AiDASH

20
25

LA WILDFIRE RISK REPORT

Key risk indicators were detectable well before ignition

Report prepared by AiDASH Research

LA Wildfire Risk Report

Key risk indicators were detectable well before ignition

February 17, 2025

Introduction

New data reveals that Los Angeles's recent wildfires—the Palisades, Eaton, and Hurst fires—were not inevitable. Rather, they were detectable weeks in advance through satellite-driven vegetation stress and ignition analysis.

This study from AiDASH, using 6 months of satellite data over the affected areas and analysis using proprietary AI models, shows that key risk indicators crossed critical thresholds well before ignition, underscoring the urgent need for data-driven wildfire mitigation strategies.

These fires were fueled by a combination of prolonged drought, critically dry vegetation, elevated temperatures, and extreme weather conditions and serve as stark reminders of the escalating wildfire risks posed by climate change and environmental degradation.

Analysis of the factors behind these fires provides key insights into how vegetation dryness, fuel conditions, and climatic trends converge to create conditions ripe for ignition and rapid spread. This analysis shows that proactive, targeted vegetation management such as fire breaks could have mitigated the impact of the LA wildfires.

Key findings

- **Vegetation stress hit critical levels well before the fires.** Normalized Difference Vegetation Index (NDVI) in Palisades dropped approximately 20% to 0.3—a threshold indicating extreme dryness—by early October. Similar patterns were detected in Eaton and Hurst.

- **Fire fuel conditions were primed for ignition.** Moisture levels in the region dropped below 13.5%, making vegetation highly flammable.

- **Weather patterns changed.** Consistent decrease in relative humidity, increasing frequency of high-wind events, and rising average temperatures increased the likelihood of wildfire ignition and spread.

- **Fire intensity and resistance to control surged.** The Energy Release Component (ERC) exceeded the critical threshold in all three regions, indicating extreme potential for heat release.

LA wildfire analysis: Risk factors

Vegetation acted as the primary fuel for ignition and fire spread in all three regions. Normalized Difference Vegetation Index (NDVI) is a key metric used to measure the health and density of vegetation by analyzing satellite imagery. NDVI provides insight into vegetation health, biomass, and dryness, making it a vital indicator for wildfire risk. An NDVI spot value refers to the specific NDVI measurement for a particular location (or "spot"). (See Figure 1.)
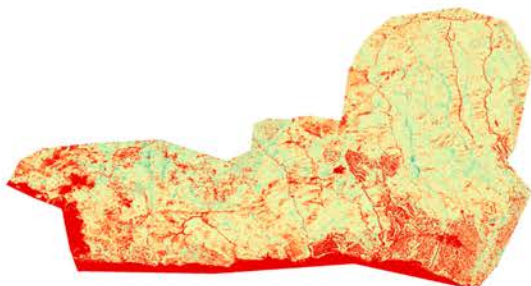
NDVI ranges:

- 0.6–1.0 (healthy vegetation)
- 0.2–0.6 (stressed/sparse)
- 0.0–0.2 (bare soil)
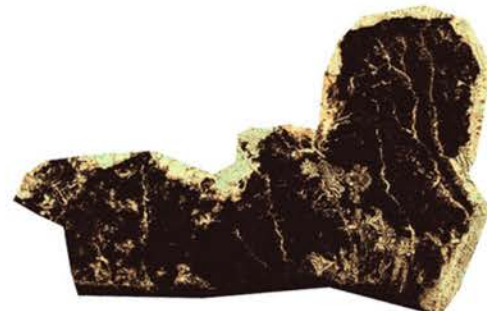- <0.0 (non-vegetative surfaces)
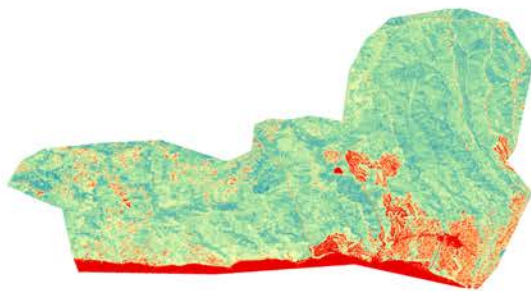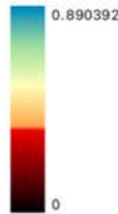
April 30 2024 (**Palisades**)
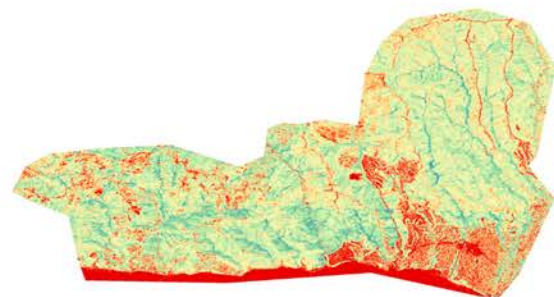
October 8 2024 (**Palisades**)

December 13 2024 (**Palisades**)

January 15 2025 (**Palisades**)

Figure 1: NDVI spot values for Palisades from April 30, 2024 to January 15, 2025.
Source: Airbus Imagery, 3km x 3km resolution.

In the Palisades, NDVI values dropped to 0.3 by October 8, 2024, indicating critical vegetation stress. In Hurst, NDVI values fell to 0.28 by November 17, 2024, reflecting severe dryness and a continuous fuel load. This trend was mirrored in Eaton, where NDVI declined steadily, reaching 0.35 by September 2, 2024, and further dropping to 0.3 by December 15, 2024.

The charts below show NDVI vegetation health in each of the three areas. The percentage of each area with dense and healthy vegetation declined significantly through the latter half of 2024. The drastic drop suggests a notable transformation in the landscape's vegetation, leaving large amounts of potentially dry, dead, or dying vegetation. (See Figure 2).
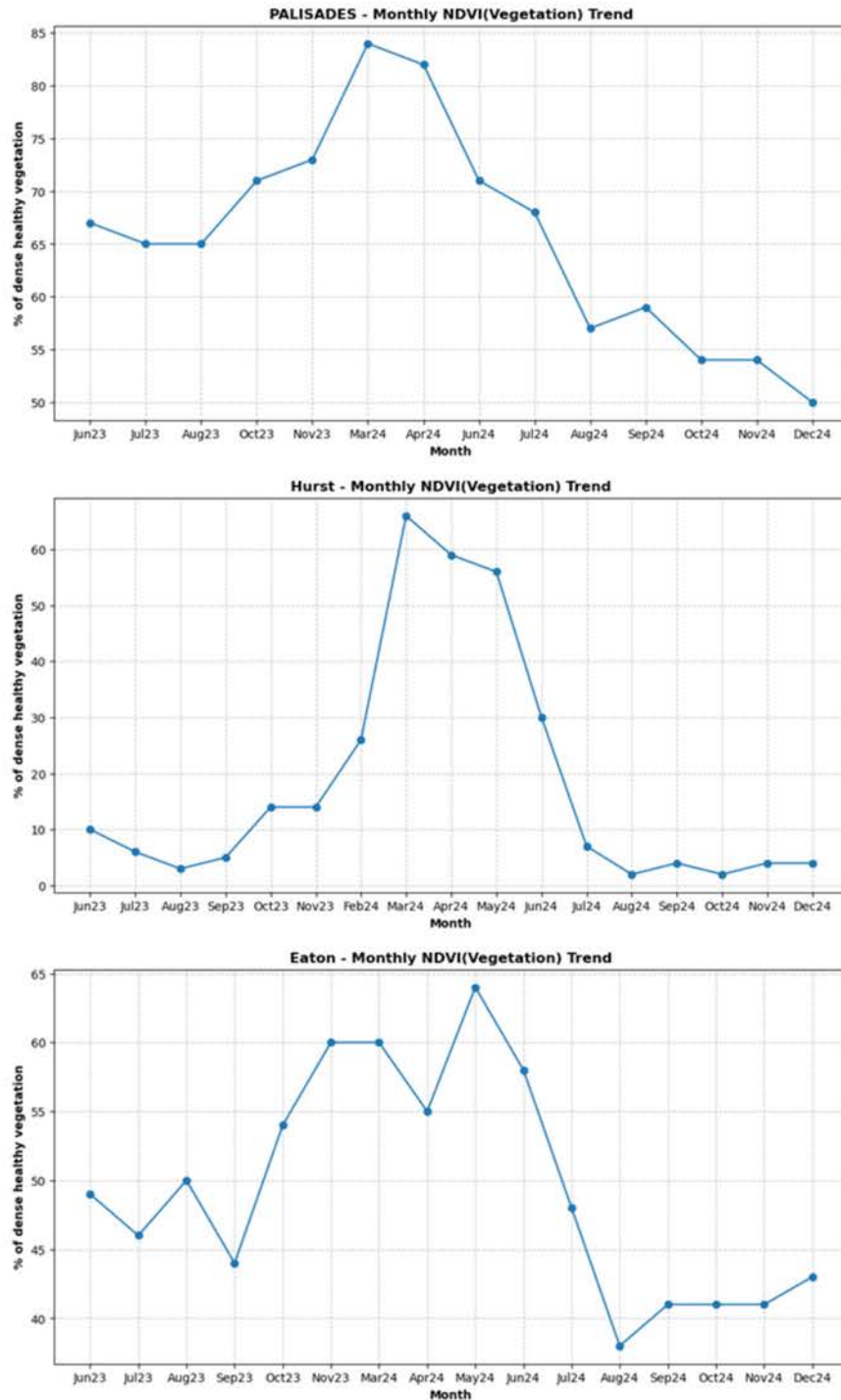

Figure 2: Monthly NDVI values showing what percentage of each area maintained dense and healthy vegetation from January 2023 through December 2024.

Source: USGS Landsat

This vegetation dryness was exacerbated by minimal precipitation and prolonged drought conditions. The Evaporative Demand Drought Index (EDDI) revealed intensifying drought conditions across Los Angeles throughout 2024. All three wildfire zones experienced EDDI values exceeding 2.0 by late fall, signaling extreme drought stress. The drought peaked in December 2024, just weeks before the fires, with the Hurst area showing the most severe conditions as EDDI values surpassed 2.5.

Further exacerbating the vegetation-driven risk was the lack of precipitation in the months leading up to the fires. Persistent dry conditions in all three regions reduced fuel moisture levels below critical thresholds of 13.5%, increasing the susceptibility of the landscape to ignition.

Compounding this, rising land surface temperatures (LST) contributed to further vegetation desiccation. In the Palisades, LST increased from an average of 77.7°F in 2023 to 84.5°F in 2024 during the summer months. Similarly, Eaton and Hurst saw LST averages rise from 80.2°F to 90.3°F and 88.7°F to 97.7°F, respectively, during the same period.

Another key metric referenced in wildfire risk assessment is the Energy Release Component (ERC), a measure of fuel flammability. Higher ERC values (>50%) indicate drier fuels and increased fire danger.

ERC Value (BTU per square foot)	Fire Behavior Implication
0 - 35%	Low fire potential; fuels still retain moisture.
35-50%	Moderate fire danger; fires may spread under windy conditions.
> 50% (Critical ERC)	High fire danger; large fuels are dry, leading to sustained burning.

The ERC consistently exceeded the critical threshold of 50% in all three regions towards the end of 2024, indicating extreme potential for heat release. Elevated ERC values in late summer and fall highlighted the cumulative drying of vegetation and the increased likelihood of ignition and fire spread. (See Figure 3).
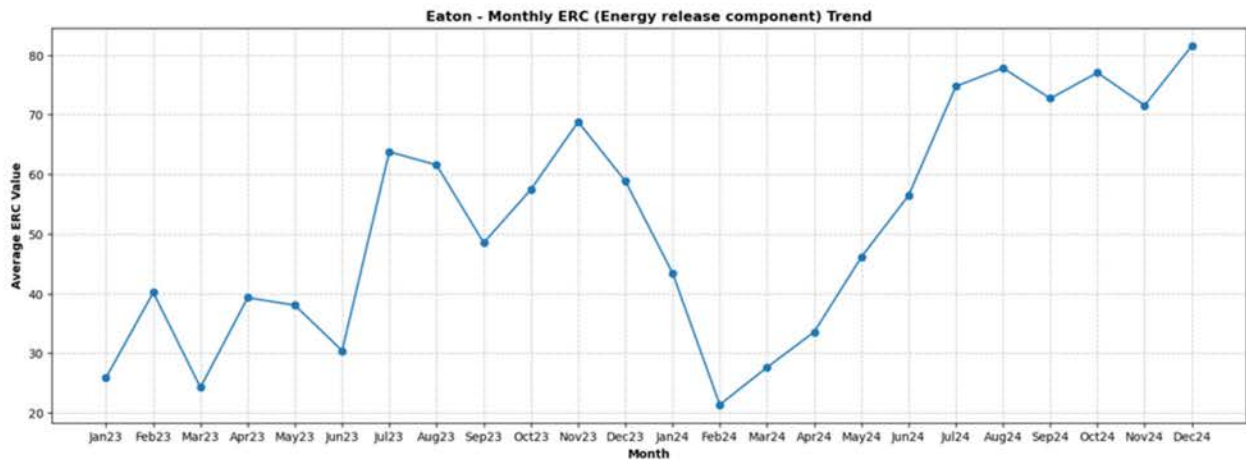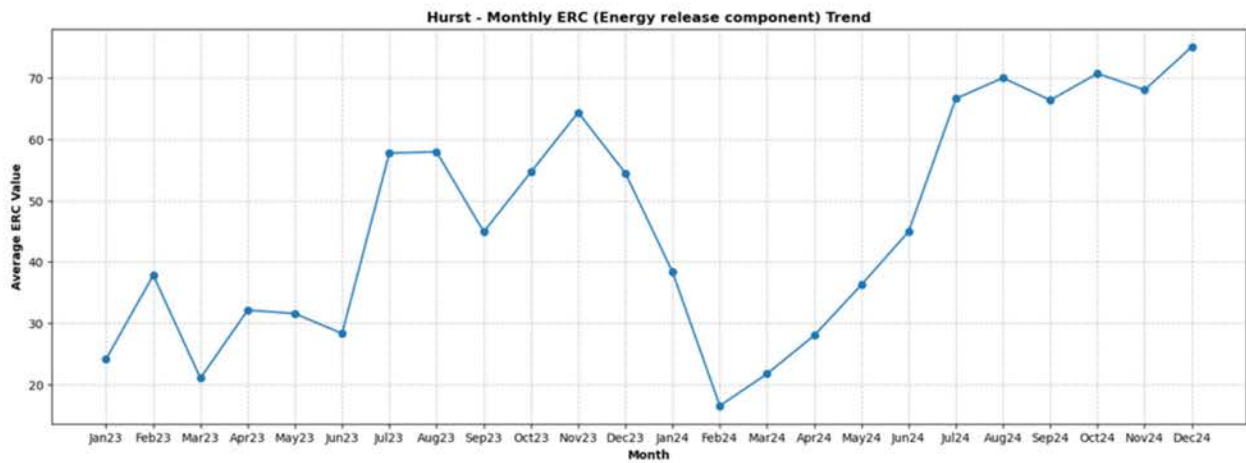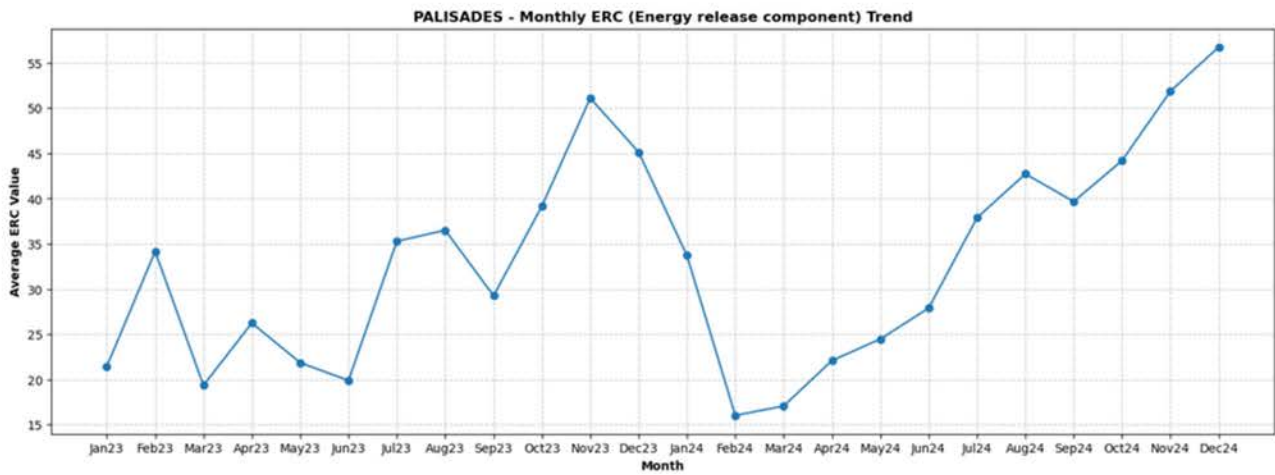
Figure 3: Monthly ERC values from January 2023 through December 2024 showing the rapid increase in drier fuels and increased fire danger throughout 2024.

Source: GRIDMET

Reducing risk through proactive vegetation management

The key lesson from these fires is that vegetation management provides a crucial lever for wildfire risk reduction, even when environmental conditions may be beyond immediate control. The integration of high-resolution satellite monitoring with both proactive and reactive vegetation management strategies offers a powerful approach to identifying and mitigating fire risks before they escalate into disasters.

Proactive vegetation management is crucial for reducing wildfire risks, focusing on systematic fuel load reduction through thinning, prescribed burns, and mechanical clearing. The implementation of strategic fuel breaks has proven effective, particularly where broad roads combine with fire-retardant species and brushed green patches to create defensive barriers. In Wildland-Urban Interface (WUI) areas, the creation of defensible spaces—maintaining ember-resistant zones around structures and thinning vegetation within 30 to 100 feet of buildings—has significantly enhanced community protection.

The reactive approach leverages real-time wildfire ignition and spread risk assessment models to guide emergency response and mitigation efforts during active fires. These models integrate weather conditions, fuel loads, and topography to identify high-risk zones and determine strategic responses, including emergency fuel break creation and backburning operations.

Learning from fire breaks: Nature's blueprint for prevention

While the LA wildfires caused significant damage, they also revealed crucial insights about effective wildfire prevention. Analysis of satellite imagery before and after the fires showed clear evidence of how natural and managed fire breaks successfully halted fire progression in several locations, offering valuable lessons for future vegetation management strategies.

Case Study 1: High-moisture vegetation as a natural barrier.

In one notable instance, a line of tall trees with high moisture content effectively served as a natural fire break. NDVI analysis revealed these trees maintained consistently higher moisture levels compared to surrounding vegetation.

This natural barrier prevented embers from crossing to the other side, demonstrating how strategically placed moisture-rich vegetation can act as fire retardants. The effectiveness of this barrier suggests that incorporating fire-resistant species into vegetation management plans could create natural fire breaks. (See Figures 4-6.)
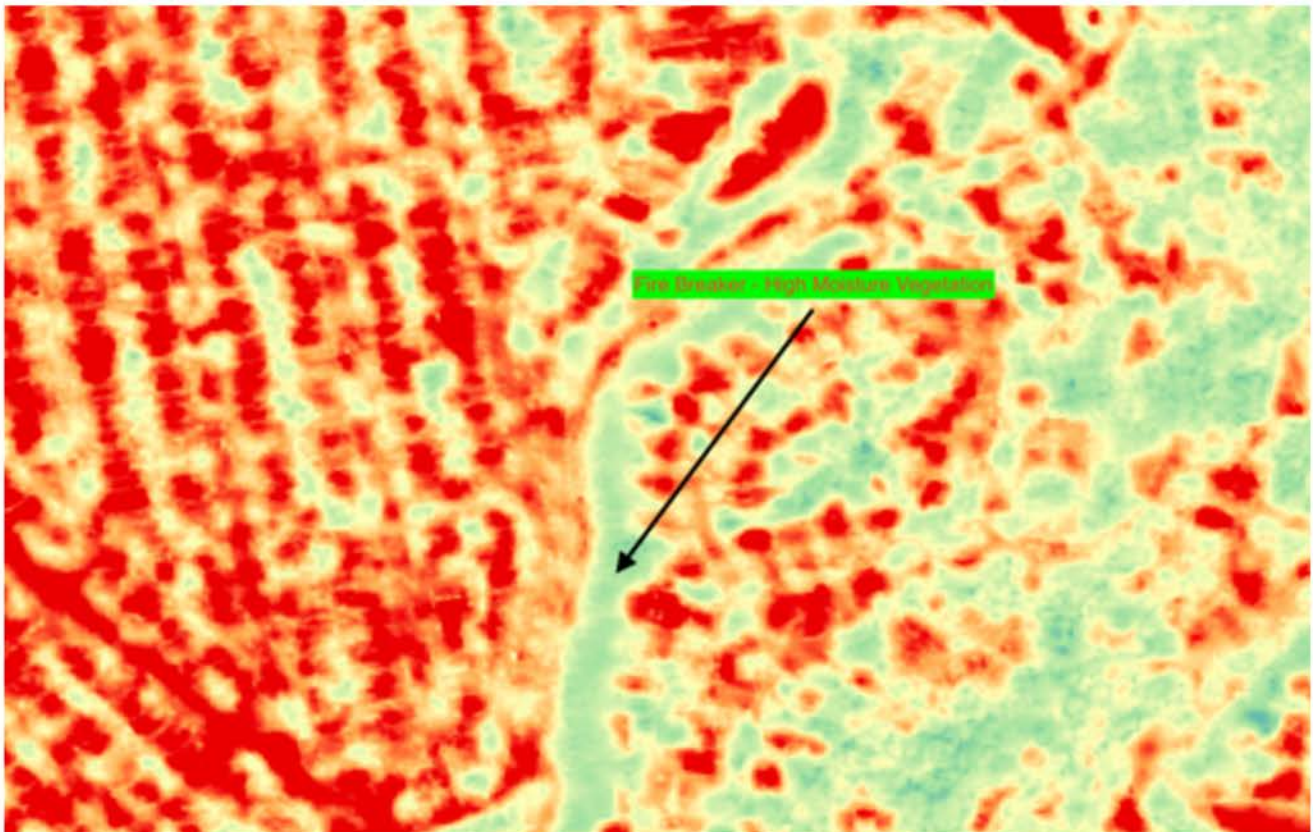
Figure 4: Before
Tall trees with high moisture content prevented embers from spreading. Note the damaged area, fire breaker, and non-damaged area

Figure 5: After

Figure 6: NDVI

Case Study 2: Strategic distance management.

Another critical insight came from areas where wide vegetation clearings played a decisive role. In locations with clearings exceeding 100 feet, fire spread was notably contained.

However, this case study also highlighted the crucial relationship between clearing width and wind conditions. During periods of high winds, clearings of even greater widths were necessary to effectively halt fire progression. This finding emphasizes the importance of dynamic vegetation management that accounts for local weather patterns and wind conditions. (See Figures 7-9.)
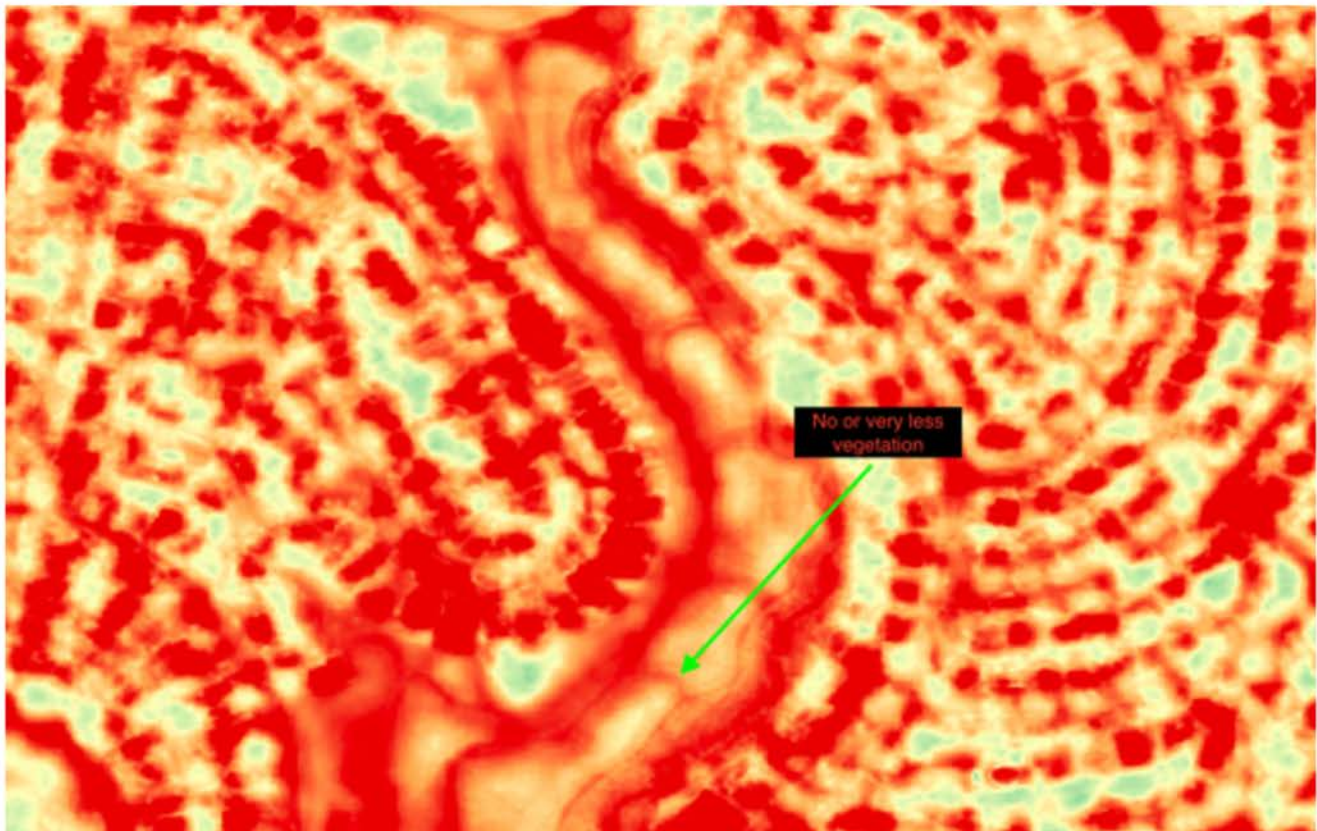
Figure 7: Before
Clearings >100 feet helped contain fire spread. Higher wind conditions necessitate clearings of greater widths.

George Wolfberg Park at Potrero Canyon

Figure 8: After

Figure 9: NDVI

Case Study 3: Urban interface protection.

The third case study demonstrated how minimal fuel load in surrounding areas created an effective fire barrier that protected residential zones.

Areas with significantly reduced vegetation density showed marked success in preventing fire encroachment into populated areas. NDVI analysis of these regions confirmed that maintaining low fuel density around residential areas significantly enhanced protection against advancing wildfires. (See Figures 10-12.)
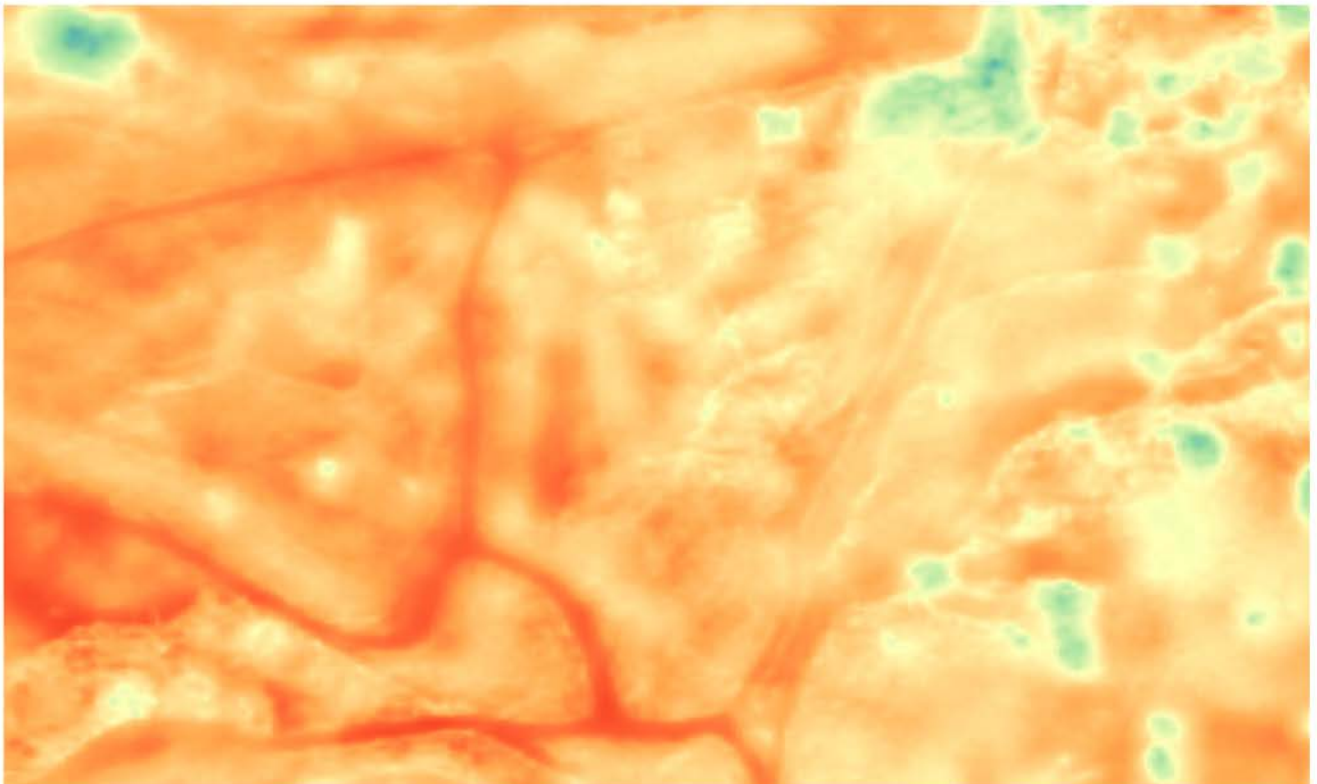
Figure 10: Before
Minimal fuel load around residential areas was more successful in preventing fire encroachment.

Figure 11: After

Figure 12: NDVI

These real-world examples from the LA fires provide clear evidence that strategic fire breaks can effectively mitigate wildfire risks. Ironically, by demonstrating which natural and managed fire breaks succeeded in containing spread, the fires themselves illuminated effective solutions. This understanding can inform more effective vegetation management strategies that use fire breaks. These strategies include:

1. **Strategic placement of moisture-rich, fire-resistant vegetation to create natural barriers.**
2. **Implementation of sufficient clearing widths based on wind condition analysis.**
3. **Careful fuel load management in Wildland-Urban Interface (WUI) zones.**

These insights reinforce the importance of data-driven vegetation management in wildfire prevention and highlight how satellite monitoring can help identify and maintain effective fire breaks.

Necessary technological advances

The effectiveness of vegetation management strategies has historically been constrained by limitations in monitoring capabilities. Traditional approaches relied on infrequently updated, low-resolution imagery that failed to capture rapid changes in vegetation conditions. Modern wildfire prevention demands higher-resolution imagery and more frequent monitoring to detect early warning signs of fire risk.

AiDASH addresses this critical gap through advanced satellite monitoring that combines high-resolution and high-frequency data collection. By fusing high- and medium-resolution satellite imagery, the platform provides daily insights into vegetation conditions and fuel loads. It's a significant advancement over annual or seasonal assessments, which is a key learning from this report and analysis.

This technological advancement enables a comprehensive approach to vegetation management both within and outside utility rights-of-way (RoW). Inside the RoW, the platform guides proactive measures including side clearing, hazardous tree removal, overhanging branch management, and brush clearance. Beyond the RoW, it supports the strategic creation of fire breaks and identification of hazardous vegetation that could impact infrastructure.

AiDASH's AI-driven analytics provide dynamic modeling of fuel load changes—a capability that surpasses traditional wildfire analytics by enabling timely, targeted interventions before vegetation becomes a critical risk factor.

Conclusion

Key risk indicators that led to the LA wildfires in early 2025—including vegetation dryness, low vegetation fuel moisture and drought conditions, and extreme weather conditions—could have been detected weeks in advance through satellite-driven vegetation stress and ignition analysis.

These findings underscore the urgency of implementing better wildfire risk mitigation strategies, primarily in the area of vegetation management—both proactive and reactive. Proactive strategic fuel load reduction includes proactive brush and dry grass clearance along the RoW and removing hazard trees, along with creating strategic fire breaks. Reactive measures include real-time wildfire ignition and spread risk assessment and emergency vegetation trimming in high-risk areas.

These strategies require advanced, though presently available, technology: high-resolution, high-frequency satellite monitoring with AI-powered analysis.

The integration of high-resolution satellite monitoring with proactive vegetation management strategies offers a powerful approach to identifying and mitigating fire risks before they escalate into disasters.

AiDASH exists to safeguard critical infrastructure and secure the future of humanAlty™.