Project Title and Brief Abstract

- Project Title: **RECOVER 2.0: Cloud-Enabled Post-Wildfire Decision Support System (DSS) (80NSSC22K1815)**

- Project PI: Keith Weber, Idaho State University (ISU) GIS TReC

- Co-PI: Brad Quayle, USDA Forest Service, GTAC

- Team: ISU GIS TReC and US Forest Service GTAC

- Stakeholders and Partners: USDA Forest Service, USDOI Bureau of Land Management (BLM), USDOI National Park Service (NPS), the Natural Resource Conservation Service (NRCS), NOAA National Weather Service (NWS), United States Geologic Survey (USGS), and the US Army Corps of Engineers (USACE)

- Project Summary: Providing actionable information to fire managers to promote well-informed decisions during the development of post-wildfire rehabilitation plans and monitoring needs

- Earth Observations applied: Landsat 5, 8, and 9; Sentinel 2; SRTM and Airborne Lidar

# RECOVER 2.0: Cloud-Enabled Wildfire Decision Support System (80NSSC22K1815)

Background: Wildfire frequency and area burned continues to increase relative to past decades. The limited number of fire managers at federal and state land management agencies need to develop post-fire recovery plans under increasingly limited budgets. The RECOVER decision support system provides the fire manager with conveniently accessible, fire-specific actionable information to help them develop well-informed decisions regarding landslide/debris flow risk, erosion, reseeding, and long-term monitoring.

Methods: Using 28 authoritative spatial data layers and RECOVER's **Large Fire Trigger** (LFT) automated processing, data packages are created for wildfires burning across the western US. These ready-to-use download bundles are further enhanced by an interactive dashboard and 3D map viewer.

Results:
- RECOVER was used on over 180 wildfires in 2023.
- Long-term monitoring capability was developed from RECOVER's new **NDVI Baseline Data Cube**.
- An **automated Executive Summary** became part of RECOVER in the fall of 2023

Significance: Spatial data is critical to making well-informed decisions. RECOVER provides these data in a ready-to-use format along with **actionable information** to support the fire manager.
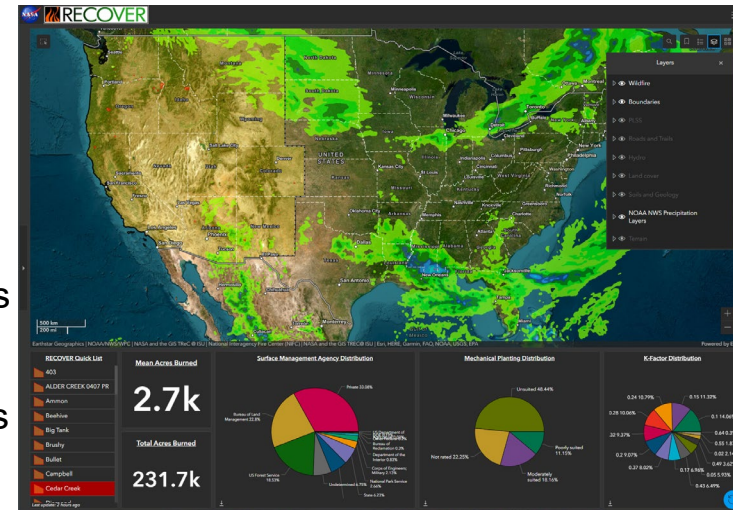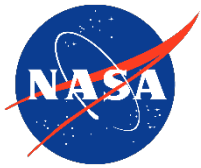
Value to Stakeholders, End Users, and Partners

RECOVER provides

- A post-wildfire DSS available to everyone

- A platform to integrate and access authoritative (FS and DOI) post-fire mapping and assessment data

The RECOVER Team

- Offers workshops, webinars, and presentations delivered (n = 765 attendees)

- Engages with our end users through the RECOVER listserv and monthly newsletters

- Co-developed (with USACE) an improved SSURGO soils layer to provide Hydrologic soil group information

- Developed a population impacted metric using US Census Block data. This is now part of the LFT and Executive Summary

Transition to GTAC is underway

Wonderful! The speed at which you showcased your teamwork is truly impressive…I'll be sharing the enhanced NASA RECOVER site with the USACE Honolulu District. I'm confident that this update will prove immensely valuable in our efforts to meticulously prepare the post-wildfire Hydrology and Debris flow model.

-USACE

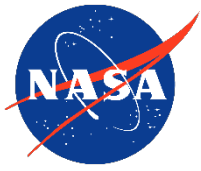## South Fire (2023_CAVNC_105733) Summary

Report Introduction

This summary report was developed using spatial data layers found in the RECOVER Data Package for this particular fire. The intent of the report is to provide a quick overview of the fire's effects and impacts on the landscape. This includes population, soils, topographic summaries and other relevant information. The user is encouraged to further explore the data layers provided by the NASA RECOVER post-wildfire decision support system to facilitate a well-informed wildfire rehabilitation plan. To assist you in these efforts, please visit the RECOVER project webpage (https://giscenter.isu.edu/research/Techpg/nasa_RECOVER2/), which provides additional tools, technologies, and capabilities. For additional details regarding all the spatial data used by RECOVER, please visit the following metadata link https://giscenter.isu.edu/pdf/PDF_NASA_RECOVER2/Metadata.pdf .

Population Summary

These estimates are based on 2020 Census data.

2020 Census block population data estimates this fire impacted 667,359 people living within the fire impacted area. The fire impacted area, 414,659 acres, is defined by the boundaries of all HUC12 watersheds intersecting the fire boundary. Population data existed for 79 % of the impacted area.

RECOVER 2.0: Cloud-Enabled Wildfire Decision Support System
PI: Keith Weber, ISU GIS TReC (webekeit@isu.edu, 208.282.2757)

Wildland Fire Program
ACTIVE PROJECT
Date (March 01, 2024)

Approach

We updated and revised the RECOVER 1.0 LFT script, updated all base layer spatial data, and moved the platform into the cloud, employing a Dashboard and web maps. We also re-engaged with past users of RECOVER (*n* = 340 individuals)

Figure: The RECOVER Web page with links to the dashboard, experience builder, and bulk download server

Key Milestones

Milestone Statement	Date
RECOVER Dashboard and Experience Builder Complete	03/2023
Large Fire Trigger (LFT) fully automated and operational	04/2023
NDVI Baseline created and ready for use	09/2023
Long-term monitor toolbox complete	05/2024
Community fire submissions web app complete	09/2024

ARL$_{Start}$ = 7   ARL$_{Most\ Recent}$ = 8   ARL$_{Goal}$ = 9

Overall Assessment: Impact

Honest Opinion

Since post-fire rehabilitation plans (e.g., BAER plans) need to be completed within a fairly short time period, having high quality spatial data necessary to correctly assess the impact of a wildfire is tremendously important.

RECOVER provides single point viewing and download access to relevant post-fire geospatial data. Negates the need to find and/or visit website sources for various data. Informs users about data that may be new or undiscovered (i.e., NDVI data, modelled outputs from agency cooperators, etc.) and makes them discoverable and conveniently accessible.

The NASA RECOVER DSS provides these data as actionable information. This DSS operates as planned and it does so very quickly.

Project's Impact/Potential as an Analogy

I will follow the baseball analogy….

Bases loaded, bottom of the ninth. The Post-fire team is down by three. RECOVER is up to bat…

It's a hit…

this is a long one folks…

It's going…

Is it going to make it over the fence?

It will be a grand slam home run IF we can successfully complete the hand-off transition to GTAC

PI Overall Assessment: Current Status

Summary of Challenges; Problems; Objective Analysis

A primary challenge at ISU has been recruiting and retaining the staff needed to complete all the tasks for RECOVER

Filling vacant positions and re-training new staff to bring them up to speed is a challenge

Available GTAC bandwidth to provide desired support is a challenge with competing ongoing activities. Progress is being made!

Signs of Positive Progress

We currently have talented staff

We have made it over most hurdles and perhaps staffing worries are behind us at ISU

The transition to GTAC has started and a promising workflow has been developed

A Billion Pixels Can't Be Wrong
(Well, actually its 1.1 billion pixels)

Contains all Landsat Imagery for the western US from 2013-2022.
Nearly 19,000 NDVI scenes
Stored as a Multidimensional Mosaic Dataset and served as an Image Service
Accessible as a web app for point analysis
OR from desktop workstations for more in-depth analysis

Learn about long-term NDVI
Mean, Median, SD, Min, Max, and
95% CI lower/upper bounds

Use these metrics to *Assess*
recovery of the wildfire area over time

RECOVER NDVI Baseline

NDVI Baseline Statistics

You clicked the map at 43.012, -111.649.

NDVI Baseline Statistics	
Mean	1394
Median	1670
Maximum	3439
Standard Deviation	1027.36
95% Confidence Interval Upper Bound	3407.63
95% Confidence Interval Lower Bound	-619.63
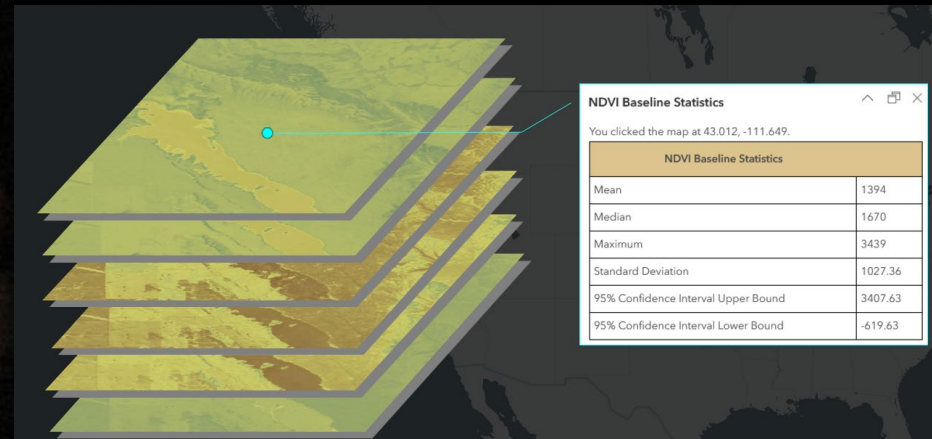
Meet the RECOVER Team

- Keith Weber (PI, GIS TReC)

- Brad Quayle (Co-PI, GTAC

- Craig Baker (GTAC)

- Michael Bogle (GTAC)

- Kyleigh Kowalski (GIS TReC)

- Mark Nigrelli (GTAC)

- Samuel Prentice (GTAC)

- Ali Reiner (GTAC)

- Di Wu (GIS TReC)

Visit the RECOVER web page
https://giscenter.isu.edu/research/Techpg/nasa_RECOVER2/

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