



March 2026

Best Practices



MANAGING GULCHES

WILDFIRE MITIGATION LESSONS FROM THE FIELD

Steep gulches in Hawai'i are often difficult and dangerous to access, making wildfire response challenging at best. Managing vegetation, stabilizing soils, and restoring native plants in these drainages is critical to reducing wildfire risk and protecting nearby communities.

WHAT'S THE CHALLENGE?

- Gulches are steep, diverse, and filled with invasive plants that fuel wildfires.
- Fire spreads easily in gulches, while access for mitigation crews is limited.
- Heavy equipment can worsen erosion and damage cultural sites.
- Erosion and flooding risks must be considered when managing vegetation.
- **Few best practices exist for wildfire mitigation in gulches; most guides are for riparian restoration.**



Aim:

Document lessons, challenges, and strategies from Hawai'i's land managers to share practical approaches to gulch management including wildfire mitigation. Highlight common lessons and unique situations.



KEY TAKEAWAYS AND LESSONS LEARNED

- **No universal approach:** gulch management must adapt to slope, soils, vegetation, climate, funding, and available work force.
- **Safety first:** gulch work is high-risk (weather, flooding, fire, steep slope) and requires planning and caution with equipment.
- **Fuel management toolbox:** mechanical clearing, herbicide, mulching, grazing, reseeding, fuel breaks, and shading with trees.
- **Planting natives and non-invasives is key:** dense, layered planting (herbs, shrubs, trees) helps shade out invasive grass and create natural fire breaks. Choose climate adapted plants.
- **Erosion control is always necessary:** use road contouring, mulching, buffers, sediment barriers when removing vegetation.
- **Community power:** volunteers and schools provide labor and stewardship; increased resilience when rooted in local support.
- **Ongoing maintenance is non-negotiable:** without consistent labor/funding, fire risk returns or worsens.
- **Sustainability & long-term vision matter:** patience, collective work, adaptability to available resources are necessary long-term. Start small and ramp up! Manageable is sustainable!

Gulch Case Studies Across the Pae 'Āina



Subject matter experts (SMEs) were interviewed for each case study below showcasing current management practices in gulches across the pae 'āina. Check out the website! There you'll find further information about the resources, the full Interview Synthesis and a recording of the webinar.

Island of O'ahu

Wai'anae Mountains Watershed Partnership

A collaboration across public and private landowners in the Wai'anae Mountains and Wai'anae Kai Forest. Using green fire breaks – weed mats with densely planted native species – to shade invasive grasses, slow fire spread, restore habitat, and stabilize soil. Maintaining years long collaborations with schools to teach nursery cultivation, mālama 'āina, and workforce development for conservation in Hawai'i.

Goal: Slow wildfire movement through fuels reduction and native plant green-breaks.



Honolulu Board of Water Supply

Watershed restoration projects in west O'ahu focused on stabilizing riparian areas, reducing invasive fuels, and protecting soil. Felling fire-prone trees but using stumps to stabilize banks. Keeping streambeds clear and using low-cost erosion controls (coconut coir or straw wattles angled upslope) to slow water and debris flow. Collaborating with agencies, schools, and community groups.

Goal: Recharge groundwater by reducing soil erosion, invasives, and wildfire risk.



Island of Maui

Division of Forestry and Wildlife, Maui

State lands managed for watershed health in upcountry Maui aimed at fire risk reduction, erosion prevention, and native restoration in steep, high-risk drainages. Using phased treatments: thin invasives, stabilize slopes (hydromulching, ryegrass, kikuyu, fencing, coir wattles), replace with erosion-tolerant natives. Adapting methods by slope and access: small machinery at edges, hand crews inside ravines with safety spotters.

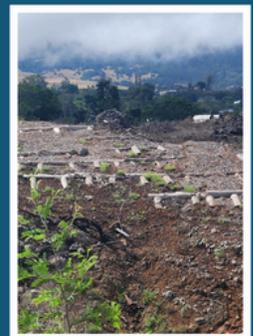
Goal: Holistic management from upland fire prevention to in-gulch soil stabilization.



Kula Community Watershed Alliance

Formed by fire survivors after the 2023 Kula gulch fires working in Kula's residential gulches. Using invasive trees as mulch to stabilize soils, slow runoff, and increase water retention, and as nurse logs for native plantings. Leveraging partnerships by combining community volunteer labor, technical support, and conservation expertise to manage steep, fuel-heavy gulches. Ensuring long-term maintenance.

Goal: Reduce invasive fuels, stabilize burned slopes, and restore native vegetation.



Gulch Case Studies Continued

Island of Hawai'i

Mauna Kea Watershed Alliance

A multi-year restoration effort on Mauna Kea's slopes, where intermittent snowmelt- and rain-fed streams run down gullies and gulches. Fuel reduction targeting gorse and non-native grasses. Treating gulches as anchor points – prioritizing access route maintenance and containment lines for fire response. Managing gulch margins for invasive plants to enhance wildlife corridors, and green fuel breaks.

Goal: Native forest restoration, reduce invasive fuels, support native bird corridors.



Kealakekua Mountain Reserve

Former ranch in South Kona restoring dry to wet forest zones through reforestation, erosion control, and targeted fuels management. Balancing erosion control (waterbars, barriers, and planting bare soils) with fuels management (selective herbicide & machine use, hand-pulling, and cattle grazing). Planting natives on gulch margins, not in channels, to harness increased moisture while preventing water damage.

Goal: Grassland cattle grazing, native forest restoration, wet gulch erosion prevention.



Island of Kaho'olawe

Kaho'olawe Island Reserve Commission

A ridge-to-reef restoration effort on Kaho'olawe powered by volunteers. Prioritizing stabilization of upper slopes, headwaters, and gulch rims. Extreme hazards prevent some in-gulch work. Erosion controls are necessary – using wattles, fascines, rock check dams, and pili grass bales to slow water, trap soil, and collect seed. Practicing flexibility and using any available resources is required in this isolated and limited access location.

Goal: Stabilize degraded gulches, reduce invasive fuels, and prevent toxic runoff.



Check out the Interview Synthesis, webpage, and recording of the webinar at the link below or scan the QR code:

pacificfireexchange.org/resource/gulch-management/



PFX FACT SHEET

PROJECT APPROACH:

- Conducted interviews with Hawai'i land managers working in gulches across agencies, organizations, and community partnerships (O'ahu, Maui, Kaho'olawe, and Hawai'i).
- Included both long-term restoration and recent post-fire efforts.
- Conducted site visits and follow-up conversations to understand real-world conditions and decision-making
- Identified common challenges, shared strategies, and place-specific approaches across diverse gulch environments
- Emphasized practitioner experience and lessons learned rather than prescriptive guidance
- Resources produced include Interview Synthesis, Fact Sheet, Webpage and Webinar



**SCAN HERE FOR
ADDITIONAL
RESOURCES**



PERMITTING:

Gulches are often considered riparian areas, where vegetation management, grading, erosion control, or channel modification can affect bank stability, stream function, and downstream sediment transport. Depending on the scope of work, projects may require review or permits at the federal, state, or county level. In Hawai'i, the Commission on Water Resource Management (CWRM) Stream Protection and Management (SPAM) Branch oversees activities affecting streams and drainages. Routine maintenance and repair of existing features may not require authorization, but more substantial actions (e.g., bank alteration, installation of structures, vegetation removal affecting channel stability) may require permits. Early coordination with regulators can help ensure projects reduce wildfire risk while protecting watershed health. Refer to DLNR CWRM Surface Water Permits for more information.

