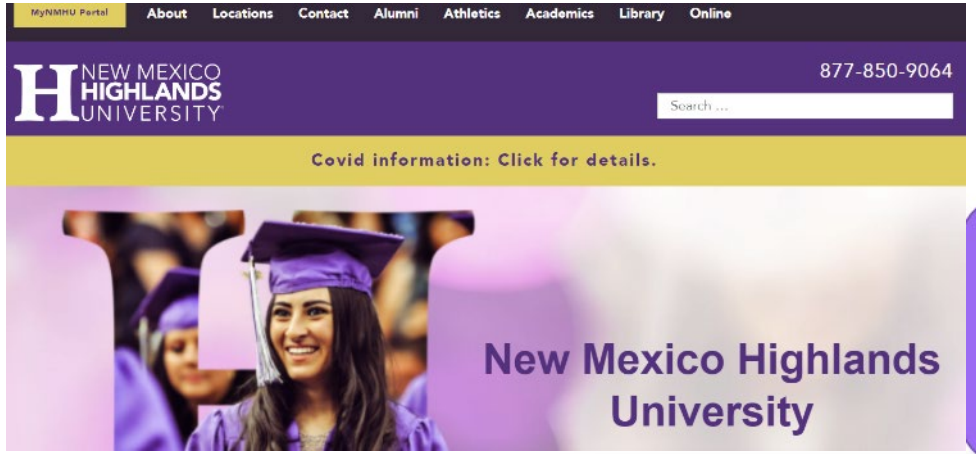
Peer Learning Session: When Fire and Floods Hit the Ranch: Sharing Knowledge and Learning with Students

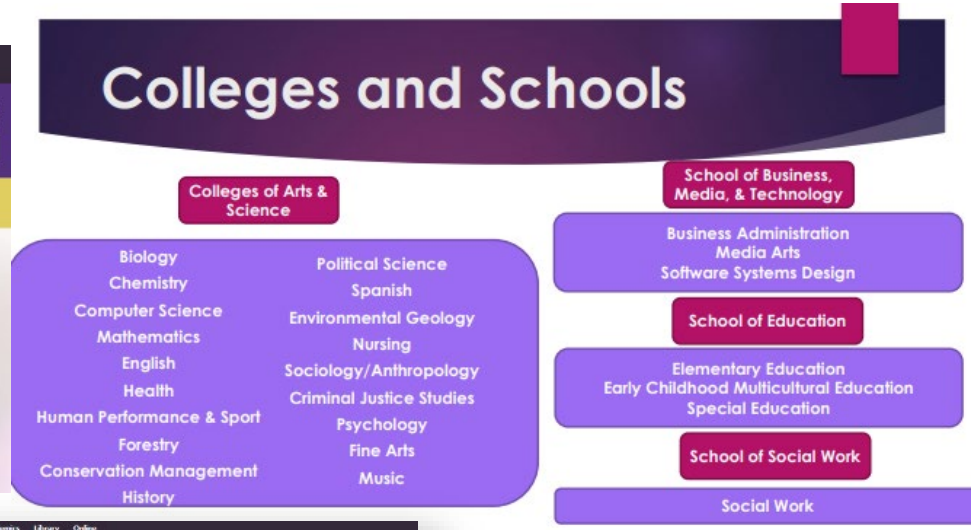
Case Study Goal

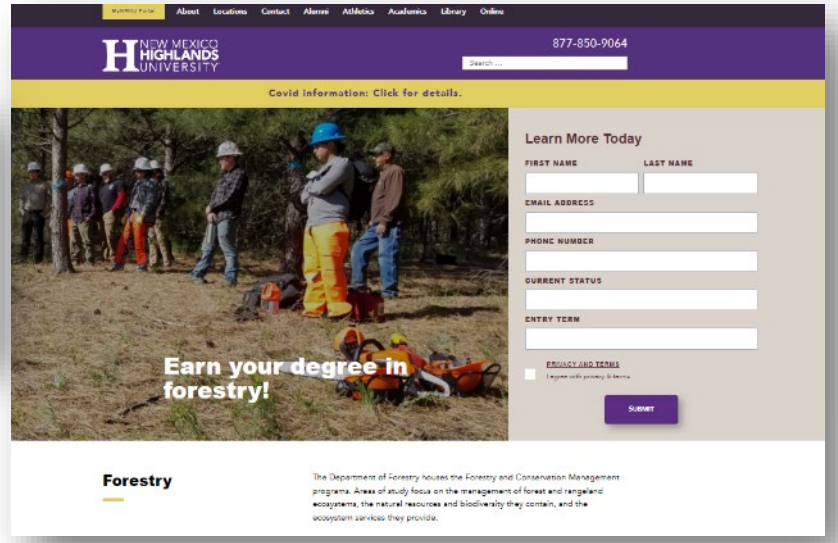
New Mexico Highlands University (NMHU) Involvement

- **CREST**, Subproject 3 NMHU Forestry Department
- Integration of technology and field data collection
- Partnership with the Collins Lake Ranch
- Improvement of land and mitigate fire damage

Getting to Know NMHU's Forestry Department







https://www.nmhu.edu/department-of-forestry-2/

NMHU Forestry Today

- The Department of Forestry offers three degrees:
  - B.S. in Forestry
  - B.A. in Conservation Management
  - M.S. in Natural Sciences with a concentration in Environmental Science and Management
- Typically 60-70 students in the Department, most from NM

❖Mission of the Department of Forestry

is to engage in teaching, research, and service in forestry to promote the sustainable management of forest resources.

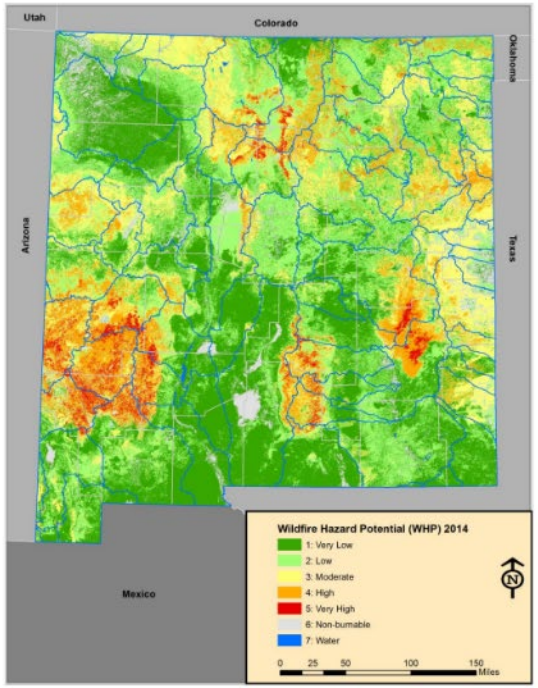


Figure 5 – The 2014 Wildfire Hazard Potential for New Mexico Fire Modeling Institute, USDA Forest Service, Rocky Mountain.

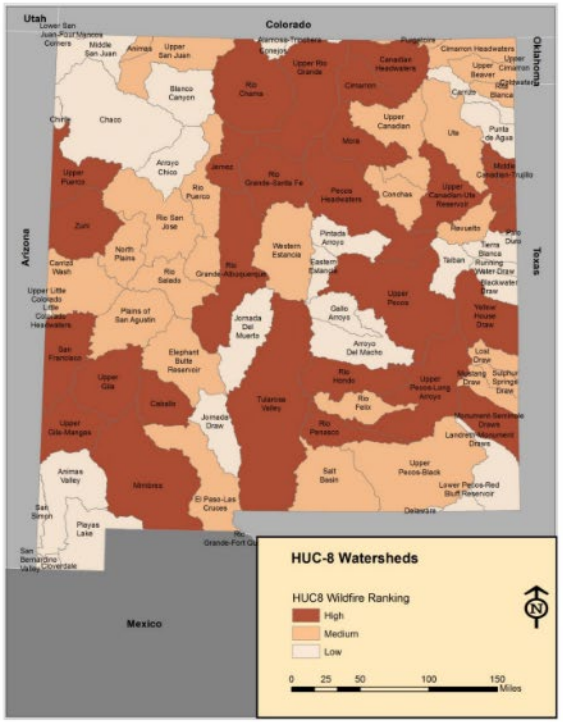
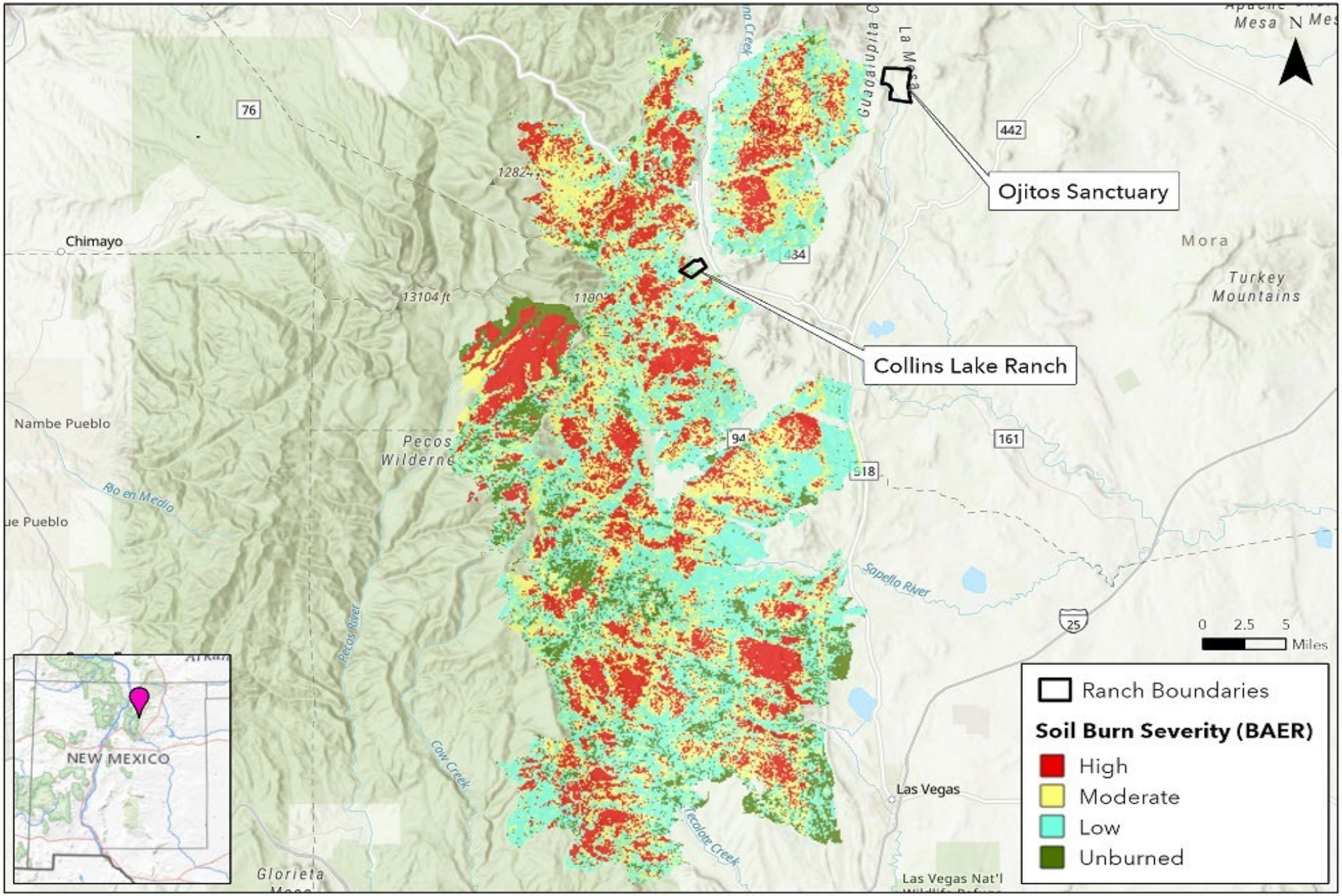


Figure 6 – HUC -8 Watersheds Ranked by Wildfire Risk.

https://nmflood.org/wp-content/uploads/2015/10/Multihazard-risk-portfolio-Flood-Fire-Final.pdf

Collins Lake Ranch, Mora New Mexico

Calf Canyon/Hermit's Peak Fire Soil Burn Severity



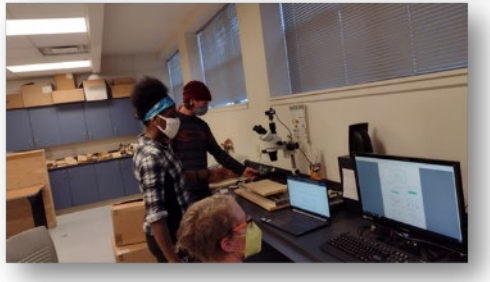
Community Gathering at Main Center

Equine Therapy

Campground

Outdoor classes during COVID

NMHU Classes



2017 NMHU Forestry Capstone Project

Students from three classes incorporated projects at CLR

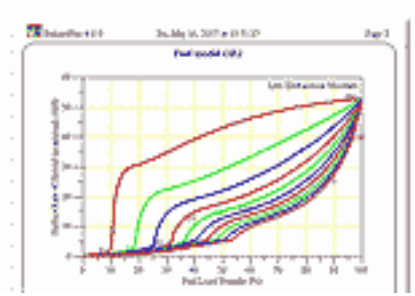
Wildlife Habitat Management –habitat analyses and use by certain wildlife species

- **Range Science and Management** – developed grazing systems for pasture land and stocking rates
- **Wildfire Fuels & Modeling** – performed pre- and post-treatment fire simulations and developed treatment prescriptions

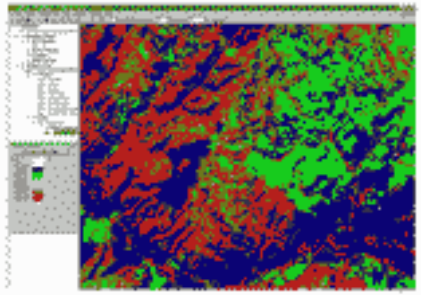
Students from Fire Behavior Modelling class performed a fuels and fire analysis for a second private ranch:

- **Fuels and Fire Analysis** – performed pre- and post-treatment fire simulations and developed treatment prescriptions
- **Fuels Data Source Analysis** – compared several sources of fuels data to determine levels of accuracy for key fuels variables

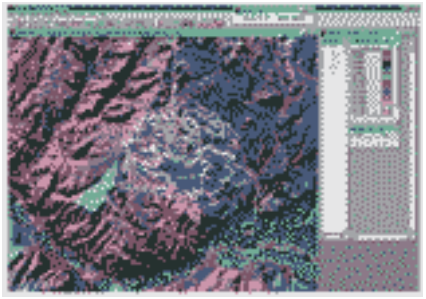
Used 3 Standard Fire Behavior Models



- BehavePlus fire modeling system



- FlamMap fire behavior mapping and analysis system

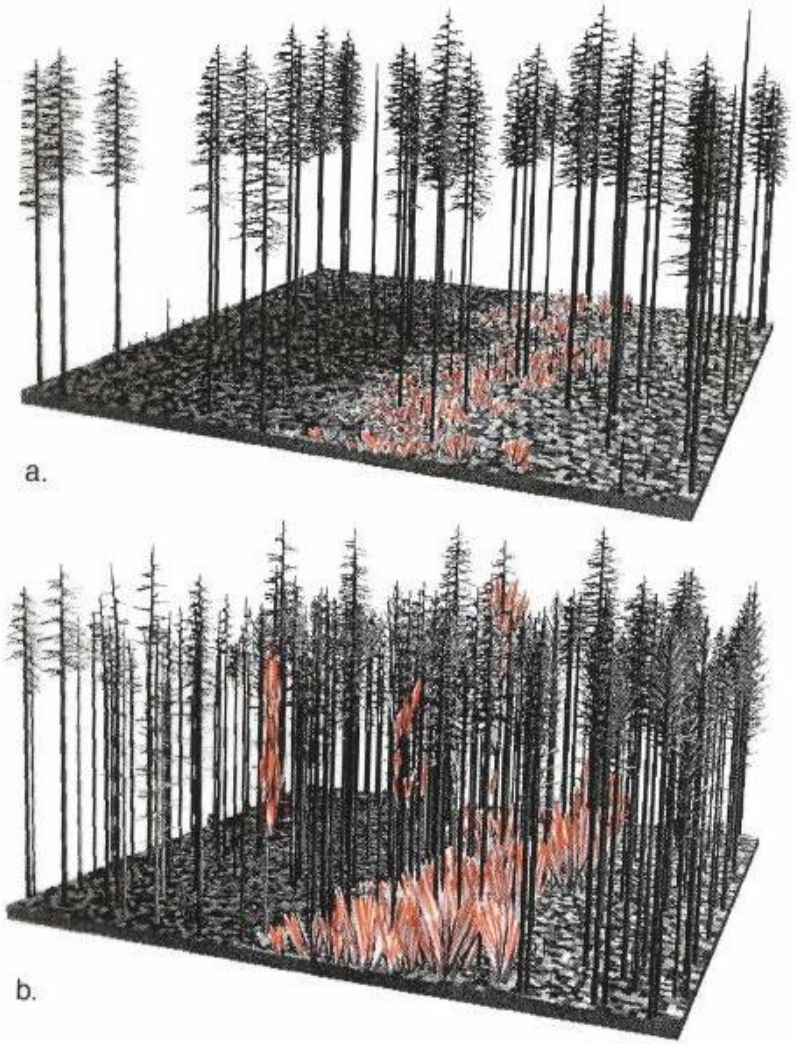


- FARSITE fire area simulator

In addition to these models, we used the Forest Vegetation Simulator to model fire behavior related to different treatment scenarios

Source: www.firemodels.org

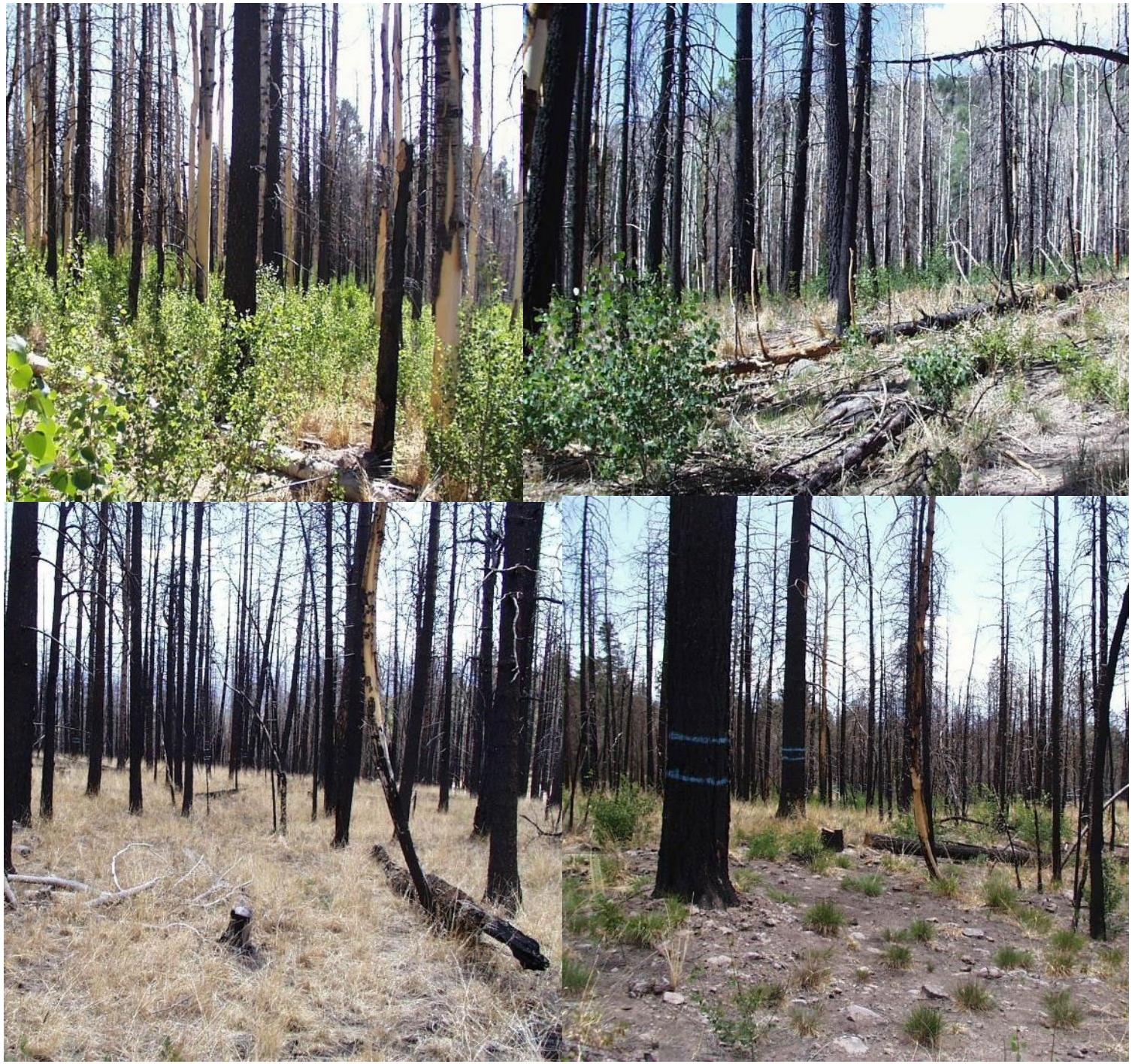
Computer Simulation of Fire Behavior in (a) Thinned and (b) Un-thinned Ponderosa Pine Stands



Forest Treatment Analysis

Forest Vegetation Simulator (FVS) – Fire and Fuels Effects (FFE)

- Used for predicting forest stand dynamics
- Summarizes current stand conditions and predicts future stand conditions under various management scenarios
- Allows for future treatment scenarios related to fire behavior



Understanding Vegetation Change Allows For Modelling:

- Changes in fuel model classification and fire behavior
- Future treatment scenarios related to fire
- Changes in wildlife habitat and domestic livestock grazing potential
- Trends in forest and range condition

Typical Forest Before Thinning

Outcome of 2017 Forestry Class Capstone Recommendations

Area around campground after thinning

FIRE

Matthew.kowal - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=122401687

https://data.democratandchronicle.com/fires/incident/8049/hermits-peak-fire/

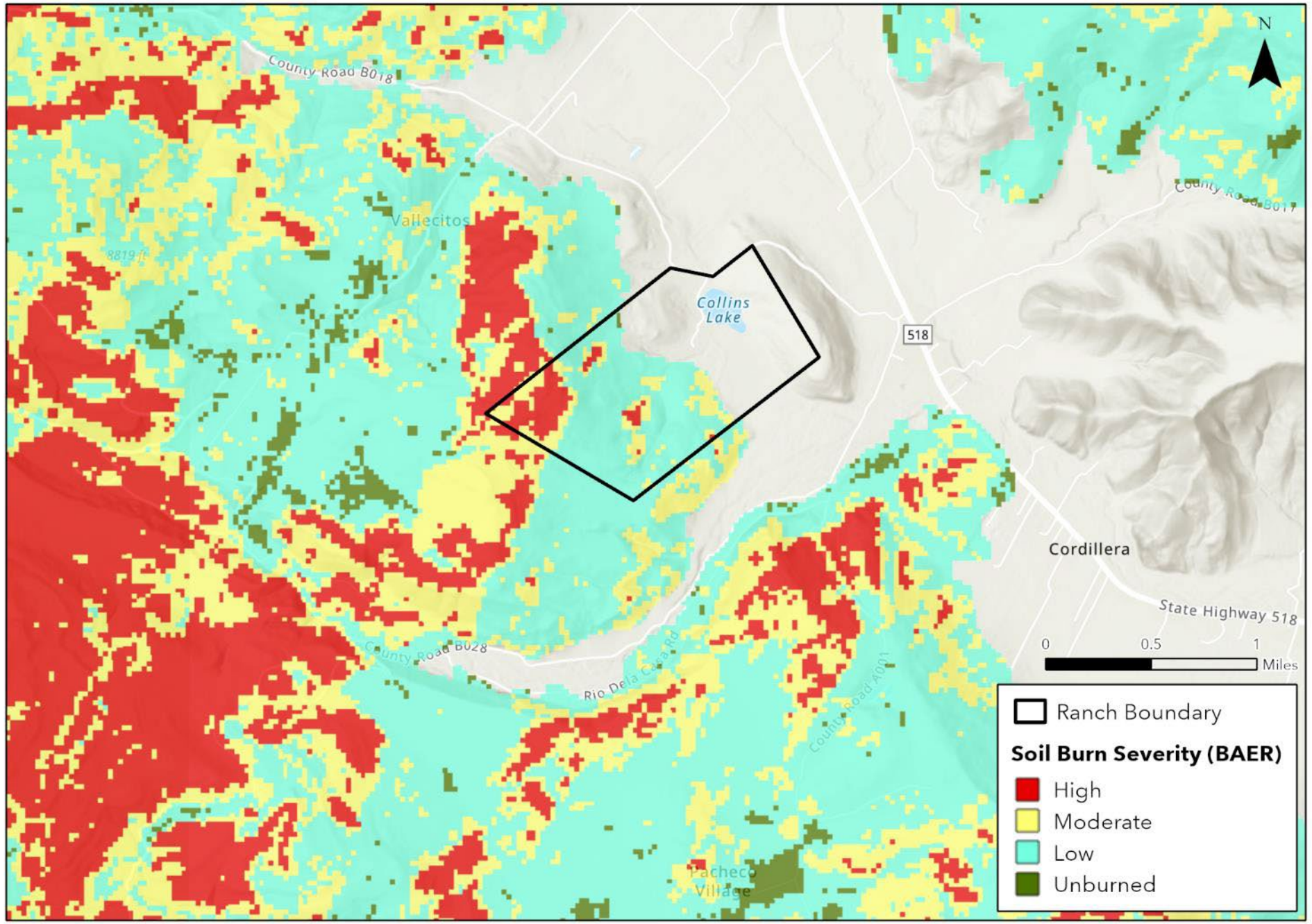
Photo by Jim Weber/Santa Fe New Mexican

FIRE

Fire near Ranch

Fire Behind Lake

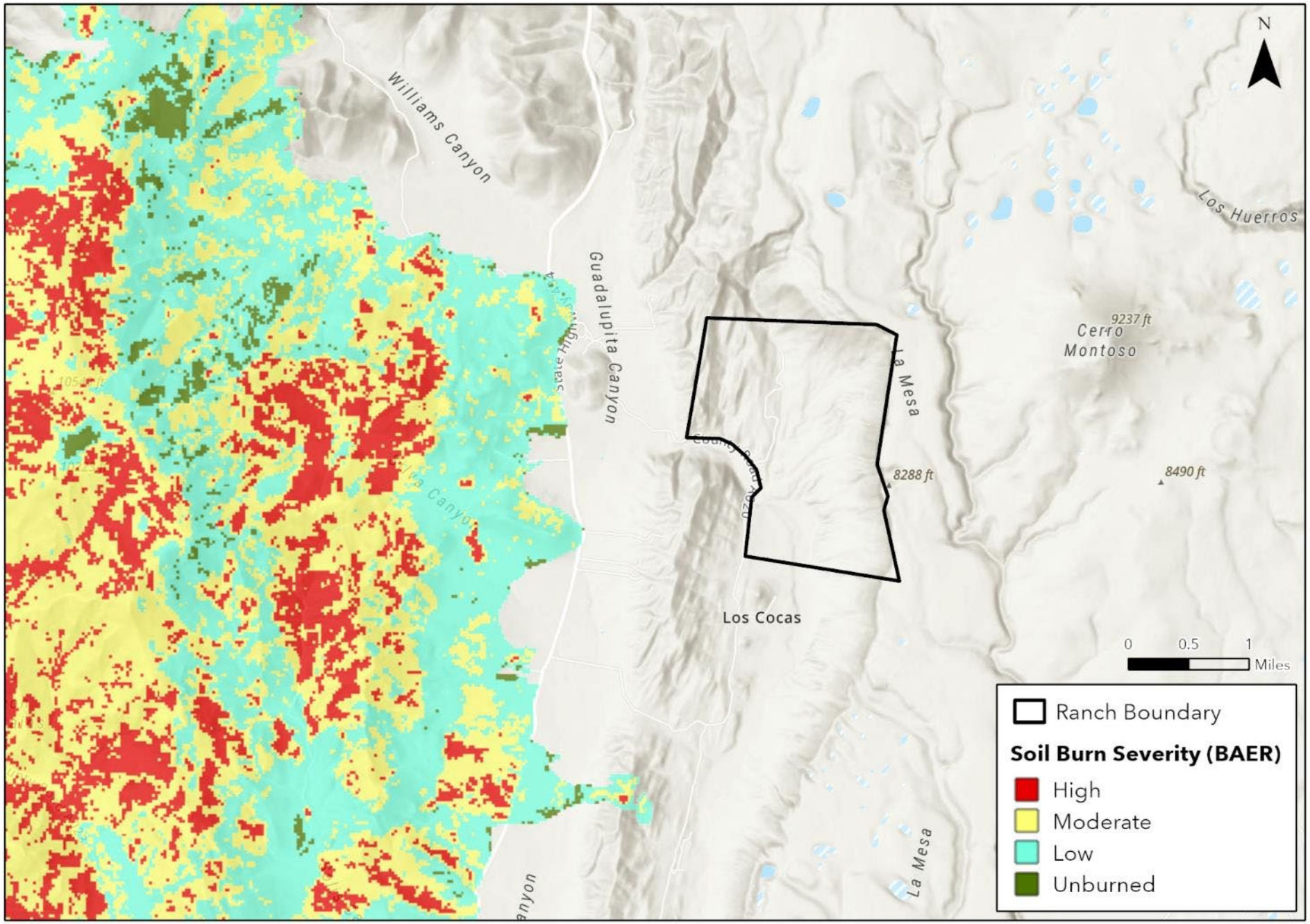
Soil Burn Severity at Collins Lake Ranch (Cleveland, NM)

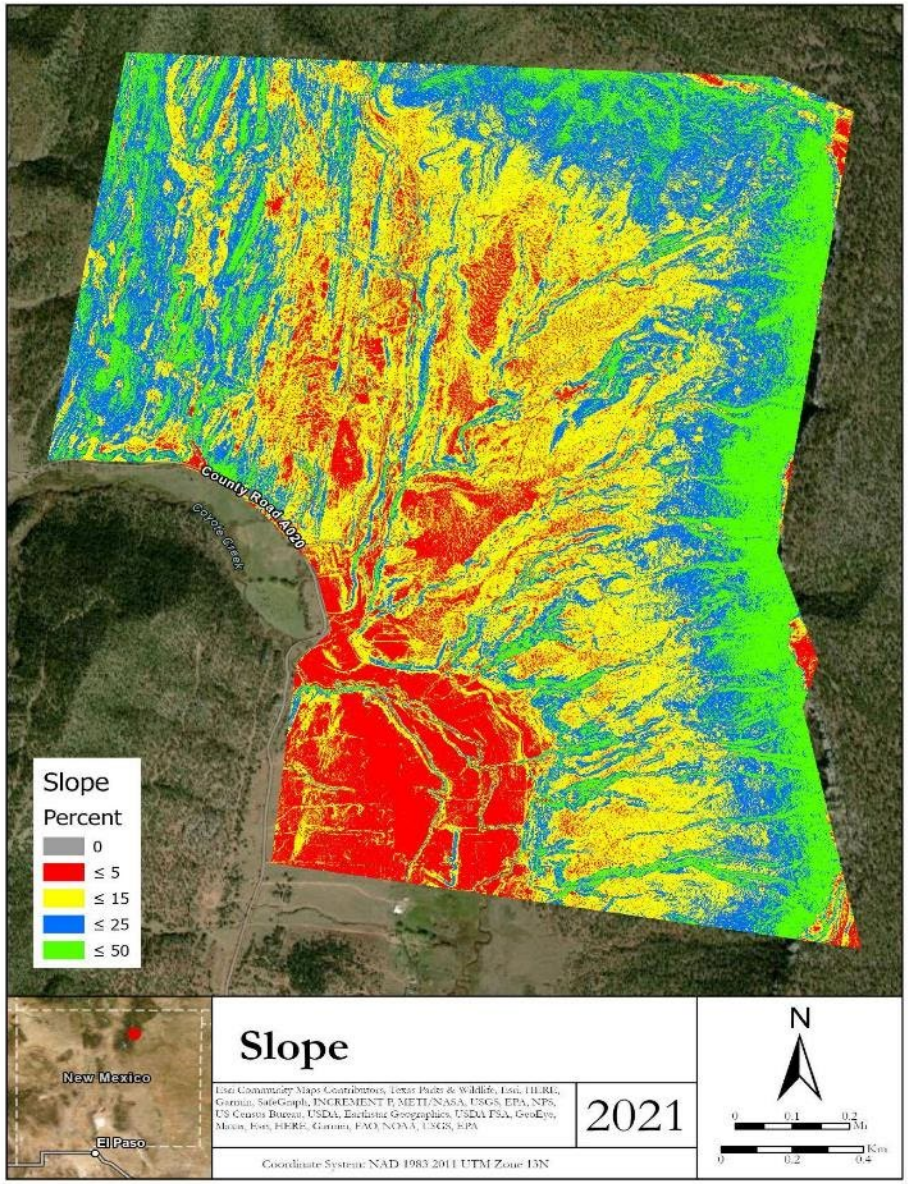


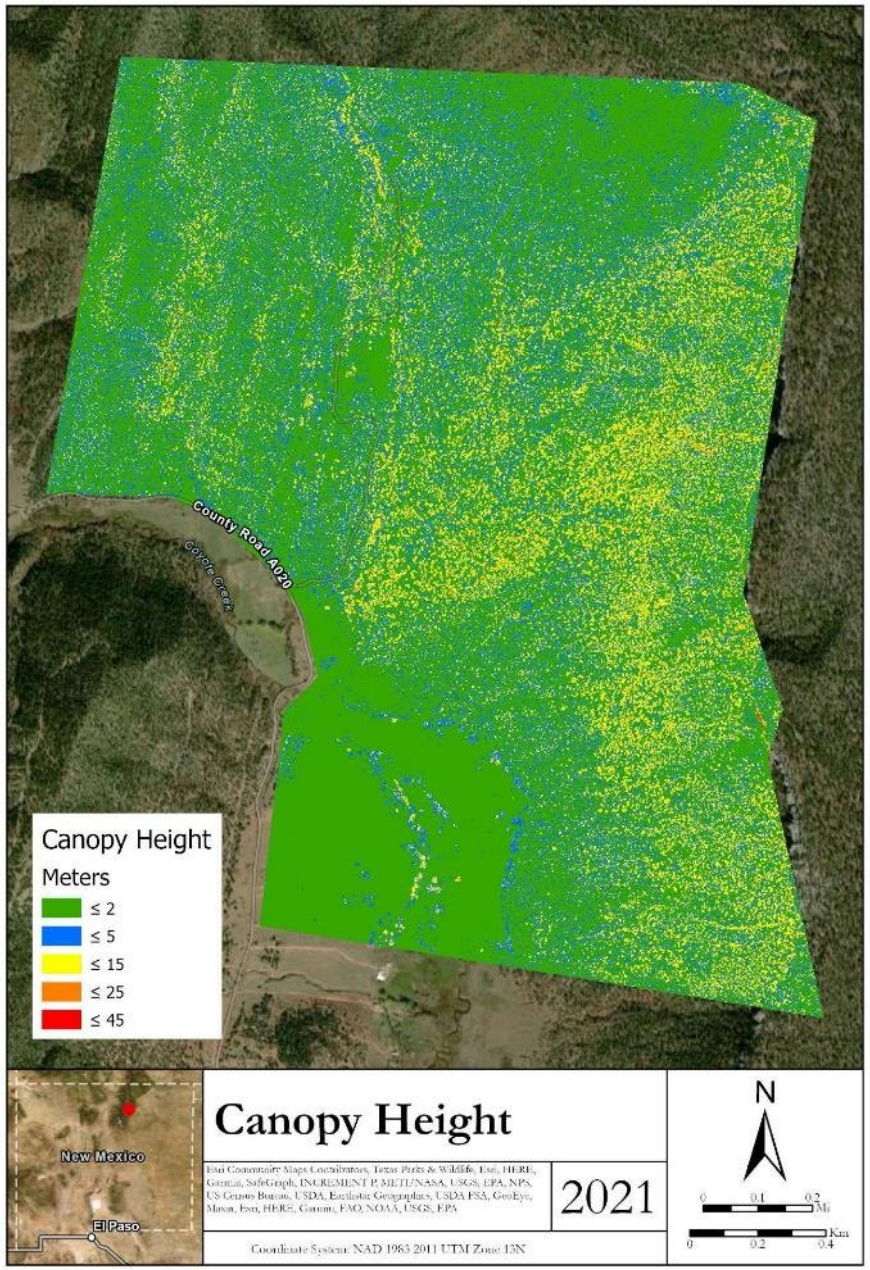
Burn Area - Thinned – Minimal Damage

Erosion – Road Up Mountain

Soil Burn Severity near Ojitos Sanctuary (Guadalupita, NM)




County Road A029
Coyote Creek
Slope
Percent
0
≤ 5
≤ 15
≤ 25
≤ 50
New Mexico
El Paso
Slope
2021
Coordinate System: NAD 1983 2011 UTM Zone 13N
N
0 0.1 0.2 Mi
0 0.2 0.4 Km


County Road A020
Circle Creek
Canopy Height
Meters
≤ 2
≤ 5
≤ 15
≤ 25
≤ 45
New Mexico
El Paso
Canopy Height
2021
Esri Community Maps Contributors, Texas Parks & Wildlife, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Esri Japan, Geographics, USDA FSA, GeoEye, Maxar, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA
Coordinate System: NAD 1983 2011 UTM Zone 13N
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0 0.2 0.4 Km

FORT-CREST

National Science Foundation CREST Grant: FORT (Forest Restoration Triangle 2019-2024)

NMHU's Department of Forestry houses the NSF funded Forest Restoration Triangle (FORT) Center of Research Excellence in Science and Technology (CREST) $5-million

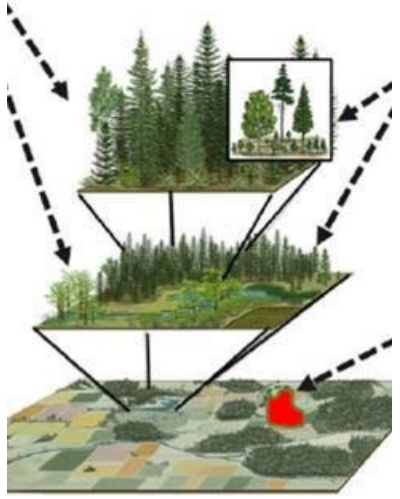
GOALS: ***To improve forest management in New Mexico and the Southwest by increasing***

- ✓ **Forest knowledge** about **health and resiliency to catastrophic wildfires**
- ✓ **NM Highlands University student**´s involvement in **professional research and work** in the forestry discipline
- ✓ the pipeline for **new forest managers and researchers**

Forest Restoration Triangle Vision: to develop strategies for the management and restoration of resilient forests in NM and the Southwest in the context of climate change and fire.

FORT-CREST - Subproject 3: landscape level

*Addresses **restoration-based approaches** applied at larger scales using an **adaptive management approach with linked education and outreach components.***



- Assesses **landscape-level placement of forest treatments** and their impact on fire management to increase resiliency to the larger landscape in the face of drought and fire
- Using these findings to **guide community outreach regarding forest management** and fire risk mitigation
- **Guide curriculum development** to increase student recruitment, retention, and competency through integrated, field-based curriculum in the **Department of Forestry at New Mexico Highlands University.**

CREST and On-Going Work At Collins Lake Ranch

Expanded Collins Lake Ranch Vision

*COVID classes environmental education at Ranch

Photo Credits: River Source

Photo Credit: NMFWRI

Water Testing

Water Testing

Questions??? Thank You!