



# Fire History and Risk at Pu'u Wa'awa'a

*Approximately 98% of fires in Hawai'i are human-caused, and 75% are accidental, therefore preventable*

## Fire in Hawai'i

Wildfires in Hawai'i are a serious threat to both natural and cultural resources and to communities in fire-prone areas. Fires occur year-round and are supported by the presence of fire-prone non-native grasses and other fire adapted plants. Wildfire ignitions are most frequent in developed areas but the largest burns occur in areas with dry grasslands and shrublands and are a major cause of habitat degradation and native species decline<sup>1</sup>. Before human arrival, wildfire ignition in Hawai'i was thought to be limited to volcanic activity and infrequent dry lightning strikes and as a result, many native Hawaiian plants have limited adaptations to fire<sup>1</sup>. Humans have greatly influenced the occurrence of fire across the Islands both by introducing fire-prone vegetation and by increasing ignitions. In fact, over the past decade (2002–2012), an average of 1,100 wildfires burned approximately 17,000 acres across the state<sup>2</sup>.

## Fire History and Future Fire Risk at Pu'u Wa'awa'a

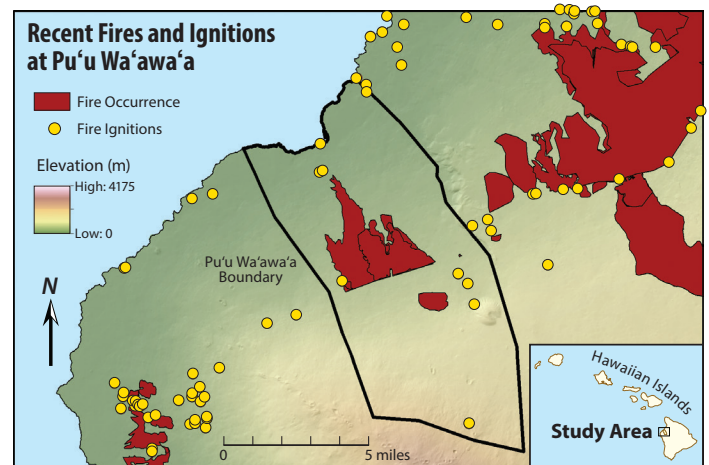
Pu'u Wa'awa'a once contained extensive stands of culturally important native-dominated tropical dry forest and was considered by early botanists to be one of the most botanically rich regions in all of Hawai'i. Severe wildfires and more than 100-years of livestock grazing, however, have removed much of the native vegetation in the area<sup>3</sup> and the profusion of non-native fountain grass and Kikuyu grass has caused a major increase in the area's ignitable fuel load, making wildland fires a primary threat to the native dryland forest at Pu'u Wa'awa'a. Between 2004 and 2011, eight fire ignitions were documented and between 1999 and 2018, a total of five large fires (>50 acres) have occurred within the boundaries of Pu'u Wa'awa'a burning approximately 6,000 acres (Figure 1). One of the largest fires, the 2016 Lightning Fire occurred just below Highway 190 and burned approximately 1,600 acres. Prior to 2000, several other large fires have been documented at Pu'u Wa'awa'a. In 1995, a wildfire burned 1,300 acres, cost the Division of

Forestry and Wildlife (DOFAW) \$369,000 to suppress, and caused an estimated \$1,755,000 in damages to natural resources. In 1999, the largest documented fire at Pu'u Wa'awa'a burned approximately 3,800 acres and cost DOFAW \$109,000 to suppress and caused an estimated \$20,500,000 of damages to natural resources<sup>4</sup>.

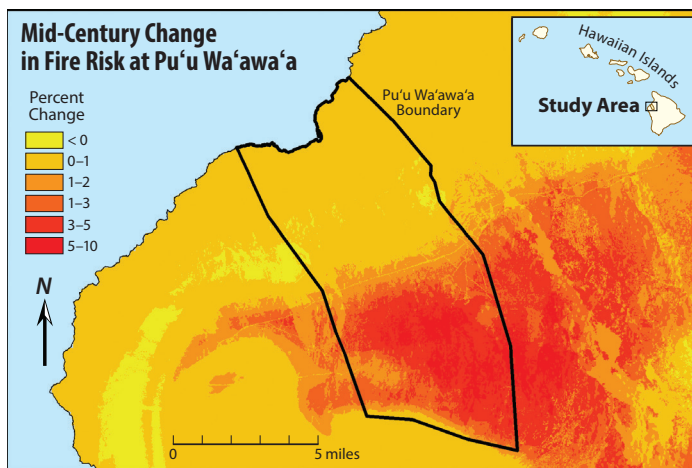
The present day risk of fire is greatest at lower elevations (<200 ft.), where non-native grasses dominate the landscape. In the future however, changes in climate may increase landscape flammability (the probability of fire occurrence) across the landscape<sup>5</sup>. Projected decreases in rainfall and increases in temperature may result in an upslope shift in peak fire flammability, with the probability of fire increasing at higher elevation sites by mid-century (Figure 2)<sup>6</sup>. Overall, Pu'u Wa'awa'a is projected to experience a ~2% average increase in wildfire risk across the landscape, however, fire risk at higher elevation sites (>200 ft.) and east of Highway 190 is projected to increase by as much as 10% by 2050.

## Management Actions

Fire management planning is integrated directly into many principal programs of the Pu'u Wa'awa'a management



**Figure 1:** Fires that burned greater than 50 acres between 1999 and 2019 (in red), and fire ignitions between 2004 and 2011 (yellow dots).



**Figure 2:** Percent change in fire risk by mid-century (2050) relative to the present day (2020).

plan, particularly livestock grazing as a tool to reduce fire fuel loads. Sixty-three miles of primary fuel breaks and fire access routes are also maintained on both sides of Highway 190, and these are critical as roadside ignitions are responsible for 90% of all wildfires at Pu'u Wa'awa'a. The fuel breaks facilitate firefighting and back burning along the roadside, with the intent of preventing fires from spreading into adjacent dryland forests. Ongoing reforestation efforts are also expected to lower fire risk in restored areas, especially at lower elevations where flammability is currently the highest<sup>5</sup>.

During extreme fire danger periods, fire equipment is pre-positioned at Pu'u Wa'awa'a and a DOFAW forester is on call for fire emergencies. Areas of high fire risk may be closed to the public to reduce the risk of fire starts. The Hawai'i Fire Department is the initial wildfire first responder in the region and provides the initial attack, communicating info, plans, and strategies with DOFAW. The DOFAW Kamuela base yard, with fire fighting equipment and personnel, is approximately 22 miles (a 30 minute drive) from Pu'u Wa'awa'a and is able to respond after mobilization. Fires often occur across jurisdictional boundaries, and firefighting teams from many different agencies (HFD, DOFAW, NPS, and PTA) often work collaboratively to fight wildfire on Hawai'i Island.

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In addition to on the ground management actions, the Hawai'i Wildfire Management Organization ([hawaiiwildfire.org](http://hawaiiwildfire.org)), tackles community wildfire prevention, mitigation, and landscape-level planning, for Hawai'i Island and the rest of the state.

## Why is This Important?

### The Role of Fire Prevention

If highly flammable non-native vegetation is not controlled, ignitions will continue to lead to large, destructive fires. Without prevention and pre-suppression measures such as reducing fuel loads, creating fuel breaks, and maintaining an appropriate equipment inventory, fires can rapidly spread through Pu'u Wa'awa'a and consume thousands of acres (Figure 3). The public can also play a role in fire prevention especially given that 98% of the fires in Hawai'i are human-caused. The public must not only be made aware of the threat and impacts of fire, but also be given the tools to prevent fires from occurring in their communities.



**Figure 3:** Nāpu'u Conservation Project staff member examines a stone structure in a recently burned area after the 2016 Lightning Fire at Pu'u Wa'awa'a.

<sup>1</sup> LaRosa et. al. 2008 <https://www.fs.usda.gov/treearch/pubs/32678>

<sup>2</sup> Trauernicht 2014 Wildfire in Hawaii Pacific Fire Exchange Factsheet

<sup>3</sup> Blackmore and Vistousek 2000 <https://doi.org/10.1111/j.1744-7429.2000.tb00509.x>

<sup>4</sup> PWW Management Plan (2003) <https://dlnr.hawaii.gov/forestry/files/2014/06/PuuWaaWaaplanv6.pdf>

<sup>5</sup> Wada et al., 2017 <https://doi.org/10.2984/71.4.2>

<sup>6</sup> Trauernicht et al., 2019 <https://doi.org/10.1016/j.scitotenv.2018.08.347>

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