Pacific Fire Exchange

communicating fire knowledge across the Pacific

Quick Reference Guide

Fuel Breaks for Pacific Island Grasslands & Savannas

JOINT FIRE SCIENCE PROGRAM

Fuels management in the Pacific includes any method of altering vegetation to reduce hazardous wildfire conditions within tropical grasslands and savannas, the most common vegetation type to burn on oceanic islands. ***Fuels management should always be part of a broader fire preparedness plan. Be sure to consult with fire professionals (i.e., your fire department) to identify water and access issues, hazards and evacuation procedures.***

How do fuels influence fire?

Fuels management focuses on reducing:

- **ignition potential** - the probability that vegetation will combust and carry fire.
- **rate of spread** – the speed at which fire moves through fuels over the landscape.
- **fire intensity** – the energy released by the fire, commonly measured as fire temperature or flame length.

KEY TERMS

Fuels reduction - reducing hazardous live and dead plants with prescribed burning, mowing, herbiciding, grazing, etc.

Fuel break - a strip with reduced vegetation thereby slowing (but not stopping) the spread of fire.

Fire break - a line (such as a road) where fuels are completely removed to mineral soil.

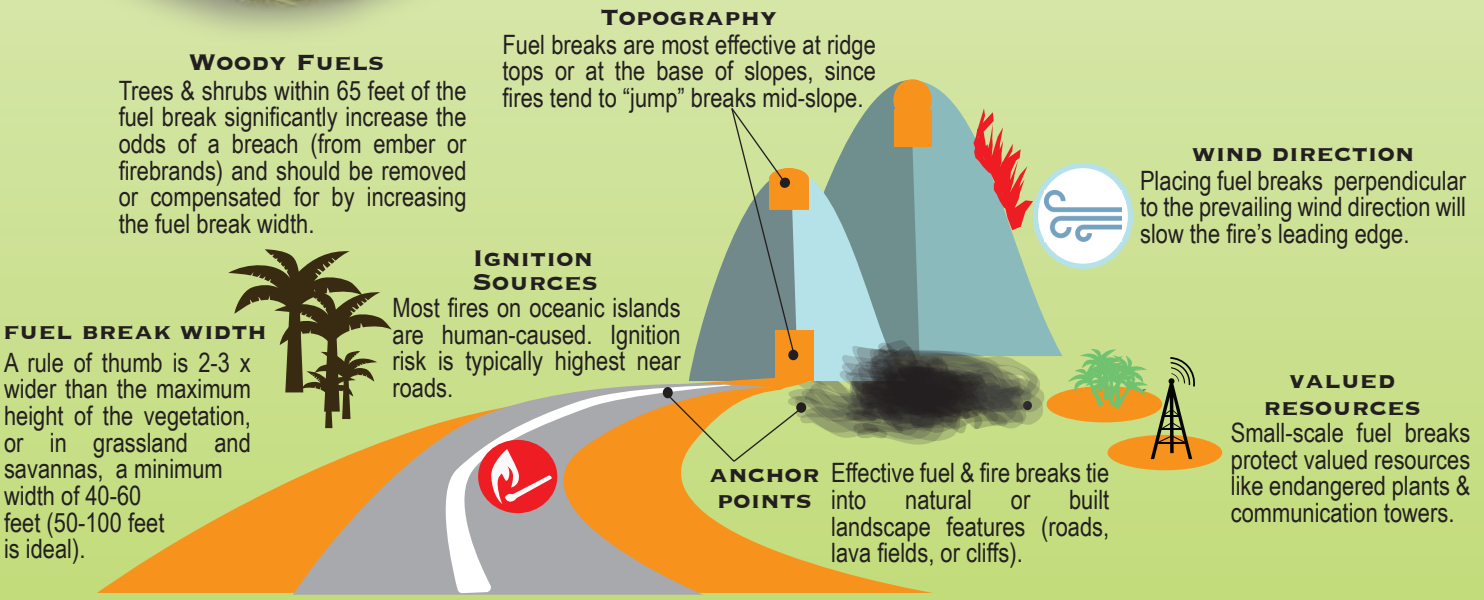
Vegetated fuel breaks - known as "green strips" containing low-statured, fire-resistant plants like succulents.

Shaded fuel breaks - dense canopy trees planted strategically to limit grassland fuels.

Fuel treatment & break design

Fuel breaks serve as a line of defense between ignition sources and valued resources by reducing the chances of wildfire ignitions and creating safer, more defensible spaces.

When fuel breaks are implemented as networks over large areas, they can effectively fragment fuels into compartments that slow fire progression and provide multiple opportunities for firefighters to contain fires. However, intense drought and very high wind conditions may limit their effectiveness in extreme conditions.



Fuel break establishment and maintenance

Lack of regular maintenance is the biggest cause of fuel break failure. **Proper maintenance includes:**

- **mechanical and chemical treatments** - mowing, plowing, disking or in remote areas weedwhacking followed by herbicides (glyphosate, imazapyr, and/or pre-emergent).
- **removal of woody debris** – remove dead vegetation post-treatment within the fuel break and along the boundary or at a minimum remove lower branches and foliage of remaining trees.
- **2-4 treatments per year** – or more in wetter areas or during wetter years.

Alternatives - green breaks, shaded breaks & restoration

A long-term strategy includes replacing grasses with green breaks or greenstrips (called fuels conversion) that reduces fire risk by disrupting fuel continuity, physically blocking wind, absorbing radiant heat, and halting the fire.

Shaded Fuel Breaks

Although more design research is needed, planting trees can increase the moisture of understory vegetation. The savanna fire in Palau above self-extinguished at the forest edge. Foresters in Yap report planting a mix of native and non-native species 8 feet wide with trees spaced 8 feet apart.

Restoration

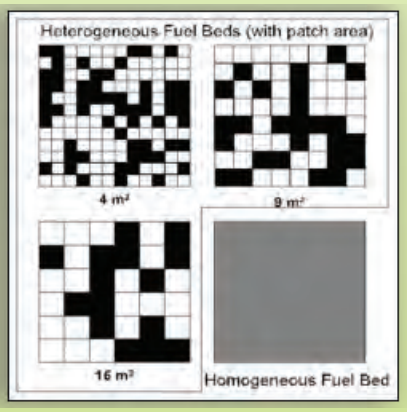
Restoring Hawaiian species like the ʻāweoweo shrub (shown above) may exclude flammable grasses like fountain grass. New Zealand fire managers have identified low flammabile *Coprosma* and *Pittosporum* species. Non-native, thick-leaved, succulent plants such as aloe, sempervivum, and yuccas are ideal, but only if they are not an invasive threat to native ecosystems.

Landscape scale treatments - prescribed fire & grazing

Grazing and Prescribed Burning

At the landscape level, both grazing and prescribed burning are more cost-effective than mechanical or chemical vegetation removal. Ranchers in Hawai'i graze and browse by cows, sheep, or goats to reduce fuel loads and in high risk areas, such as roadsides. While effective, use of animals may risk overgrazing, erosion and the establishment of unpalatable plants over the long term. Prescribed burning requires specialized training, fire suppression capacity, adequate water and fire breaks and must be implemented with care as native ecosystems in the Pacific are not fire adapted.

Patch Mosaics



Establishing a mix of different habitat or vegetation patches (including woody species which can regenerate after fire) can disrupt the continuity of grassy fuels across the landscape. This can be done via grazing or fuels conversion and reduced management costs. For example, prescribed burning under wetter conditions may result in smaller fires thereby avoiding large, destructive fires later on.

Selected References

1. Cheney, P. and Sullivan, A. 2008. Grassfires: fuel, weather and fire behaviour. CSIRO PUBLISHING.
2. Cui, X. et al. 2019. Green firebreaks as a management tool for wildfires: Lessons from China. J. of Env. Mgmt. 233: 329-336.
3. Loehle, C., 2004. Applying landscape principles to fire hazard reduction. Forest Ecol. & Mgmt 198: 261-267.
4. Nader, G. et al. 2007. Planned herbivory in the management of wildfire fuels. Rangelands 29: 18-24.

Additional Planning Resources

1. Trauernicht, C. and E. Pickett. 2016. Pre-fire planning for Hawaii and Pacific Islands. PFX Extension Guide (CTAHR RM-20). www.PacificFireExchange.org

Go Beyond the Basics

for more information:

Fuel Breaks and Fuels Management Strategies for Pacific Island Grasslands and Savannas

at www.PacificFireExchange.org

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