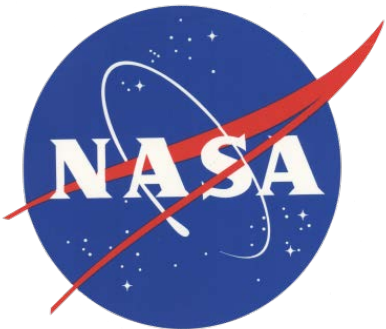   - Authoritative source data
    - Common sense Colormaps (raster)
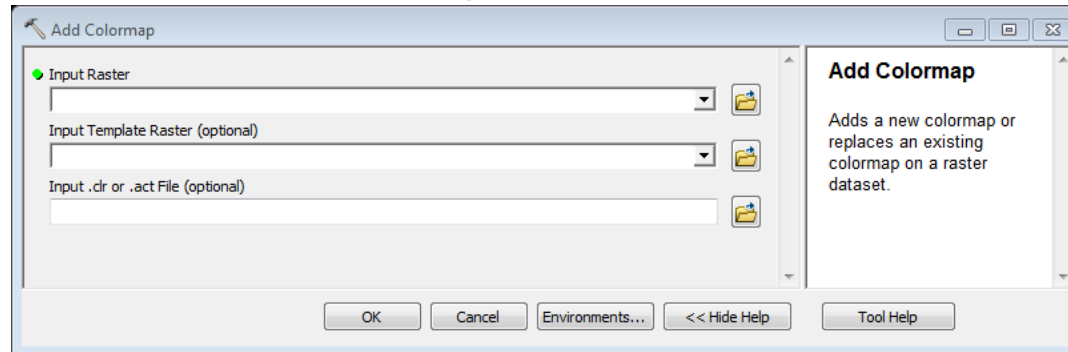
    - Accepted symbology (Map service and Layer files)
    - Meaningful units (m^2 or acres?)

Idaho State UNIVERSITY

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

Idaho State
UNIVERSITY