

# Dry forest restoration at Auwahi, Hawaii, with insights into changes in hydrology and invasive rodents

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Leeward dry forests of Hawaii have been much depleted, on Maui island, less than 2.5% of their original extents remain. Surviving dry forest stands in the archipelago have been highly modified by wildfire and non-native ungulates, rodents, plants, and invertebrates. Despite their precarious, fragmented state, individual dry forest stands remain as important biological and cultural refugia.

In 1997, triage level restoration was initiated on a 4 ha tract of degraded, diverse dry forest at Auwahi, Maui island, involving ungulate exclusion, herbicidal control of *Cenchrus* grass mats, and mass planting of native shrub saplings. Native shrub cover increased dramatically and by 2012 (3.1% to 81.9%) had near completely replaced the original dominant non-native grass cover (75.4% to 3.3%). By 2012, 14 of 22 native tree species, the primary conservation loci of the project, had established seedlings, some species after lacking successful reproduction by seed apparently for over a century.

In 2011-2014, hydrology of restored forest and adjacent non-native grasslands was compared by assessing soil hydraulic properties and soil moisture dynamics. Some significant differences were found between the two sites, suggesting that field to forest restoration may lead to ecohydrological changes, even over relatively short time scales.

One potential consequence of restoring forest from non-native grasslands on oceanic islands is shifts in community structure and increased abundance of non-native invasive rodents. In 2014, we compared rodent communities in restored dry forest and adjacent non-native grasslands. Black rats (*Rattus rattus*) outnumbered mice 20:1 in the restored forest. In contrast, mice (*Mus musculus*) dominated adjacent non-native grasslands outnumbering rats 220:1. Morphological, genetic, and isotope analyses of stomach and bone samples from trapped rodents at Auwahi, some still in progress, identify *R. rattus* as a key seed predator of many native plant species.