Mapping Cheatgrass Along California's Roadways and Powerlines to Identify High-Risk Ignition Zones

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***Abstract*—Between 2001 and 2023, wildfires in the Wildland Urban Interface (WUI) caused by power lines, vehicles, and equipment accounted for approximately 23% of the total area burned by identified ignition sources, burning an estimated 3 million acres in California alone. These ignition sources have been major contributors to the destruction of infrastructure, loss of life, and air pollution in WUI areas. The invasive grass species Bromus tectorum (cheatgrass) has played a significant role in accelerating the spread of fire. Here we demonstrate the connection between the presence of cheatgrass and wildfires of different causes. We find that in California in 2023, cheatgrass covered close to 60% of the area burned for both powerline and roadside wildfires, despite covering less than 15% of California. We also identify the presence of cheatgrass near the ignition sites of some recent major California wildfires, including the 2018 Camp Fire and the 2024 Park Fire. We present detailed 10-meter resolution maps of California identifying powerlines and roads surrounded by cheatgrass. Our findings highlight the critical importance of vegetation management in ignition hotspots to mitigate wildfire risks in the WUI.**

***Index Terms*—Wildfires, Wildfire fuel mitigation, Wildfire prevention, Powerline fires, Vehicle fires, Wildfire ignitions.**

I. Introduction

The increasing spatial extent and intensity of wildfires are making large regions of the United States increasingly hazardous to inhabit ([1], [2]). Since the 1970s, the burnt area, fire season length, and total number of large fires have all risen significantly across the country ([2], [3]).

The expansion of human habitation into wildlands, known as the wildland-urban interface (WUI), has amplified wildfire risk, resulting in devastating losses of life and property [4]. The trend of population migration into high-risk fire areas near the WUI exacerbates the potential for wildfire-related disasters [5]. Moreover, human-caused fires are not randomly distributed but are closely tied to human settlements and road networks ([6], [7], [8]). Research shows that ignitions are concentrated near roads, in areas with high road density, and in proximity to the WUI [9].

Forest roads can influence fire dynamics in complex ways, serving as fire breaks that constrain fire spread and providing access for suppression activities [10]. However, increased road access also elevates the frequency of human-caused fire ignitions [11]. The broader implications of roads for fire management remain a subject of debate, with some arguing that roads increase the risk of unwanted human-caused fires, while others contend they reduce fire hazards by facilitating suppression efforts and fuel treatments [12].

Human-caused fire ignitions arise from various sources, including burning carbon particles from automobile exhaust, improperly discarded cigarette butts, and recreational activities such as poorly extinguished campfires. The extent and location of road access play a critical role in shaping the number and distribution of potential ignition sources. Previous studies have examined the relationships between fire locations and factors such as roads, trails, towns, vegetation, rivers, topography (elevation, slope, and aspect), forestry operation sites, and other geographic variables ([13], [14]).

Overhead powerlines significantly contribute to wildfire risk as they traverse large expanses of flammable forests and grasslands [15]. While wildfires are a natural process vital to many ecosystems, they can inflict severe harm on people, communities, and infrastructure. Human activities have profoundly altered wildfire patterns over time, intensifying their threat to lives, property, and infrastructure. For example, on October 21, 2007, around 12:30 p.m. local time, the Witch Creek Fire ignited in San Diego County. This was one of over two dozen wildfires fueled by an exceptionally strong Santa Ana wind event in Southern California. High winds can damage electrical transmission infrastructure, and in this instance, the fire was reportedly triggered by wind-induced faulting (arcing) of powerlines approximately 20 meters above ground level. The fire spread quickly and combined with other wildfires, becoming one of the largest in California's history [16].

The Dixie Fire, one of the largest and most destructive wildfires in California's history, began on July 13, 2021, at approximately 6:48 a.m. local time when a large Douglas fir fell onto a power line. The cause of the tree's fall remains uncertain—one arborist from CAL FIRE attributed it to weakening from the 2008 Butte Lightning Complex fire, while another arborist suggested root rot as a possible factor. When the tree made contact with the power line, two fuses blew, but one remained active, keeping the line energized. This created an electrical fault as the tree touched both the power line and the ground. Over the subsequent hours, electrical arcing ignited ground fuels, ultimately leading to the massive wildfire [17].

While much of the current research focuses on mapping trees at risk of falling onto power lines ([18],[19]), this paper takes a different approach by investigating how to identify via remote sensing flammable vegetation that, in the event of a fault, could most easily ignite and escalate into large wildfires.

Cheatgrass, an invasive annual grass not native to North America, has profoundly influenced fire regimes across the Intermountain West, especially in the Great Basin [20], [21]. The grass earned the name ”cheatgrass” due to its propensity to invade wheat fields, thereby reducing farmers’ harvests [22]. Before 1850, this region, known for its winter precipitation, primarily supported ecosystems dominated by perennial grasses and shrub-steppe vegetation. Historical accounts from early expeditions in the Great Basin describe upland areas as being rich in bunchgrasses from genera such as Festuca, Agropyron (now Pseudoroegneria), and Elymus [22].

Originally native to arid areas of western and central Europe, southwestern Asia, and northern Africa, cheatgrass was unintentionally introduced to North America during the late 19th century through at least seven separate events. These introductions were largely the result of contaminated grain seed, packing materials, and ship ballast [23]. Early infestations were most common near wheat fields, as B. tectorum seeds often contaminated wheat seed stocks, and along railroads, where straw containing B. tectorum was used as packing material for transported goods. Additionally, B. tectorum was at times intentionally sold and planted as forage for degraded rangelands [24]. Its spread closely mirrors patterns of European human migration [23].

By increasing the continuity and abundance of fine fuels, cheatgrass significantly enhances fire frequency compared to the natural cycles in native ecosystems [25], [26]. Its unique phenological traits, including peak productivity in early spring before native shrubs and grasses, further exacerbate its impact [27].

This paper focuses on characterizing the added risk cheatgrass represents in WUI areas. Building on California’s cheatgrass map identified by satellite remote sensing [28], we determine the fraction of the area burnt that is covered by cheatgrass for fires that started in the vicinity of powerlines and highways. To highlight the role of the ignition source, we also determine the same cheatgrass coverage fraction for wildfires ignited by lightning strikes, where we find a dramatically different coverage.

The paper is organized as follows. In Section II we introduce the datasets and methods used for the analysis, along with details on two catastrophic wildfires that will be our case studies. In Section III we present our results, including cheatgress overrepresentation in WIO, the effect of cheatgrass on fire behavior, two case studies, and maps of cheatgrass in California near highways and power lines. We conlude in Section IV.

II. Data and Methodology

A. Cheatgrass Land Use Land Cover (LULC)

In our recent study [28], we utilized Sentinel-2 satellite data alongside artificial intelligence (AI) techniques to generate Land Use and Land Cover (LULC) maps that accurately represent the distribution of Cheatgrass across California. The analysis employed one year of data (e.g., July of the previous year to June of the current year) to capture the seasonal dynamics of vegetation. For example, the 2024 LULC map was derived using data from July 2023 to June 2024, enabling the identification and mapping of highly flammable grasslands ahead of California’s peak wildfire season, which typically starts in July [29].

To develop the initial labels for this mapping, [28] integrated open-source Calflora data [30], which provided detailed field observations of vegetation types. A semi-supervised machine learning algorithm was then employed to refine these labels, iteratively improving the accuracy and consistency of the dataset by aligning satellite data with ground truth observations. By combining AI-driven analysis with refined labeling, the LULC mapping process [28] effectively captured the temporal variability and phenological changes of Cheatgrass. Figure 1 depicts the 2024 Cheatgrass LULC map from [28], which serves as the basis of the present study.

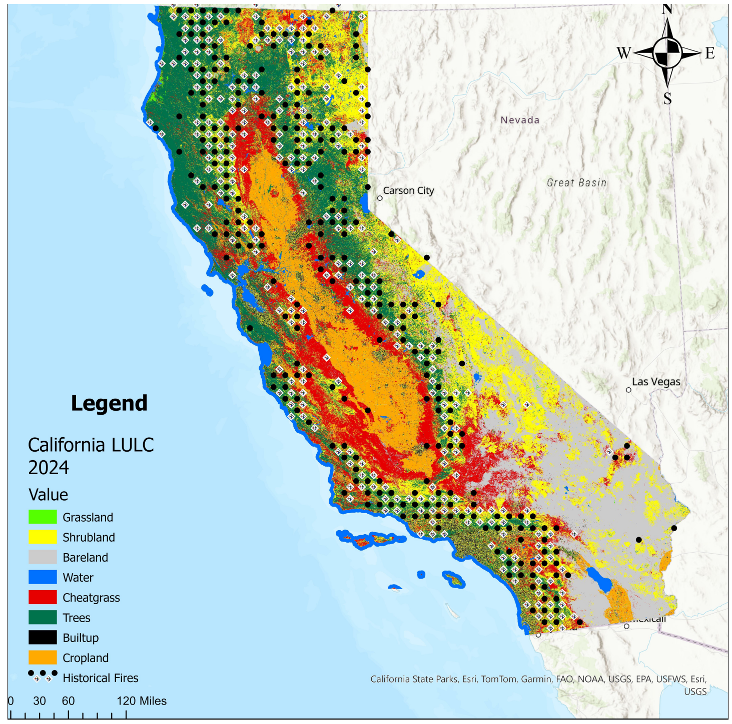

Fig. 1: Cheatgrass LULC map of California for 2024 adopted from [28], overlaid with historical fire perimeters in California [31].

B. Power line, roadway and wildfire datasets

California has 33,000 miles of power lines, with PG&E owning 57%, Edison 16%, and San Diego G&E 6%, while 18% belongs to municipal utilities and 3% is federal [32]. According to the 2015 Interregional Transportation Strategic Plan, the California State Highway System (SHS) comprises approximately 51,326 lane-miles of roadway. Figure 2 illustrates the extensive network of overhead powerlines and highways across California. Given this immense scale and the limited preparation time available for the annual forest fire season, it is crucial to utilize remote sensing technology to predict potential ignition points and manage vegetation effectively.

We utilized the Transmission Line dataset [33], the Highways dataset [34], the Historical Fires shapefile [31], and ignition point data from CAL FIRE’s Incident dataset [35]. These datasets provide a comprehensive view of infrastructure and fire history, aiding in the assessment of wildfire ignition risks and mitigation strategies.

Table I highlights that nearly 3.27 million acres were burned by wildfires ignited by Powerlines, Equipment Use, and Vehicles between 2001 and 2023, which collectively account for close to 23% of the area burned by known causes. These fires pose an outsize threat to human populations as they occur at the Wildland-Urban Interface (WUI).

TABLE I: Cause vs Acres Burnt from 2001-2023. Derived from [31].

CAUSE	Acres Burnt	PERCENTAGE (%)
Lightning	8,760,522.43	60.64
Powerline	1,459,257.12	10.10
Equipment Use	1,155,018.98	7.99
Arson	977,027.25	6.76
Campfire	890,698.42	6.16
Vehicle	656,992.90	4.55
Debris	327,703.56	2.27
Playing with fire	77,195.12	0.53
Aircraft	34,340.10	0.24
Escaped Prescribed Burn	32,493.69	0.22
Smoking	20,376.73	0.14
Railroad	20,289.74	0.14
Structure	6,638.57	0.05
Firefighter Training	2,164.78	0.01
Non-Firefighter Training	1,529.37	0.01
Illegal Alien Campfire	1,418.88	0.01

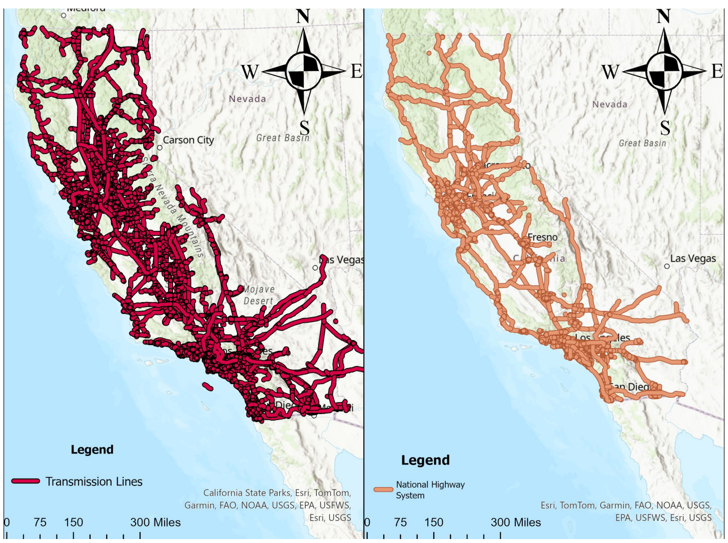

Fig. 2: Transmission Line [33] and Highways [34] across California

C. *Cheatgrass burning characteristics*

Cheatgrass creates a highly flammable connection between open grasslands and forests and dries out early in the fire season, making it particularly prone to fueling fires [36].

In BehavePlus Beta 6 [38], we simulated extremely dry conditions by setting the following fuel moisture parameters: 5% dead fuel moisture, 30% live herbaceous fuel moisture, and 30% live woody fuel moisture. A wind adjustment factor specific to the fuel type was applied, along with a slope steepness of 50%. The simulations modeled the headfire [39] rate of spread for wind speeds ranging from 0 to 120 km/h.

Dynamic Fuel Models [40] were utilized, prioritizing the driest fuel categories to accurately represent conditions prone to wildfires.

Dynamic Fuel Type	Description	Image of Fuel
GR7(Cheatgrass)	The primary carrier of fire in GR7 is continuous dry-climate grass. Grass is about 3 feet tall.	
SB4	The primary carrier of fire in SB4 is heavy blowdown fuel. Blowdown is total, fuelbed not compacted, most foliage and fine fuel still attached to blowdown. Spread rate very high; flame length very high.	
TL9	The primary carrier of fire in TL9 is very high load, fluffy broadleaf litter. TL9 can also be used to represent heavy needle-drape. Spread rate is moderate; flame length moderate.	
TU5	The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length moderate.	
SH7	The primary carrier of fire in SH7 is woody shrubs and shrub litter. Very heavy shrub load, depth 4 to 6 feet. Spread rate is high; flame length very high.	

TABLE II: Selected dynamic fuel types, their Descriptions, and corresponding images [37].

Table II highlights the five fuel types included in the simulations, each serving as a key example of highly flammable, dry vegetation.

Invasive annual grasses like cheatgrass (Bromus tectorum L.) exhibit a high surface-to-volume fuel ratio, making them highly flammable and capable of rapidly propagating wildfires, even during moist early-season conditions. Additionally, they significantly enhance fine fuel continuity, facilitating fire spread [41]. Consequently, cheatgrass can be classified as GR7 in the Dynamic Fuel Models, as detailed in Table II. The primary focus was to demonstrate how the presence of cheatgrass at potential ignition points poses a significantly higher risk of rapid wildfire propagation compared to other vegetative fuels, highlighting its critical impact on wildfire dynamics.

The outcomes of these simulations are further examined and discussed in the Results and Analysis section.

D. Camp Fire

The Camp Fire was caused by the failure of a single metal hook attached to a PG&E transmission tower on the company's Caribou-Palermo transmission line, which carried power from hydroelectric facilities in the Sierra Nevada to the Bay Area. The tower, a little under 100 feet (30 m) tall, was built on a steep incline on a ridge above Highway 70 and the North Fork Feather River near the community of Pulga [42].

The tower had two arms, each with a hook hanging from a hole in a long piece of metal. The hook held up a string of electrical insulators. The transmission power lines were suspended from these insulators, away from the steel tower itself so as to prevent electricity arcing between them. One of the hooks on the tower (about three inches (7.6 cm) wide and one inch (2.5 cm) in diameter) had been worn down by rubbing against the metal plate that it hung from, to the point where only a few millimeters of metal remained [42].

At 6:15 a.m. local time on Thursday, November 8, a PG&E control center in Vacaville recorded an outage on the company's transmission line in the Feather River Canyon. The hook—which was about 7/8ths worn through—had snapped under the weight of the power line and insulator string that it supported, which weighed more than 142 pounds (64 kg). No longer held up, the energized power line struck the transmission tower. This created an electric arc between the power line and the tower, which reached temperatures estimated at 5,000 to 10,000 °F (2,760 to 5,540 °C) and melted metal components of the conductor and the tower. The molten metal fell into the brush beneath the tower, setting it alight.[43]. The Camp Fire caused 85 fatalities, displaced more than 50,000 people, and destroyed more than 18,000 structures, causing an estimated $16.5 billion in damage. It was the most expensive natural disaster (by insured losses) of 2018 [42].

E. Park Fire 2024

On July 24, 2024, the Park Fire ignited near Bidwell Municipal Park in Chico, California. The fire rapidly spread, exhibiting extreme fire behavior and burning through the 41,000-acre Ishi Wilderness before advancing deeper into Lassen National Forest, as well as private, state, and other federal lands [44].The ignition of the fire was traced to a vehicle fire. An unknown male was seen pushing a burning car into a gully near Alligator Hole in Upper Bidwell Park. The car rolled approximately 60 feet down an embankment near Chico Creek, where it burned completely and spread flames that became the Park Fire. The man was observed leaving the area by blending in with other citizens fleeing the rapidly growing fire [45].

The fuels within the fire area were diverse and included uncharacteristically dense and continuous grasses in meadows such as Childs Meadow and Battle Creek Meadow, manzanita and oak brush, pine with a grass understory, and mixed conifer forests. The mixed conifer composition consisted of White and Douglas fir, Ponderosa, Jeffrey, and White pine, as well as incense cedar, often with an understory of younger regenerating conifers and areas containing larger downed logs. Additionally, areas with a history of relatively recent logging (within the past 20 years) were characterized by grass, short brush, and young timber, all contributing to the rapid spread and intensity of the fire [44].

F. Purpose of the Case Studies

Both the Camp Fire (2018) and the Park Fire (2024) are used as case studies in this section to demonstrate how the findings of our research could have informed better management of cheatgrass at ignition points. The Camp Fire, caused by a spark from powerlines, and the Park Fire, ignited by a vehicle fire, illustrate scenarios where the presence of highly flammable cheatgrass at the ignition site could exacerbate the rate of fire spread and flame intensity. By analyzing these case studies, we highlight the potential application of our findings to improve fire management strategies, particularly in mitigating the devastating effects of Cheatgrass during wildfire ignition and initial spread phases. This contextual framing provides a clear connection between our research outcomes and their practical implications for wildfire management.

III. Results

A. Cheatgrass overrepresentation in area burnt at WUI

For the 2023 fire season in California, we determined the vegetation types within wildfire burnt areas, separated for different ignition types. We used the LULC vegetation maps from our previous study [28]. Our results are shown in Table III. We see that between July 1, 2023, and December 31, 2023, cheatgrass accounted for about 55.9%, 56.2%, and 40.4% of the vegetation burned in fires caused by powerlines, vehicles, and equipment use, respectively. This is remarkable given that cheatgrass represents less than 15% of the overall area covered in California. Figure 3 provides a visual representation of the vegetation affected by various ignition sources during this period.

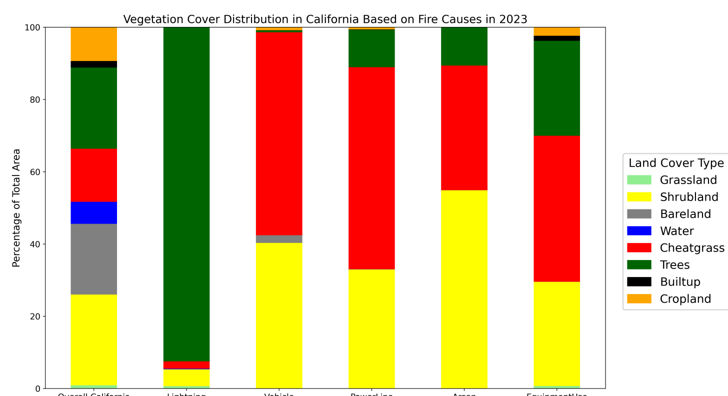

Fig. 3: Distribution of burnt vegetation by ignition type compared to the overall land cover in California for 2023.

B. Effect of cheatgrass at ignition point on fire behavior

The Rothermel fire spread model provides a foundational framework for predicting wildfire behavior by using key parameters such as fuel load, particle size, and moisture content. However, the original 13 fuel models were limited to extreme fire conditions and could not adapt to varying environmental scenarios. Dynamic fuel models, introduced as an improvement, incorporate the ability to

TABLE III: Vegetation Burnt in California during the 2023 fire season.

LULC Category	Overall California (%)	Lightning (%)	Vehicle (%)	PowerLine (%)	Arson (%)	EquipmentUse (%)
Grassland	0.89	0.65	0.04	0.01	0.00	0.69
Shrubland	25.1	4.6	40.3	33.0	54.9	28.8
Bareland	19.6	0.07	2.10	0.05	0.01	0.04
Water	6.10	0.15	0.01	0.01	0.00	0.00
Cheatgrass	14.7	2.02	56.2	55.9	34.5	40.4
Trees	22.5	92.5	0.49	10.4	10.5	26.3
Builtup	1.81	0.02	0.06	0.13	0.06	1.39
Cropland	9.36	0.00	0.82	0.56	0.00	2.34

shift live herbaceous fuels to the dead category based on moisture content, allowing for a more accurate representation of real-world conditions. This adaptability enhances predictions across different climates and seasons, making them especially effective for fire behavior outside peak fire seasons or in humid environments. By addressing these limitations, dynamic fuel models significantly improve the precision of wildfire management and ecological assessments [46].

The Rothermel fire spread model, integrated into the BehavePlus system, predicts surface fire behavior by calculating the rate of spread and flame length based on inputs such as wind, slope, and fuel moisture. BehavePlus enhances modeling with configurable options and visualization tools, making it suitable for wildfire management and prescribed burns [47]. We utilized BehavePlus simulations to analyze and compare the rate of spread for cheatgrass relative to other fuels, focusing on identifying its potential as a critical factor in ignition hotspots and its role in rapid wildfire propagation.

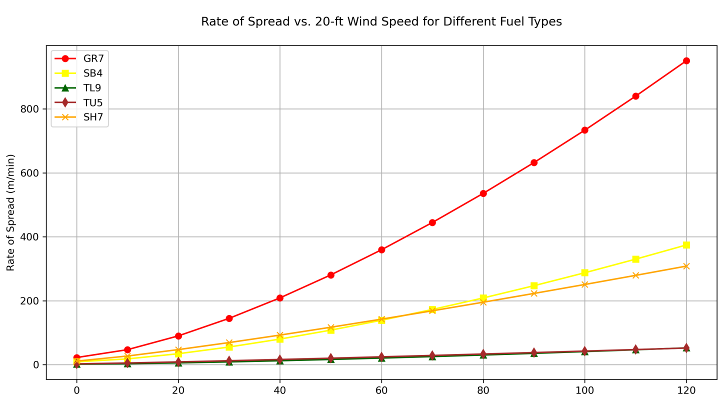

Fig. 4: Wind Speed vs Surface Rate of Spread of fire. The graph highlights that the GR7 fuel model exhibits a significantly faster surface rate of spread compared to other vegetation categories listed in Table II.

As illustrated in Figures 4 and 5, our fire behavior simulations in Behaveplus [38] under extreme wind conditions highlight the catastrophic potential of cheatgrass (GR7; Table II) when present at the ignition point. During peak winds of 120 km/h, such as those experienced during Santa Ana Winds or hurricanes, surface fires can spread at speeds of up to 900 meters per minute (54 km/h), with flame lengths reaching as high as 25 meters, as shown in Figures 4 and 5. Even at moderate wind speeds of 40 km/h, the rate of spread remains substantial at 12 km/h, with flame heights of approximately 12 meters.

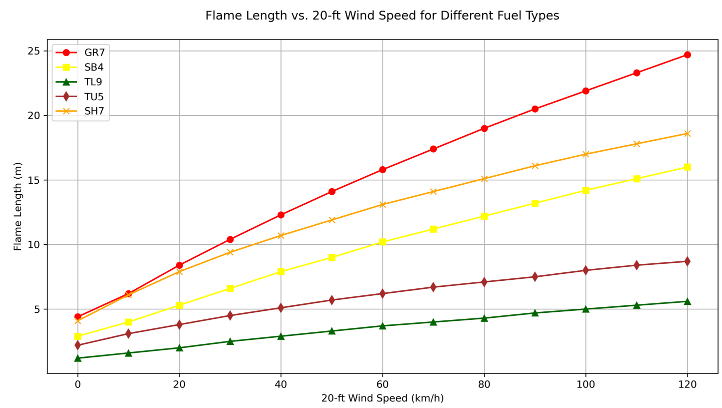

Fig. 5: Wind Speed vs Flame Length. The graph highlights that the GR7 fuel model exhibits higher flame length compared to other vegetation categories listed in Table II.

Our simulations reveal that the presence of cheatgrass at the ignition point dramatically amplifies fire behavior. Its fine, dry fuel properties allow it to ignite almost instantaneously, creating a highly flammable source that accelerates the initial spread of fire. Once ignited, cheatgrass efficiently transfers flames to surrounding vegetation, initiating a rapid and self-sustaining fire propagation cycle. This effect is particularly pronounced under high wind conditions and steep slopes, where the fire fueled by cheatgrass at the ignition point can quickly develop into a highly destructive blaze. These findings highlight the critical role of cheatgrass at ignition sites and the urgent need for focused mitigation strategies to address this risk.

C. Example cases: role of cheatgrass in the Camp Fire and Park Fire

An analysis of the Camp Fire ignition point revealed a substantial presence of flammable cheatgrass around the likely area of ignition, as highlighted by a cyan rectangle in Figure 6. Given the right combination of wind and dry conditions, even a small spark in this fine fuel could trigger a catastrophic wildfire. The 2018 LULC map [28], incorporating data up to June 2018 and potentially available by July 2018, could have provided a critical three-month window for vegetation management. Early identification and removal of

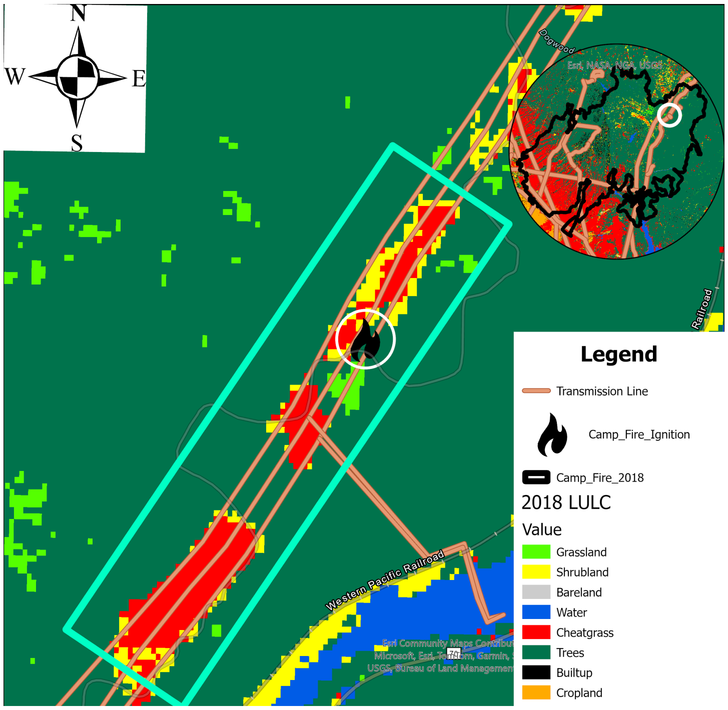

Fig. 6: Cheatgrass Land Use and Land Cover (LULC) map at the 2018 Camp Fire ignition point, highlighting the distribution of cheatgrass vegetation and proximity to power lines at the ignition site.

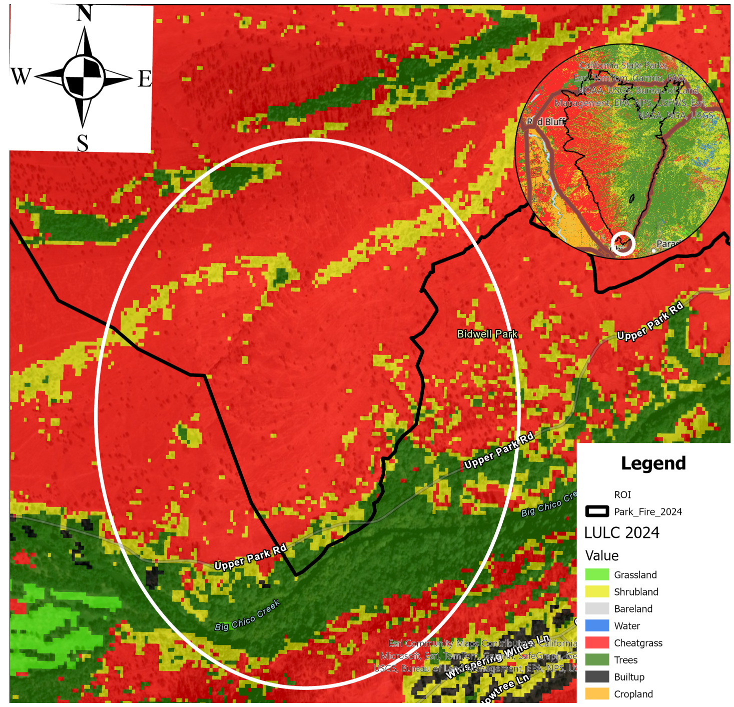

Fig. 7: Cheatgrass LULC map for the Park Fire 2024, depicting the region of ignition (ROI). The precise ignition location was not released by CAL FIRE.

flammable vegetation during that period might have prevented the Camp Fire that occurred on November 8, 2018.

Similarly, the largest fire of 2024, the Park Fire, was caused by a burning car pushed into a gully near Alligator Hole in Upper Bidwell Park [45]. Since CAL FIRE [48] has not officially released the exact ignition coordinates of the Park Fire, we marked the general area in Upper Bidwell Park, where the fire is believed to have started, as the Region of Ignition (ROI) in Figure 7. We see in this figure that the northern area of Upper Park Road is densely covered with cheatgrass.

Our 2024 LULC map [28], based on data available up to June 2024, shows this region's vegetation prior to the Park Fire, which occurred on July 24, 2024. Due to the availability of Sentinel-2 data, one can produce historical LULC maps spanning 4–5 years, providing valuable information on the spread of cheatgrass for vegetation management. In the case of the Park Fire, while the extent of cheatgrass in the ignition region may have been more widespread than during the 2018 Camp Fire, targeted fuel breaks or proactive vegetation management, especially addressing the dense invasive and highly flammable grass, could have significantly reduced the likelihood of the Park Fire occurring.

D. Cheatgrass near highways and power lines

Building on the mapping tool presented in our previous study [28], we mapped cheatgrass within a 500-meter buffer surrounding power lines and highways across California (as shown in Figures 8 and 9). Figures 8 and 9 illustrate that historical power line and vehicle fires have predominantly occurred in areas with high concentrations of cheatgrass along highways and near powerlines.

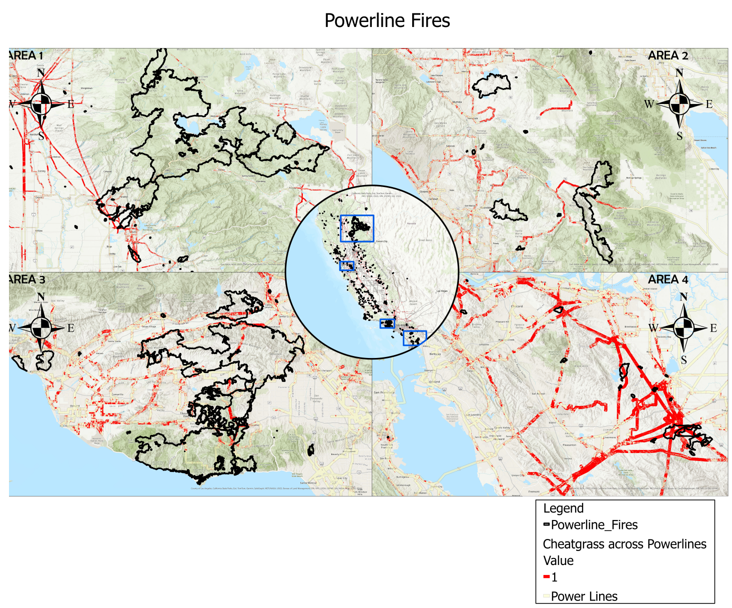

Fig. 8: 2024 cheatgrass near powerlines (500m) and historical powerline-ignited fires across California [49]. This figure illustrates that most powerline fires originate near hotspots of cheatgrass in close proximity to powerlines.

This mapping can serve as a resource for vegetation management, facilitating targeted interventions to mitigate fire risks.

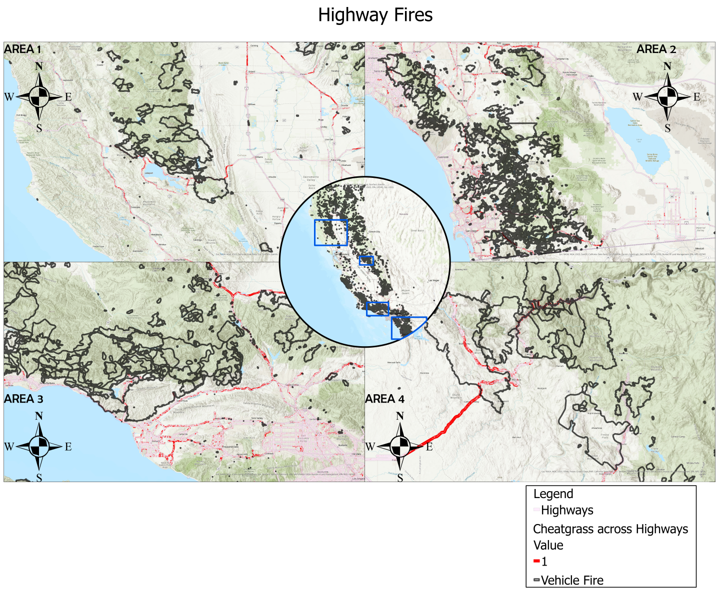

Fig. 9: 2024 cheatgrass near highways (500m) and historical vehicle ignited fires across California [49]. This figure illustrates that most vehicle fires originate near hotspots of cheatgrass in close proximity to highways.

Fig. 10: The treatment area clearly acted as a fuel break between the fire and surrounding vegetation. Fire Year 2023 [52].

E. Roadside proactive management

Figures 6 and 7 illustrate the effectiveness of mapping highly flammable cheatgrass at a 10-meter resolution. This detailed mapping can benefit vegetation management strategies, such as implementing targeted grazing or conducting prescribed burns.

As highlighted by Mosley and Roselle [50], targeted livestock grazing—particularly with sheep and goats—during late April and early May is an effective approach to reduce cheatgrass. These animals are especially suitable for this purpose as their grazing can be precisely managed using herding techniques or portable electric fencing. Unlike cattle or horses, sheep and goats can more easily consume annual grasses when the plants are smaller, making them particularly effective.

High-resolution mapping can also be leveraged to pinpoint high-risk areas along highways and powerlines to support long-term efforts to establish native, fire-resistant plant species. These plants, well-suited to local ecosystems, can help curb the persistent spread of invasive cheatgrass. For instance, Cox and Anderson (2004) [51] demonstrated the success of introducing native crested wheatgrass (Agropyron cristatum [L.] Gaertner) in cheatgrass-dominated regions using a method known as "assisted succession."

Figure 10 shows an example of how fuel mitigation plans are being implemented by CAL FIRE along highways, underscoring the importance of integrating proactive vegetation management strategies in these high-risk zones. A notable success story demonstrating the efficacy of these measures is the containment of the Creek Fire, which started on July 25, 2023, on the northbound side of Interstate 5 near the Hooker Creek Road exit in Tehama County. The fire spread quickly along the steep verge of the interstate, but its forward progress was halted by the Interstate 5 North Red Bluff Fuel Treatment. Due to aggressive suppression efforts and a history of ongoing fuel treatments dating back to 2011, the fire was fully contained at 1.3 acres on the same day it began. The strategically placed fuel break not only slowed the fire's spread but also prevented it from reaching nearby residential and commercial properties valued at $4,000,000. Without this critical mitigation strategy, the fire had the potential to grow to 10-20 acres, causing significant economic and property damage [52]. This incident underscores the critical role of proactive fuel management in minimizing wildfire risks and protecting communities.

IV. Conclusion

We investigated the distribution of cheatgrass along poewr lines and highways accross the state of California and evaluated its significance in these high-risk areas. Our key findings are as follows:

1) While cheatgrass only covers less than 15% of California, its presence in burnt areas for wildfires caused by powerlines and roadsides is close to 60%.
2) For lightning-ignited wildfires cheatgrass presence is negligible within the burnt area, highlighting the relevance of cheatgrass specifically in WUI.
3) Cheatgrass was present at the ignition sites of two major California wildfires, the 2018 Camp Fire and the 2024 Park fire.
4) In the presence of cheatgrass, wildfires spread substantially more quickly than with other vegetation, further increasing the severity of wildfires.

Proactive measures, such as targeted vegetation clearance, prescribed burns, or introducing native fire-resistant plants, could help reduce the risk in these high-risk areas.

While our work is a step forward, it also demonstrates the need for continued efforts in wildfire prevention. Using historical data and maps can inform practical, on-the-ground decisions for managing vegetation and preventing fires. Though challenges remain, small, targeted actions based on this type of analysis could help minimize the damage caused by wildfires in the future.

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